ARCHAEOLOGICAL MITIGATION
FOR THE
CANADIAN MUSEUM FOR HUMAN RIGHTS
AT THE FORKS, WINNIPEG, MANITOBA

Submitted to

PCL CONSTRUCTORS CANADA INC.

On Behalf of

FRIENDS OF THE
CANADIAN MUSEUM FOR HUMAN RIGHTS

FINAL REPORT

**QUATERNARY
CONSULTANTS LTD.**

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EXECUTIVE SUMMARY

The archaeological mitigation at the site of the Canadian Museum for Human Rights had its genesis in the decision to build a large basement under the structure. As the excavation for the basement would eradicate buried cultural resources, the Federal and Provincial regulatory agencies, mandated with heritage resource management, required that the impact be mitigated through controlled archaeological excavation.

The field project, extending from June 6 to November 5, 2008, was the largest block excavation undertaken in Manitoba. A contiguous area of 150 square metres was excavated uncovering eight sequential cultural layers, representing campsite occupations nearly one thousand years ago. Over the course of the project, twenty-six archaeologists were employed to scientifically excavate, record, and document the artifact recoveries. In the field laboratory, staff cleaned, identified, computer catalogued, and packaged, to museum standards, all 379,941 recovered artifacts.

After the field component was completed, six analysts, selected by tender for six different classes of artifacts, commenced detailed analysis of the recovered artifacts. This first required confirming or augmenting field identification of the artifacts with continual updating of the catalogue record. Each analyst compiled the data provided by the artifacts in their category, e.g., ceramic sherds, for each cultural level to assist in the development of a picture of the activities and survival strategies of the occupants on those occasions in the past when there was a group of people living at the site.

The recovered information provided data on several important lacunae in Manitoba's history. The ceramics, as analyzed in the included monograph-like chapter by Ernie Reichert (Chapter 13), illustrate previously unknown aspects of the evolution of a distinctive type of ceramic ware in the Red River region. The lithic artifacts showed aspects of cultural linkage with a generalized Western Plains material culture as well as specific data on travel and trade. The botanical recoveries provided insight into the environment while the faunal artifacts yielded information on subsistence strategies.

Residue analysis, undertaken by Paleo Research Institute, of ceramic sherds provided knowledge of the wide range of plants used in the diet as well as evidence of cultivated plants—corn and beans. Fragments of tools, a hoe and a squash knife made from a bison scapula, recovered during the excavation, suggest that horticulture occurred at or near the Canadian Museum for Human Rights site. This is temporally comparable with the data recovered from a site at Lockport, Manitoba.

In summary, this descriptive report is but a preliminary of what can be accomplished with the recovered data. In each class of artifact, specialized analyses can tease out new truths about the people of the past as evidenced at this location at these time periods. Then, a synthesis, using this data and that from other archaeological sites, can be undertaken to attempt to more completely write the history of Manitoba's early occupants.

ACKNOWLEDGMENTS

In a project the size of this mitigative recovery operation, the number of people who contribute to its completion is extensive. As Senior Author, I would like to acknowledge the unstinting assistance of Pam Goundry who acted as Laboratory Director during the field component, as the Database Manager during the analysis period, as a specialized analyst for one class of artifacts, and as co-author of this report. In addition, she served as the in-house editor, reducing often turgid text into readable and comprehensible language.

The staff of the project require special thanks. They often worked under adverse circumstances, ranging from floods to frost. Michael Evans, as Field Supervisor, kept the excavations going in an orderly fashion in spite of the vagaries of the weather, variations in staffing, and in the face of changing project requirements. Sonya Hauri-Theissen, as Laboratory Supervisor, maintained professional-level laboratory procedures for preparing, identifying, and cataloguing the recovered artifacts while continually training staff who were cycled through the laboratory to obtain a comprehensive knowledge of archaeological procedures.

The following staff all delivered their best efforts: Holly Alston, Amy Brown, Celia Buchok, Nathalie Cahill, Ian Cunningham, Laura Curtis, Kate Decter, Sara Halwas, Michelle Ip, Derek Kun, Keith Letandre, Daesha Mackie, Andrew McCausland, Sylvia Morrisseau, Mark Paxton-MacRae, Tasha Pegado, Ernie Reichert, Cameron Robertson, Maynan Robinson, Jason Romanyshyn, Eric Simonds, Nicole Skalesky, Rachel ten Bruggencate, and Tracy Turner. Some were with the project from the wet, soggy onset to the frosty finish, while others left earlier for various reasons. To all, thank you. Special thanks are proffered to the 'old hands'—Ernie Reichert, Mark Paxton-MacRae,—who, in addition to undertaking exemplary work, took the time and effort to mentor those who had less experience, the trainees, the interns, and those who had just graduated from the University of Winnipeg Archaeological Field School. Other staff members who had previous experience on different sites brought their knowledge and shared it with the newer members. Also, to everyone who slogged through the mud to restore the site and the sump drainage system after each of the interminable rain storms and floods, my thanks.

In addition, special thanks to the volunteers who suffered the same joys and unpleasantries as the staff. Biron Ebell, Cynthia Worsley, Sara Halwas, and Holly Alston donated their time to assist in the project.

A grateful acknowledgment goes to Biron Ebell who committed four half days per week for the majority of the period of the excavation. With his vast experience, he provided mentoring for many of the younger staff.

Before the field work began, a presentation had been made to the Elders of Thunderbird House and they offered to bless the site. On May 21, 2008, a three pipe blessing ceremony was held at the location of the excavation. Migwitch.

Throughout the course of the project, Roger Armitt, former Elder-in-Residence at the University of Manitoba, was consulted for spiritual knowledge about traditional beliefs and the possible manifestation in the archaeological record. He visited the site often and his sharing and encouragement is appreciated.

Prior to the start of the field project, assistance was received from Kevin Skinner, of PCL Constructors Canada Inc., who arranged for the availability of the Millar Dome, to shelter the project from inclement weather. Todd Craigen, also from PCL, arranged to make available a site office trailer when the burgeoning construction activity in Winnipeg made it nearly impossible to rent one. The entire staff was continually grateful to Chris Strachan of PCL who managed to keep us supplied with working pumps and hoses to alleviate the flood waters, as well as keeping the generator fueled and serviced to provide power for the laboratory and those ever-needed pumps.

A great big thank you goes to Val McKinley, Curator of Anthropology, University of Winnipeg. She customized a version of the artifact cataloguing database program used at the U of W for our use and made several visits to the site to train staff and tweak the program.

The assistance of the Interpreters from The Forks National Historic Site, under the direction of Barbara Ford (Manager of Visitor Experience), was greatly appreciated. They endured rain, sun, and cold to deliver the heritage message to members of the public. Using artifact replicas and stories, they were able to bring the past to life for visitors and, in doing so, made our work relevant in the present and freed the archaeologists to concentrate on the excavation process.

Thanks to the analysts who took myriads of artifacts and abstracted data which helps illuminate the past. They are Donalee Deck (Botanical and Charcoal), Michael Evans (Mammal, Avian, and Reptile Remains), Pam Goundry (Shellfish), Mark Paxton-MacRae (Lithic Artifacts), Ernie Reichert (Ceramic Artifacts), and Eric Simonds (Fish Remains). With a few hiccups along the way, the end result was a report which will stand as a monument to their labours.

A special note of appreciation goes to Ernie Reichert who went way beyond the required descriptive analysis and produced a thesis-like monograph that revises much of the conceptual framework of the typology of early Manitoba ceramics. This seminal work has been published in this report to the enhancement of all our works.

Some of the individual analysts wish to make acknowledgments of their own. Donalee Deck would like to thank Elizabeth Punter, University of Manitoba Herbarium, Department of Botany for the identification of the elm leaf impression in clay.

Michael Evans wishes to thank Holly Alston for all the assistance she provided during the analysis of the faunal material.

Pam Goundry gratefully acknowledges the assistance of Dr. Lane Graham, Associate Head, Department of Biological Sciences, University of Manitoba, in confirmation and identification of various clam shells, which aided in the compilation of a reference collection.

Mark Paxton-MacRae wishes to thank Val McKinley and Jody Schmidt of the Anthropology Laboratory at the University of Winnipeg for their generosity in allowing him to use their comparative collection as well as providing space to spread many boxes of lithic artifacts and their ongoing interest in the project. He would also like to thank Cooki Lumsden for lending a hand with the photographing of the artifacts as well as Ernie Reichert for doing more of the same. Shannon Crooks volunteered to act as assistant and spent many hours at the Anthropology Labs counting, sorting, and weighing flakes and he would like to thank her especially for her time, patience, and commitment. He would also like to take this opportunity to thank Sid Kroker and Pam Goundry for the opportunity to complete the lithic analysis as well as their kindness and forbearance throughout this process.

Ernie Reichert would like to thank his wife, Andrea, for her great patience and understanding during the extended efforts of this project. Especially for carrying his end of the beautiful load that is their daughter, Holly Rose, when he was indisposed with this report. He would also like to thank Brian Lenius and Dave Olinyk for making the time and enduring his queries (special consideration goes to Brian Lenius for the loss of his father on the evening of a scheduled ceramic meeting). Finally, two people in particular require special mention, very honourable people indeed, Sid Kroker and Pam Goundry.

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1.0 INTRODUCTION

The archaeological component of the Canadian Museum for Human Rights (CMHR) began in the fall of 2003 when Quaternary Consultants Ltd. was contracted by Friends of the Canadian Museum for Human Rights Inc. to undertake a preliminary impact assessment within the proposed location for the museum. The comprehensive report (Quaternary 2004a) examined data obtained from twenty-four assessment trenches located east of Waterfront Drive and between Water Avenue and the Forks Axial Pathway. Cultural and stratigraphic data from previous impact assessments and infrastructure construction projects were integrated into that report. These data derived from:

- *Provencher Bridge Project Archaeological Impact Assessment* (Quaternary 1989);
- *Archaeological Monitoring of The Forks Access Project: South of Water Avenue (DlLg-33:97A)* (Quaternary 1999);
- *Archaeological Impact Assessment of the Legacy Estates Project at The Forks* (Quaternary 2000a);
- *Archaeological Monitoring of the Construction Components of Festival Park at The Forks* (Quaternary 2000b); and
- *Archaeological Monitoring of The Forks Axial Pathway from Esplanade Riel (Pedestrian Bridge) to VIA Rail Station* (Quaternary 2003a).

Numerous other projects had recorded archaeological data in the nearby vicinity. A comprehensive list is provided in *Archaeological Impact Assessment for the Proposed Canadian Museum for Human Rights at The Forks* (Quaternary 2004a:1-2).

The preliminary stratigraphic data was compiled into a brief report (Quaternary 2003b) which was circulated to the architects who were submitting designs for the proposed structure. The stratigraphy report indicated that it would be advisable to consider building at grade. Any excavations below the railroad fill layer, which generally extends to a depth of 1.5 metres, would encounter archaeological layers and require mitigation.

The archaeological component was discussed in a report, issued by Mel Falk and Associates (2006) to Friends of the Canadian Museum for Human Rights Inc., examining compliance requirements. Subsequently, the definitive requirements regarding archaeological resource management were encompassed in a report by the Canadian Environmental Assessment Agency and submitted to Western Diversification Fund which detailed compliance concerns under the Canadian Environmental Assessment Act (2007). This report outlines the archaeological requirements associated with the construction of the Canadian Museum for Human Rights. It reiterates one of Falk's recommendations which called for a block excavation to address and mitigate cumulative impacts upon the archaeological resources at The Forks. In addition, it reiterated the necessity of following the required steps for obtaining a Heritage Permit under the Manitoba Heritage Resources Act. This Act, and the pertaining regulations, is administered by Historic Resources Branch, Manitoba Culture, Heritage and Tourism.

1.1 Mitigation Requirements

The requirements for mitigation were subject to several design changes from the inception of the museum proposal through the entire field archaeological program. The original plans for the winning design for the museum did not envision any sub-surface components beyond piles and grade beams to support the basal slab. However, in late December, 2007, the architects and engineers determined that a basement to house mechanical and electrical services would be advantageous. The new configuration of the basement was L-shaped with the long axis measuring 21.5 metres east/west by 14.4 metres north/south and the northern extension measuring 11.0 metres by 10.0 metres. Subsequent refinement of spacial requirements brought the long axis down to 21.0 metres by 11.0 metres. This was the footprint (Figure 1.1-1) at the time discussions were initiated with Historic Resources Branch as to the terms of the Heritage Permit. A representative of Parks Canada was also present at the discussions to make known the Federal point-of-view under the Canadian Environmental Assessment Act. The wide-ranging discussions, over several meetings, covered excavation standards, laboratory standards, analysis requirements, staffing, budget, and timeframe. The decisions were compiled into an attachment to Heritage Permit A26-08 (Appendix A). The long axis of the basement footprint was to be hand excavated to professional standards, with all soil screened through 6 mm screens. Each excavated unit (one metre square) was to be mapped and photographed. A field laboratory to process the recovered artifacts was to be established on site. Staff would process the artifacts, identify them, and catalogue them using an electronic cataloguing system. The northern leg of the L-footprint was to be removed, by cultural level, with mechanical assistance and screening of all soil. The Heritage Permit was issued on May 30, 2008. A separate Heritage Permit had been applied for, and was issued at the same time, to cover archaeological monitoring of construction components.

In the first week of September, 2008, the Board of Directors for the Canadian Museum for Human Rights was appointed and decided to eliminate the basement entirely. This occurred on September 8, 2008. This decision left only the freight elevator footing (5 m x 7.5 m) as having sub-surface impact. The elevator is located at the eastern end of the former basement area and will have an impact to a depth of 2.2 metres below surface. This depth goes through Cultural Level 1 to just above the Cultural Level 2 Complex.

The Project Director (Sid Kroker) discussed the status of the site, once the basement had been cancelled, with representatives from Historic Resources Branch and Parks Canada. It was decided that it was necessary to mitigate the archaeological impact across the southern half of the basement area in addition to that of the freight elevator. Thus, it was decided to complete the excavation of:

a. the Level 3 Complex (two layers) to the 10 metre East line, at which point the layers took a considerable nosedive downward; and
b. the Level 2 Complex (five layers, some intermittent) across the entire 135.5 m^2 block.

The rationale was that it was ethically required to complete the contiguous block where the Level 3 Complex was highest in elevation as well as the Level 2 Complex over the entire southern area. The thickness of sterile riverine sediments between Level 2 and Level 3 in the eastern end of the site meant that there remained approximately 50 cm of soil between the base of impact of the elevator footing and Level 3—deemed adequate protection. All of the rest of the initial rectangular block, except for 10 isolated excavation units which had been initially excavated during the early days of the project, was left intact. These isolated 10 units were excavated through Level 2 and closed off.

The result of the decision by the Board of Directors on September 8 was that most of the excavation area became a research excavation as there was no impact to mitigate. The elevator footing area was mitigated 100%.

The late start of the project (originally planned for early May), the multiplicity of cultural levels, in conjunction with downtime due to flooding and never being able to fully fill the staff compliment, meant that the original target date of closure on September 15, 2008 was totally unrealistic. The presence of eight cultural levels as opposed to the forecast three meant that by the time the basement was cancelled, the staff had already excavated four times the original budget parameters and still had more to go. Discussions with representatives of PCL Constructors Canada Inc., Friends of the Canadian Museum for Human Rights Inc., and Historic Resources Branch led to additional funding being provided to complete the mitigation decision of Level 3 in the southwest, Level 2 Complex across the southeast half, and the elevator shaft. This additional funding permitted completion of field requirements and enabled augmentation of some scientific analyses such as radiocarbon dates and residue analysis.

1.2 Onset of the Project

The determinations of the permit requirements were detailed to PCL Constructors Canada Inc. (prime contractor for the project) and Friends of the Canadian Museum for Human Rights Inc. (the client).

The budgetary ramifications of the requirements of the Heritage Permit (issued by Historic Resources Branch) were compiled into a preliminary budget which was the subject of more than one meeting. Due to the lack of water hook-up at the excavation site for water hook-up for wet-screening recovered artifacts, the result was dry-screening of artifacts. The onset of the project also included the establishment of the Millar Dome to cover the excavation area and the intermittent use of a Bobcat or front-end loader to remove backdirt. To avoid the costs of tying into the Manitoba Hydro electrical grid, which has a ductline paralleling Pioneer Boulevard, a diesel generator was installed on the site, courtesy of PCL.

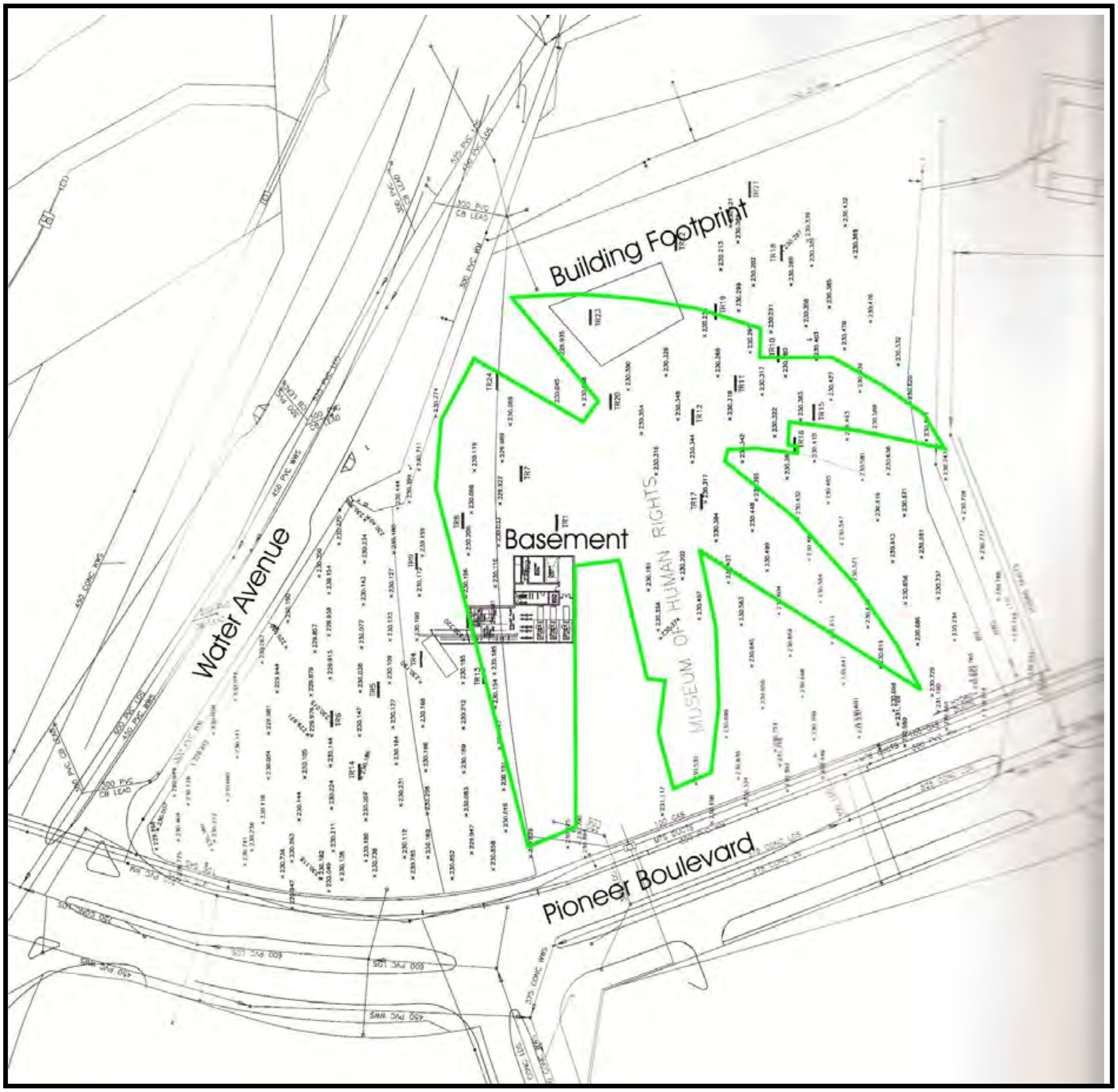


Figure 1.1-1: Building Footprint and Basement Superimposed on Site Map with Elevations

Permission was obtained, in early May, to initiate planning for the project to begin in early June. The contract with PCL was signed on May 23, 2008.

Even though the contract for the project had not been signed and regulatory approvals had not been granted, initial logistical planning had begun in late April, 2008. Enough of the forthcoming project had been agreed to by all stakeholders that some steps could be taken. These included meetings with First Nations Elders, arranging for selected staff, trying to rent a trailer for the field laboratory, and inventorying available field and laboratory equipment and supplies.

One of the first initiatives was to have a meeting with the Elders of Thunderbird House. The Project Director, along with representatives of the stakeholders, met with the Elders and outlined the project as it was then known. The excavation process and the ensuing analysis and report preparation was discussed. The Project Director requested that a Blessing Ceremony be held prior to the beginning of construction. This occurred on May 21, 2008. Several Elders attended the ceremony. Three of the Elders brought pipes and conducted a very moving ceremony.

Early on, the first of several problems became blatantly apparent. It was obvious that obtaining a full complement of field staff would be a problem. Initially, the proposed archaeology project envisioned a Project Director, a Laboratory Director, 21 field archaeologists, and 6 interns. In the archaeological discipline, summer field positions are usually filled by the end of February. Most students, graduate and even undergraduate, begin their job search in January and usually have summer positions before the middle of March. By the time that it was possible to commit to offering positions (mid-May) for the mitigative excavations for the Canadian Museum for Human Rights, the majority of graduate and undergraduate archaeologists in the province, and throughout the country, had already obtained their summer positions. Some staff were able to be hired on a tentative basis, with the proviso that the project was not yet a confirmed reality.

Another problem was that, due to the active construction environment, it was difficult to rent a trailer for use as the field laboratory. At one time, Quaternary Consultants Ltd. was on the waiting list of four different firms that provide trailers, with no guarantees from any about the availability of anything before September. Ultimately, PCL was able to free up a field office trailer which was used for the laboratory.

1.3 Site Preparation

Given the large area and the need to minimize disruption from inclement weather, PCL offered to provide a 4800 square foot Millar Dome - a canvas tent with iron structural support. This covered an area larger than the projected block excavation of 11metres by 21 metres and also provided a sheltered area for soil screening (Plate 1.3-1).

Plate 1.3-1: Archaeological Crew Excavating Under Tent with Screening Area at Rear

There were two options for protecting the excavation area, either placing the tent at ground level and shoring the excavation area or excavating a large pit and installing the tent within that pit at a level below surface. Due to regulations under the Manitoba Workplace Safety and Health Act, individuals cannot work in an area with a depth greater than 1.5 metres without adequate shoring being installed. As the uppermost cultural layer was expected at a depth of 1.5 metres with subsequent layers below, the excavation area would have had to be shored if the tent was at ground level, most probably with steel I-beams driven vertically into the ground and using 2" x 6" planks between them. This would have been a major cost and the alternative of sinking the tent into the ground was chosen. This decision was taken to save monies at the beginning of the project and, as later events proved out when the basement was cancelled, turned out to be very astute. The original justification for the installation of shoring was that it would also serve during the construction of the basement. When the basement was eliminated, this justification disappeared.

On May 29, 2008, PCL, utilizing the services of Hugh Munro Inc., began removal of the central portion of the large soil berm that was present between the two properties: The Forks North Portage P4 parking lot to the south and the City of Winnipeg parking lot to the north. The property dividing line was aligned with an eastern extension of York Avenue if that road had continued east of Waterfront Drive.

By mid-afternoon, excavation of the tent footprint began, starting in the southeast corner. Sid Kroker, Project Director, was on site to monitor the excavation. The large back-hoe was equipped with a ditching bucket which enabled the operator to produce a flat, level floor. No evidence of cultural material was found in the eastern portion of the excavation to a depth of 185 cm. The archaeologist dug several test holes for a further 50 cm and found no archaeological layers. It was decided to level the floor at a depth of 185 cm below grade. Traces of cultural layers were encountered in the western end of the excavation, resulting in a gradual raising of the floor of the excavation. The southwest corner was the highest area at a depth of approximately 175 cm below grade. The entire area had been excavated by mid-morning of May 31, and the operator backsloped the edges of the pit, as well as cut a ramp into the east end for access for a Bobcat or small front-end loader to remove the processed soil from the screening area. The excavated soil was stockpiled on the existing ends of the soil berm.

PCL personnel installed a chain-link fence around the entire project area to eliminate unauthorized access to the excavation area. They also constructed a railed, viewing platform on the western end of the excavation for public access to allow members of the public to observe the on-going process.

On June 3, the crew from PCL began to erect the tent within the excavated rectangle, a process estimated to take three days. The weather became inclement on the second day with considerable rain and delayed the process.

On June 6, when it had been estimated that the tent construction would be finished, the archaeological staff arrived on site to begin the moving of materials from Quaternary Consultants' facilities to the field laboratory and initiate the preparation of the site for excavation. The tent was still incomplete and the day was marked with heavy rain which was preventing the PCL crew from finishing their labours. As well, run-off from the parking lot to the south was filling the excavation area with water. This was the first of several torrential downpours that plagued the project throughout the summer and was the harbinger of the inundations which would occur with frightening regularity.

The archaeological crew was sent home and told to return on June 8. By that morning, the PCL crew had performed miracles and the tent was erected. Sump pumps had been used to remove the run-off water from the excavation area. The site was still extremely muddy but the archaeological staff began moving equipment from the Quaternary Consultants Ltd. offices and laying out the excavation grid. The site datum was established at the southwest corner of the basement area which was to be mitigated. Despite several visits by PCL surveyors to establish mitigative parameters, first for the entire basement area and later for the mitigation parameters for the freight elevator footprint in the eastern portion of the basement area, the elevation of the site was not determined until a legal land survey was completed in 2009.

The weather continued to be uncooperative and the site flooded on June 9 and June 11 with continuing showers on June 13 and heavy rains on June 15. One of the concerns with the parking lot flooding, besides damage to the excavation unit walls and downtime while the site dried out, was contamination of the soils and artifacts with fossil fuel residue washing from the gravel surface of the lot. This would have considerable ramifications to the integrity of the radiocarbon dates of the organic artifacts that were submerged as the hydrocarbon molecules would adhere to the surfaces and be absorbed into the interstitial openings in the bone or charcoal.

By June 18, the area had dried enough to bring in a large backhoe to excavate sump pits at the exterior of each of the four corners of the tent. These were in addition to the previously excavated sump pit at the edge of the fenced compound which was intended to intercept the drainage from the parking lot to the south. One pump was placed in each pit plus two in the interception pit. It was hoped that this would be sufficient to keep the site dry.

To be brief, it wasn't. The excavation area was again submerged twice on June 27/June 28, due to heavy rains. The first occurrence was during a cloudburst on the afternoon of the 27th, when approximately one metre of water poured into the excavation area (Plate 1.3-2). The pumps managed to drain the site by 11:00 p.m. but the forecast was for continuing storms and at 2:30 a.m. the site was again deluged. Again, there was more than one metre of water in the excavation area which took most of the next day to pump out. Another half day was required for the area to dry sufficiently for crew to begin working, cleaning up flood debris, clearing silt from the excavation units, etc. In all cases where the forecast was for rain, a member of the staff stayed on site overnight to ensure that the generator was operating, the breaker switches had not been thrown, and that the pumps had not clogged with silt.

Plate 1.3-2: Excavation Area After First June 27 Flood

By July 11 enough floods had occurred with the concomitant loss of field operation time that a berm was acknowledged to be necessary. The berm was constructed to intercept the drainage from the parking lot to the south which had been the largest contributor to the continual flooding. With the berm in place, no serious flooding occurred during the rest of the summer as the sump pits and pumps were able to handle the water that derived from rain and tent run-off. However, several more severe storms that occurred in July and August meant that staff still had to stay at the site overnight to ensure that the pumps in the sump pits did not silt up or the electrical breakers did not throw. In addition, maintenance of the corner sump pits (Plate 1.3-3) and tent run-off drainage channels had to be continually undertaken.

Plate 1.3-3: Crew Cleaning Sump Pit after a Deluge

1.4 Project Staffing

The project administration was undertaken by Sid Kroker (Project Director) and Pam Goundry (Laboratory Director). This entailed all administrative aspects, including liaison with stakeholders, regulatory bodies, and the prime contractor. It also included payroll administration and site decisions concerning methodological parameters for both the excavation and the laboratory.

Early in the staffing process, the field supervisor (Michael Evans) and the laboratory supervisor (Sonya Hauri-Theissen) were hired on a tentative basis, as the project had not yet received final approval. During May, several individuals were also contracted on the same condition, with final confirmation when the project became a reality.

One of the components of the very first budget was designating a number of staff positions for First Nations individuals. As there are very few professional Aboriginal archaeologists, all of whom have full-time employment, it was recognized that these staff positions would be filled by people with limited exposure to the techniques and methods of archaeology. During May, employment notices were posted with First Nations organizations, as six positions had been targeted for trainees—individuals with an interest in Aboriginal history but no archaeological training. Twenty- one people were interviewed and six were selected. Two other individuals were chosen for an intermediate intern level. They had no archaeological training but had a moderate knowledge of anthropological theory and some knowledge of Manitoba pre-European history.

When the project started in June, the field staff consisted of fifteen individuals ranging from experienced archaeologists, through interns, to trainees. Attrition, for various reasons, occurred over the summer.

It was a major blessing when the combined University of Winnipeg/University of Manitoba Archaeological Field School program (under the direction of Roland Sawatsky and Val McKinley) finished on July 4, 2008, and there were several qualified students who could be hired. Seven Field School students joined the project in early July. Unfortunately, the beginning of classes at University meant that many of the staff left the project to continue their academic career.

Over the course of the project, twenty-six people were employed: Holly Alston, Amy Brown, Celia Buchok, Nathalie Cahill, Ian Cunningham, Laura Curtis, Kate Decter, Michael Evans (Field Supervisor), Sara Halwas, Sonya Hauri-Theissen (Laboratory Supervisor), Michelle Ip, Derek Kun, Keith Letandre, Daesha Mackie, Andrew McCausland, Sylvia Morrisseau, Mark Paxton-MacRae, Tasha Pegado, Ernie Reichert, Cameron Robertson, Maynan Robinson, Jason Romanyshyn, Eric Simonds, Nicole Skalesky, Rachel ten Bruggencate, and Tracey Turner. Some worked from the beginning to the end, others left earlier for various reasons, and some were part-time. All performed well under occasionally arduous circumstances, i.e, flooding, heat, and, in November, freezing temperatures.

The project was augmented by several volunteers who donated their time to undertake excavation or work in the laboratory. The volunteers were Biron Ebell, Cynthia Worsley, Sara Halwas, and Holly Alston. The latter two were hired on as full time staff during the latter stages of the project. Special thanks must go to Biron Ebell who committed four half days per week for the majority of the duration of the project.

Most people rotated through the laboratory so that they received a good grounding in both field methods of excavation and laboratory identification and cataloguing techniques. Some had a preference and a natural affinity for the excavation portion of the project while others displayed a talent for the laboratory component. The two supervisors, with regard for scheduling and project requirements, managed to allocate people where they felt most comfortable - no small feat.

During the summer, the project operated from Thursday to Monday. This provided an opportunity for viewing the process by tourists who are more frequent on the weekends. After Labour Day, the project shifted to a Monday to Friday operation.

1.5 Field Excavation Methods

The excavation area, 22 metres east/west by 11 metres north/south, was gridded into one metre square excavation units, each of which was given a specific designation, A1, A2, A3, etc. The southwest corner of the excavation area was used as the Site Datum. All distances and depths were measured from this point which had been measured at 175 cm below surface. Individuals were assigned to a unit to excavate. Michael Evans (Field Supervisor) worked out the field operations schedule and was able to cope with the disruptions to his schedule caused by the several floods. During the early stages of the project, experienced archaeologists were teamed with those people with less or no experience to provide a mentoring situation.

The excavation was carried out by hand troweling by natural levels. This means that the cultural level was followed, regardless of variations in topography such as dips or rises which mirrored the original ground level terrain at the time of the occupation. Each level was completely excavated before moving downward to the next level which was separated by sterile riverine silty clay deposits. All excavated soil was screened through a 6 mm mesh at the screening area which was located at the east end of the tent (Plate 1.5-1). Prior to the beginning of the project, it had been decided to use dry screening rather than wet screening for several reasons: the cost of hooking into the City of Winnipeg water system, the problem of drainage for the screen water as the screening area would have had to be located outside of the surface run-off area at the site, and the time factor as wet screening takes considerably longer than dry screening. The trade-off is that smaller artifacts such as fish bone, fish scales, lithic flakes, and small ceramic sherds are less likely to be recovered as the vigorous shaking action necessary to remove the soil will also carry smaller items through the screen.

Each excavator, in addition to the basic trowel, used sharpened teaspoons, grapefruit knives, and dental picks to excavate around artifacts. Artifacts were left *in situ* until the entire level had been exposed. All diagnostic artifacts and selected other specimens were measured from the southwest corner of the unit to record the exact provenience. At this point, a photograph, using a digital camera, was taken of the unit and the excavator drew a map of the unit, illustrating the locations of all diagnostic artifacts, different matrix components (silt, clay, ash, charcoal, etc.), and disturbance situations such as rodent burrows. In addition to photographs of the cultural matrix of each level in each unit, special features such as hearths, pottery concentrations, and diagnostic artifacts were photographed. The site photography index includes over 2500 digital pictures.

Plate 1.5-1: Screening Soil Matrix

All artifacts were placed in a labeled level bag, with provenienced artifacts in an individual bag along with the provenience tag, for further processing in the laboratory. Artifacts which could be selected for future analyses, such as large mammal bone for standard radiocarbon dating, charcoal samples for AMS radiocarbon dating, ceramic sherds with adhering cooking residue, were wrapped in tinfoil for protection prior to bagging.

Once the level was completed, the excavator moved to another unit to continue at that cultural level or, using a flat, square-bladed shovel, shaved through the sterile riverine deposits to reach the next cultural level.

The general procedure was to completely remove one cultural level across a block area and then move, *en masse*, into another block area to reiterate the same process. Level 1 was excavated from Unit A1 to Unit E10 (Figure 1.5-1) , where the strata began to dip downward to the east. Level 2 was excavated across the same area. When it became crowded, due to diminishing numbers of unexcavated units, excavators were assigned units on the north side of the basement area as well as continuing Level 1 and Level 2 excavations in the eastern half of the south side.

Before excavating Level 3 in the southwest corner of the area, it was necessary to remove approximately 40 centimetres of riverine silty clay. The thickness of sterile soil between Level 2 and Level 3 was insufficient to bring in a Bobcat for mechanized removal, as the treads of the machine would disturb the cultural deposits. A team of casual labourers was hired to physically shovel out and wheelbarrow the sterile sediments. This operation was overseen by the Field Supervisor and two of the staff.

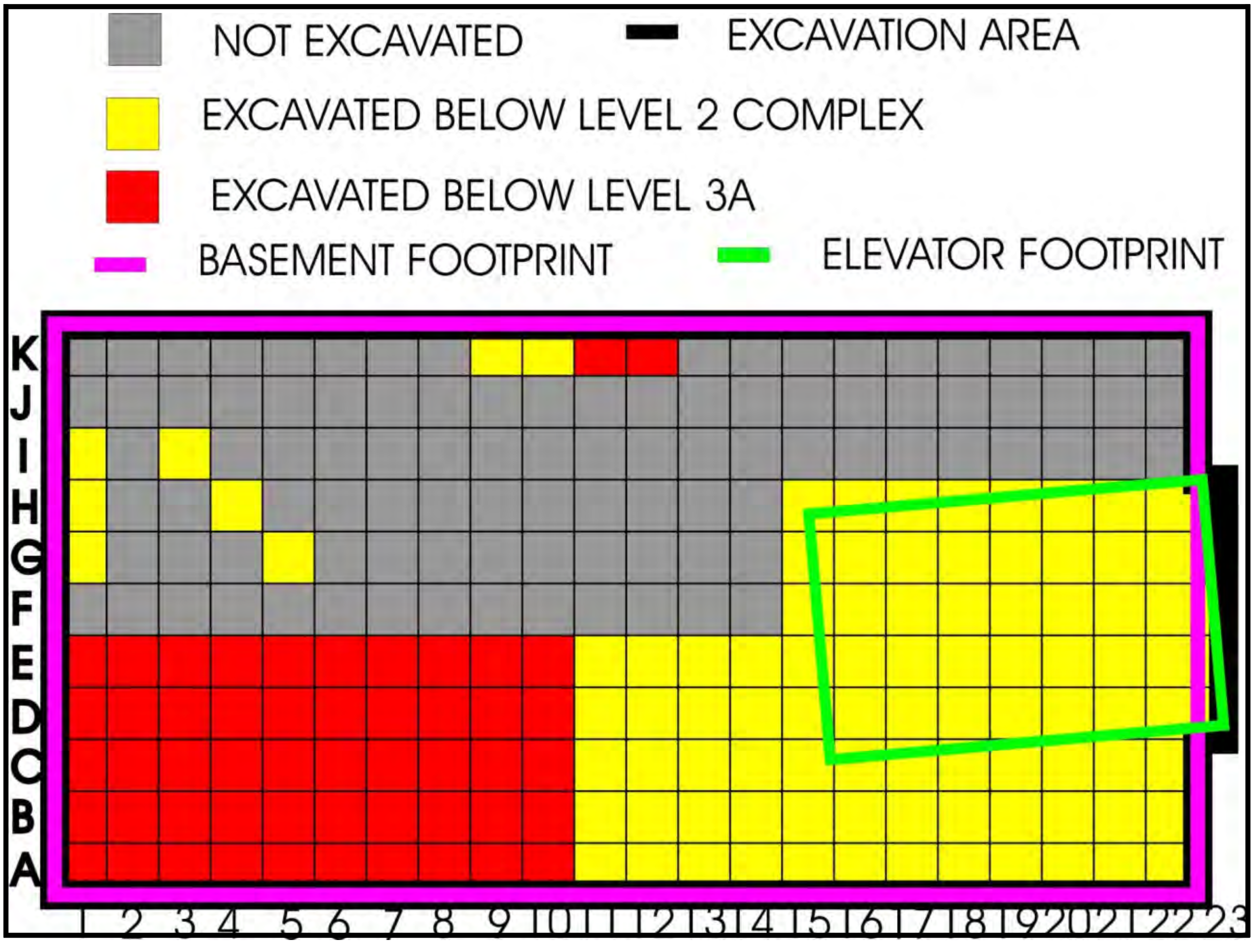


Figure 1.5-1: Excavation Area Showing Footprints and Excavation Blocks

With Level 3 exposed in the southwest portion of the excavation area, the excavation of units on the north side was placed in abeyance, with the main thrust being to complete the excavation of the south half. Staff excavated Level 3 (which also had another layer - Level 3A directly below) in the western portion of the site, west of the 10 metre line and Level 1 and the Level 2 Complex to the east of the 10 metre line. The strata composing Level 2 split more than once as the layers dipped. Eventually, five discrete levels were defined (Levels 2, 2A, 2B, 2C, and 2D), separated by, at times, as little as 5 millimetres of soil. Level 2, in the west end of the area, had given some indications that it was a composite level but until the separation resulting from the lower elevations and the resultant flood depositions, it was unknown how many. During the excavation, the depth of the various strata were recorded for both the south wall (0 North) and the north wall (5 North), as well as north/south mappings at selected intervals. The stratigraphic situation will be discussed in the chapter on stratigraphy (Section 2.0).

In early September, the basement was cancelled and the necessity for mitigation of that particular feature became moot. The only remaining sub-surface impact associated with the building footprint was the footing area of the service elevator in the eastern end of the former basement footprint. This meant that the excavation units in the north half of the basement footprint would be excavated to the base of Level 2 and no further units opened in that portion of the site. In the south half of the site, it was decided to terminate the excavation of the Level 3 Complex at the 10 metre east line (Figure 1.5-1) where the soil layers dipped considerably. Level 1 and Level 2 Complex were completely excavated across the entire southern half of the excavation area as well as in that portion of the north side where the footprint of the freight elevator footing occurred. The depth of impact of the elevator was such that it may have impacted Level 2 to Level 2D but there was an additional 60 centimetres of sterile sediments between Level 2D and Level 3. This was deemed sufficient protection and the excavation was closed off at the base of the Level 2 Complex.

The project was lucky in that the late fall weather was quite favourable. Temperatures did not fall too far below freezing each night and minimal ground freezing occurred. The working conditions were relatively comfortable, provided one wore a heavy jacket and gloves (Plate 1.5-2).

Plate 1.5-2: Excavating in Early November

The last day of excavation was November 5, 2008. All of the equipment was loaded up and returned to Quaternary Consultants Ltd. offices. A layer of plastic was placed over the entire site, both the areas which had been excavated, as well as the unexcavated areas on the north side.

One of the conditions of the Heritage Permit was to conduct an exploratory, machine-assisted, excavation of a 4 metre x 4 metre block below the base of hand excavations. The location chosen was at the southwest corner of the excavation area, as all known cultural layers had been excavated within that portion of the site. On November 12, 2008, a large back-hoe arrived to undertake the excavation. It was equipped with a ditching bucket (Plate 1.5-3) and was able to excavate 5 centimetre thick slices across the block. The hole was excavated below the point where water began seeping into the bottom (Plate 1.5-4) and was closed off at a depth of 2.47 metres below the lowest hand-excavated level of the block (Level 3A) (Plate 1.5-5). The next morning, the PCL Project Manager for the tent removal said that 1.2 metres of water had seeped into the hole overnight, indicating the excavation had gone more than 1 metre below water table. The stratigraphic details will be discussed in Section 2.0.

Plate 1.5-3: Large Backhoe with Ditching Bucket to Excavate Exploratory Hole

Plate 1.5-4: Water Seepage at Base of Hole

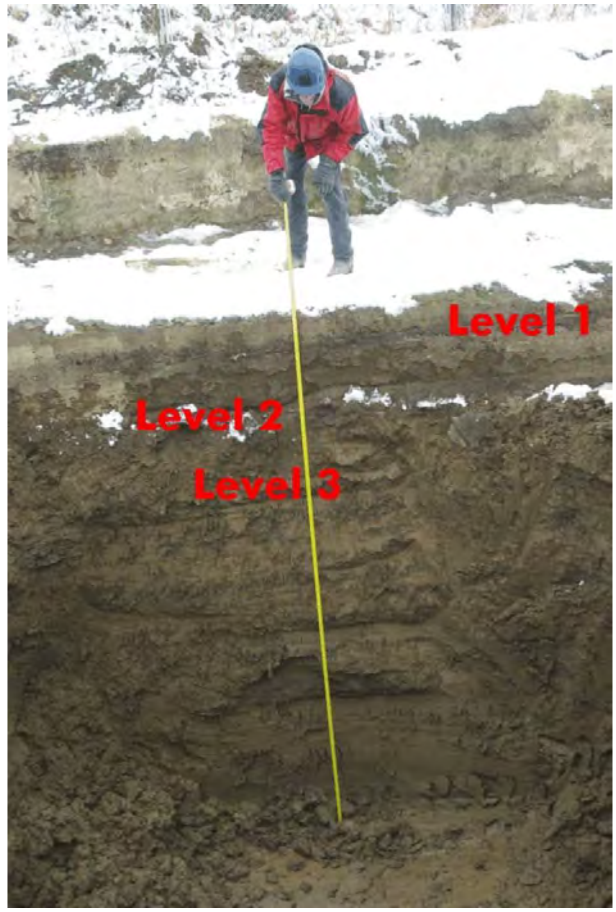


Plate 1.5-5: Annotated Stratigraphic Wall of Exploratory Mechanical Excavation

1.6 Field Laboratory Methods

The field laboratory was set up in a construction site office trailer, rented from PCL. In addition to the laboratory operations, the trailer provided storage space for field and lab supplies. Electricity was provided by a field generator and water was obtained from a 500 gallon tank which was refilled as needed by The Forks North Portage maintenance staff. Tables and desks were set up to provide working spaces (Plate 1.6-1).

All artifacts, as they came in from the excavation area, were cleaned. Each class of artifacts (faunal, lithic, ceramic) required different treatment. Selected lithic cutting tools were dry-brushed clean rather than washed in order to retain an unmodified surface which could later be submitted for residue analysis. Similar treatment was applied to ceramic sherds which had adhering residue from the cooking of food. The faunal remains (fish bone, mammal bone, shellfish) were washed with a wet toothbrush to remove adhering soil. Once cleaned and dried, the artifacts were sorted to type (faunal, lithic, ceramic), and identified to the limits available to the lab staff. Faunal and lithic reference collections provided by Quaternary Consultants Ltd. and the University of Manitoba Anthropology Department were on site.

Given the expected large quantity of artifacts to be recovered, the original plans called for a computer database cataloguing system. Originally, it had been planned that the Manitoba Museum database would be used. The Museum system is an on-line computer cataloguing system which would result in the recovered artifacts being catalogued in a manner compatible with all previously recovered artifacts from The Forks. These plans fell through partially due to the unfortunate lateness of project start-up as well as reticence on the part of the Museum to accept the collection without a major fee-for-service commitment.

The project was very fortunate that another source for a database program was offered. Valerie (Val) McKinley, Curator of Anthropology, University of Winnipeg, offered to customize a FileMaker program which is used at the University for cataloguing their archaeological collections. She provided an operating program and tailored it to the requirements of the Human Rights Museum project. Ms. McKinley also made several field visits to check the status of the program, tweak it where necessary, as well as providing instructional support for the laboratory staff.

After the artifacts from each level bag were cleaned and identified, the data for each specimen was entered into a computer database (Plate 1.6-2). This data consisted of the type and sub-type of the artifact, the quantity, the weight, the material identification, the provenience, and any other pertinent information. The database program was able to print out individual artifact cards for each artifact or group of artifacts which were then placed, along with the card in a clear plastic bag. The cards and bags are acid free and meet Museum curation requirements.

The principle of cluster cataloguing was used, i.e., all catfish dorsal spines from a single level within an excavation unit were given a single catalogue number. The underlying principle is that if an artifact within a cluster is worthy of additional investigation, it will be given a unique number unto itself, while carrying along all of the original data entered with the cluster. By using a spreadsheet type database, sorting of artifacts for analysis is not dependent upon the catalogue number but on the various attributes of the artifacts.

The laboratory usually had three or four individuals working in it. The Laboratory Supervisor (Sonya Hauri-Theissen) rotated personnel through all aspects of the lab, washing artifacts, identifying artifacts, and computer cataloguing. During the course of the project, more than 380,000 artifacts were processed and catalogued using more than 23,000 catalogue numbers.

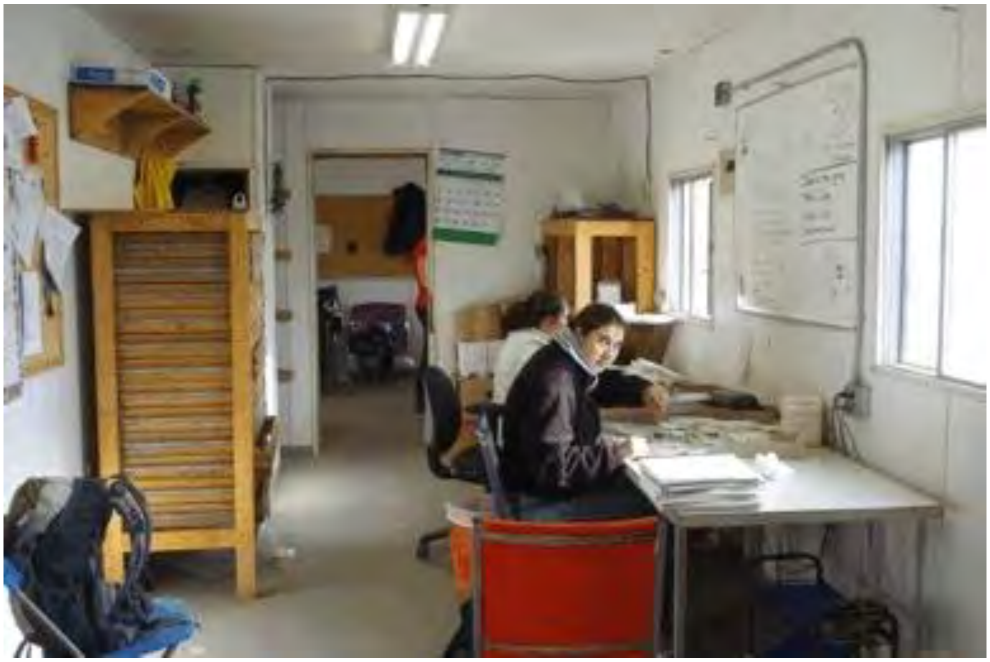


Plate 1.6-1: Artifact Preparation in the Field Laboratory

Plate 1.6-2: Computer Cataloguing of Artifact Data

1.7 Public Interface

The role of site interpreter was assumed by Parks Canada staff at The Forks National Historic Site. Accordingly, interpreters from Parks Canada, under the direction of Barbara Ford, Manager of Visitor Experience, The Forks National Historic Site, were on site for two two-hour periods each day beginning in mid-June and ending after Labour Day. The interpreters experienced all of the inclement weather without the advantage of having a tent, although during rainy periods when there were no visitors, they were able to access the Laboratory trailer.

The interpreters and the public audience were able to observe the project from a viewing platform constructed at the west end of the tent (Plate 1.7-1). This enabled people to look down into the excavation area and watch the archaeological staff working. Two large (4' x 8') time line story boards, originally constructed for The Forks Public Archaeology Project (1992), were erected at the beginning of the walkway to the platform to help the public place the cultural layers being excavated in chronological sequence. In addition, the Parks Canada staff brought replicas of artifacts similar to those being recovered from the excavation.

Plate 1.7-1: Viewing Platform at West End of Tent

Professional archaeologists, Elders, and stakeholders were often taken for guided tours into the excavation area but this opportunity was not provided to members of the general public for safety concerns both for the individuals and the integrity of the site. Due to space constraints, the laboratory was not open to the public but could be accessed by professionals and stakeholders. For the most part, professionals who visited the site were supportive of the project and were impressed with the field logistics and the recoveries, recognizing that this was the largest block excavation undertaken in Manitoba.

An official media day was held on June 27, 2008, as the excavation had proceeded enough that the cameras were able to show the archaeological process and techniques to their viewers. It was well that the event occurred in the late morning as that afternoon the site was flooded due to a torrential cloudburst. During the course of the summer, several television and radio stations made intermittent visits to the site. One noteworthy happening was when a freelance reporter arrived on site just as a footprint in the clay was discovered. This was one of the few times that a newspaper was able to 'scoop' the electronic media who were, naturally, out in full force the next day. Overall, the media coverage was invariably positive and helped inform the public about the important heritage that was being unearthed in preparation for the construction of the Canadian Museum for Human Rights.

Over the course of the summer, several hundred visitors viewed the archaeological project. As Parks Canada staff were not on-site full-time, members of the archaeological staff also interacted with the tourists. Visitors ranged from young enthusiastic children to retirees and from Winnipegers to international tourists. The range of comments was as varied as the visitors with some people expressing surprise at the age of the artifacts being recovered and others being disappointed that it was not a dinosaur dig. The archaeologists were able to explain the methods of recovery and discuss the types of artifacts being recovered. The majority of visitors were appreciative of the opportunity, welcomed the information provided, and the chance to talk with professional archaeologists.

1.8 Post Excavation Operations

After the field project was completed on November 5, 2008, all equipment and artifacts were brought to the office of Quaternary Consultants Ltd. The Project Director and Laboratory Director ensured that the artifact database was internally consistent, i.e., that interlinked fields were compatible with each other. The Laboratory Director sorted the artifacts into the five primary categories for further identification and analysis: Lithic, Ceramic, Floral, Fish Faunal Remains, and Mammal Faunal Remains. The quantities of artifacts in each category were determined from the database and a "Request for Proposals" was issued for each of the five artifact groupings. The distribution list for the RFP's included all project staff, the Anthropology Departments of University of Manitoba, University of Winnipeg, Brandon University, University of Saskatchewan, and Lakehead University.

The "Request for Proposals" listed the number of artifacts in each category as well as the total catalogue numbers. It also listed the quantities of specific artifacts that would pertain to the amount of analytical time required by the analysts, i.e., projectile points, ceramic rim sherds, etc. The RFP required the bidders to detail their analytical methods, their estimated timeframe, experience, and their fee for completing the analysis and the interpretation of the results for each cultural level. The RFP noted that proposals would be assessed on methods and timeframe as well as budget.

Several bids were received for each category and they were assessed by the Project Director and Laboratory Director. The winning bidder was notified and the artifacts given into their care. Each bidder was responsible for locating their own work area. Where possible, Quaternary Consultants Ltd. was able to assist with the loan of equipment, reference material, and published references. The analysts were also encouraged to access additional resources such as reference collections at the University of Manitoba, University of Winnipeg, Manitoba Museum, etc.

The winning analysts were:
- Ceramic - Ernie Reichert;
- Lithic - Mark Paxton-MacRae;
- Floral Remains - Donalee Deck;
- Faunal Remains other than Fish - Michael Evans; and
- Fish Faunal Remains - Eric Simonds.

Other classes of artifacts were analyzed by Quaternary Consultants Ltd. Notably, Pam Goundry analyzed the Shellfish Remains, while Sid Kroker was responsible for all remaining recoveries.

As part of the contract with each of the analysts, they were required to review the identifications of all artifacts and submit updates to the Laboratory Director when identifications, quantities, weights, etc. were modified. This resulted in considerable revisions, on an on-going basis, to the original database in all artifact categories. In instances where artifacts which had been cluster catalogued were broken apart for specific identifications or because of noteworthy attributes, the Laboratory Director was able to provide a new catalogue number and artifact card for the analyst. It had been determined that only one person should have the responsibility for modifying the database, especially with regard to the assignment of new catalogue numbers to avoid the possibility of five different analysts giving the same number to five different specimens. Thus, all database modification was processed through Quaternary Consultants Ltd.

The final component of the project is the compilation of this report. The report is a collaborative effort in that, while each analyst was responsible for the interpretation of their category of the artifacts for each cultural level, they also had input into the overall report. This insured that the final version of the report was a comprehensive synthesis of all viewpoints and specific insights resulting from experience during the recovery portion of the program and the analysis of the different classes of the artifacts. The Project Director and Laboratory Director were responsible for the final edits.

2.0 STRATIGRAPHY AND DATES

The excavation area lies on the west side of an aggrading curve of the Red River. Given the vast catchment basin of the combined Red and Assiniboine Rivers, it was not uncommon for flood events to occur. A survey of historical flood events by Rannie (1998), using primarily fur trade journals, details high water episodes between 1790 and 1870. In this eighty year period, a total of twenty four floods of varying magnitude were recorded. For comparisons of magnitude, Rannie (1998:188) includes the larger floods of the 20th century. Eleven floods, including the 1997 flood, appear in his chart. This means a minimum of 35 floods have been noted in the past 220 years, or an average of a high water episode every six years. These often occur in clusters, i.e., 1824, 1825, 1826, 1828, 1829, 1830, with periods of two or more decades before the next flood.

Inasmuch as the general elevation at The Forks was lower as one moves back in time, the frequency of floods during pluvial periods would have been the same or greater. Thus, near the end of the Neo-Atlantic Climatic episode, dated between A.D. 900 and A.D. 1200 (Bryson and Wendland 1967), the temperature was cooling and there was increased precipitation. High water episodes could have occurred at a greater frequency, perhaps with an average as frequently as every three or four years.

Each flood has a different result in terms of deposition which makes decoding the stratigraphic record of the riverine sedimentation extremely difficult. The delimiting parameters, such as speed of spring melt, addition of spring precipitation to the winter snowpack, run-off conditions for both rivers, and the amount of ground thawed prior to the flood, all have an effect on the sediment load of the rising waters. The speed of the transit of the water past the site also has an effect. If the water flows through the Red River channel quickly, very little sedimentation would occur as opposed to a situation where ice jams cause the water to pond and the sediment load to settle out, the heavier particles first and the lighter silts and clays later. Often, one can observe this fractionation in the sediment layer with larger sand particles underlying silt which underlies clay, giving rise to a tripartite layer representing a single high water episode. To further complicate matters, an extremely wet summer can give rise to mid-summer high water episodes which can also result in sedimentation, albeit at a lesser amount.

The condition of the flooded area also has an effect upon the results of the incoming water. If the ground is thawed, the rising water will float the lighter objects, such as leaves, grass, and charcoal, and move them inland. As the water recedes, these objects will be redeposited within the flooded zone. If the water is moving rapidly, trees may be impacted by ice floes and uprooted, resulting in an eddy-causing obstruction which can result in soil erosion to the sides of the uprooted tree due to increased water flow.

The periods between floods can see the development of a soil horizon through the accumulation of humus resulting from plant growth on the freshly deposited sediments. If the flood deposit is thin, the existing vegetation will grow through it and, given sufficient time, the newly deposited silts will be incorporated into the existing A Horizon. If the flood deposit is thick enough, the previous herbaceous vegetation will be smothered, with only shrubs and trees continuing to grow after the flood. The lower vegetation will be characterized by colonizing plants, often generating from seeds transported along with the sediments in the flood waters.

2.1 Upper Soil Layers at the Site

The upper soil layers of the majority of The Forks area reflect its period as an active rail yard. The topmost layers consist of gravel, sand, coal clinkers, coal fragments, and artifacts from the last one hundred years. The railroad period at The Forks began in 1889 when the Northern Pacific and Manitoba Railroad established a repair shop and roundhouse (FRC 1988:55). For the next century, railroad activities and businesses based upon proximity to the transportation network were ubiquitous in the area. As the steam locomotives were fired with coal, the residue was used as land fill, resulting in a thick layer of cinders being spread across the area. The cinders, in conjunction with gravel and sand, comprise a layer which ranges between 50 cm and 150 cm thick across the former rail yard. At the Canadian Museum for Human Rights excavation site, the thickness ranged between 95 cm and 110 cm, often reflecting underlying rises and hollows in the 1890 ground surface.

When the site was prepared by mechanical excavation to just above Level 1, several buried soil horizons were observed below the surface historical layers. These relict soil horizons were thin. The thickest was 1.5 cm thick with most being less than 0.5 cm. The horizons were discontinuous, extending for less than five metres before disappearing. Often, there would be a re-appearance of a soil layer at a slightly different elevation and it would be impossible to ascertain if it was the same layer separated by a gap or two different layers representing two different periods of soil formation. If the situation was the former, it could represent an instance where the higher points of an undulating ground topography were eroded during a flood episode.

2.2 The Cultural Layers

A series of cultural layers were excavated across the site and provided considerable evidence for flood activity at the location. The depths and thickness of these layers were recorded and showed that the stratigraphy of the site was both simpler and more complex than originally anticipated. The major cultural levels were extensive, occurring across the entire site, while subsidiary levels were intermittent.

The cultural layers which rested on soil layers of differing degrees of development are plotted on Figure 2.2-1. For purposes of illustration, the vertical depths have been exaggerated three times. Otherwise, the distinctions between the layers would be less clear. All depths were measured from the southwest site datum which was measured at 1.75 metres below grade. After the legal land survey of the property was completed in 2009, the ground elevation adjacent to the site excavation was determined to be 230.246 metres above sea level (Todd Craigen 2009:pers. comm.). The elevation of the site datum, in metres above sea level, has been calculated at 228.496 metres a.s.l. with Level 1 occurring 28 cm below that. It can be seen that all levels decrease in elevation to the east, with the declension more marked on the south wall than along the north wall (5N).

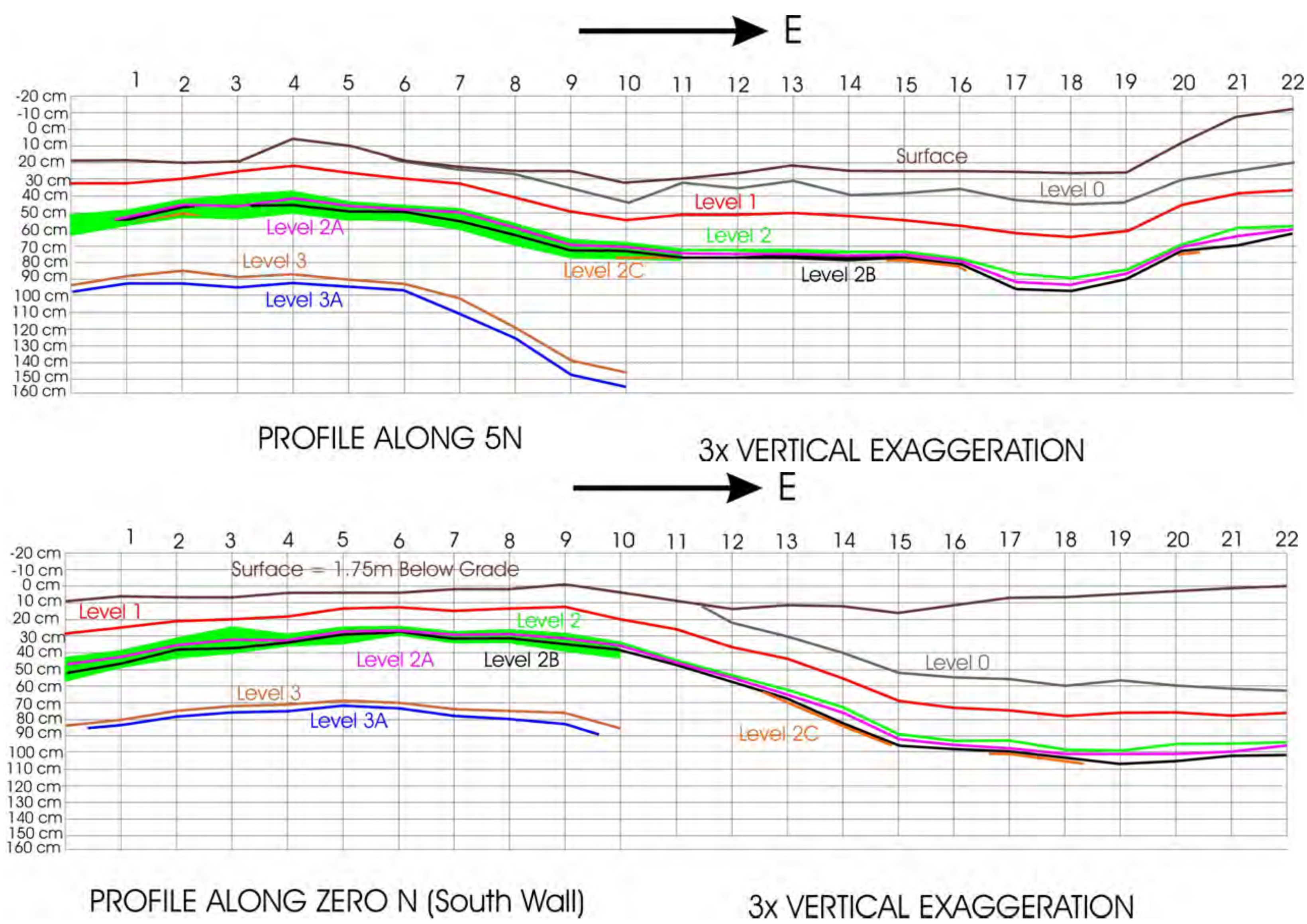


Figure 2.2-1: Stratigraphic Profiles Along Long Axis of Excavation

A sterile buried soil horizon above the cultural layers was designated as Level 0. Examination of Figure 2.2.1 shows that all levels remain in relatively the same position, indicating that the riverine depositions between Level 0 and Level 1, between Level 1 and the Level 2 Complex, and between the Level 2 Complex and the Level 3 Complex were uniform. This would suggest that the major flood deposition regimes between those layers were the result of large floods where the water ponded sufficiently for a large quantity of silts and clays to settle out. It is also worth noting that there does not appear to be any erosion of the levels, suggesting either that the water rise was gradual or that the ground was frozen at the time of the flood. There appears to be a textural change between the top and bottom of the sterile layers between the cultural layers, with coarser silts at the base and finer clays at the top. The gross stratigraphy of the site indicates that either there had been three major floods which deposited significant layers of sediment or a series of smaller floods, depositing thinner sediments between the periods of cultural occupation.

A series of four excavation units had been excavated in the K-Line (Units K9 - K12). The stratigraphic sequence was similar to that observed in the large block excavation. Levels 1, 2, 2A, and 3 were recorded but the cultural levels are not physically linked to the corresponding levels to the south. It is obvious from Figure 2.2-1 how much change in elevation can occur in a few metres. While not likely, there are different possible scenarios which could produce a similar profile:

- there is an additional cultural level present, such as Level 0 actually being a cultural level at the north side of the area;
- the deposition regimen is different due to different topography and what was recorded as Level 3 may be equivalent to Level 2B; or
- one or more occupation levels are not present and the level recorded as Level 3 may be a cultural level not encountered in the block excavation.

This uncertainty can lead to a degree of tentativeness in interpreting some of the cultural recoveries, especially the ceramics.

The microstratigraphy of the site is where the situation becomes extremely complex. The situation between Level 3 and Level 3A is similar to that of the larger floods, wherein a uniform layer of riverine sediments were deposited upon Level 3A. The deposition layer is much thinner (approximately 1.0 to 1.5 cm) and indicates that the high water period was much shorter or that the turbidity of the water was less.

The situation in the Level 2 Complex is just that—complex. During the course of the excavation, five cultural levels were defined, mostly in the eastern portion of the excavation area. In the western portion of the site, west of the 10E line, there was only intermittent separation of levels. That separation was at most 3 to 5 millimetres and indicators of multiple occupations were subtle and only readily discerned in retrospect. Instances of overlapping hearths can be seen as sequential occupations or two slightly displaced fires during the same occupation. Similarly, the presence of a cultural layer below Level 2 was designated as Level 2A. However, if there had been no flood deposition between Level 2 and Level 2A, that could have been Level 2B or even Level 2C. It was only in the eastern part of the excavation area where the separations became clearer and even then, given the intermittent nature of the lower levels (Figure 2.2-2), it was not always readily evident to which designated cultural level a specific horizon was linked. Correlation between adjacent units helped in the determination but where the previous level had been absent in an adjacent unit, the designation was occasionally left in abeyance until the next adjacent unit was excavated.

The five half units at the eastern end (D23 to H23) were shovel shaved and the entire Level 2 Complex was removed as a bulk layer due to time pressure at the very end of the project. All recovered artifacts within those units were treated as Level 2, even though Levels 2A, 2B, and 2C may have been present.

Level 2A is the most extensive of the lower levels in the Level 2 Complex and covers most of the area east of the 5 East line (Figure 2.2-2). The thickness of separation between Level 2 and Level 2A ranged from nil to a maximum of four centimetres. Occasional units did not have evidence of the cultural layer and this could be due to one of three reasons:

- ♦ the distribution of artifacts within a campsite location is never uniform and the units may represent sterile portions of the campsite; or
- ♦ these area were high points in the original topography and the water flow and ponding was such that no sediments were deposited to effectively separate Level 2 and Level 2A; or
- ♦ a subsequent flood could have resulted in the erosion of higher topographic points, thereby relocating the artifacts.

A similar situation probably occurred between Level 2B and Level 2A, although it would appear that the denser part of the occupation lies to the northwest and the excavated area may represent a peripheral portion. If this is the case, the first option of non-deposition would be the more likely.

Level 2C and Level 2D are more problematic to explain. It could be that Level 2C is a campsite location situated north of the main excavation area and only present in the elevator mitigation area (Figure 2.2-2). An alternative explanation is that there was only limited deposition by the high water episode between the occupation represented by Level 2C and that of Level 2B so that the artifacts pertaining to Level 2C were directly overlain by those from Level 2B and incorporated into the recoveries from that horizon. A third explanation is that there was ice rafting activity associated with the highwater episode after Level 2C was deposited and the ice action scraped away the artifact-bearing upper layer of the soil.

Level 2D, while present, is very intermittent. It only occurs in eleven units, mostly in the elevator mitigation area (Figure 2.2-2). The majority of the recovered artifacts are light, predominately fish bone and charcoal. These could be representative of material relocated by flood waters from an occupation area further inland from the river. Countering this possibility is the presence of limited numbers of ceramic sherds. As these are denser, they would not be as readily moved as the lighter specimens which would be floated or tumbled by receding water. A possible explanation for the formation of Level 2D may be suggested by the micro-topography of the occupation site.

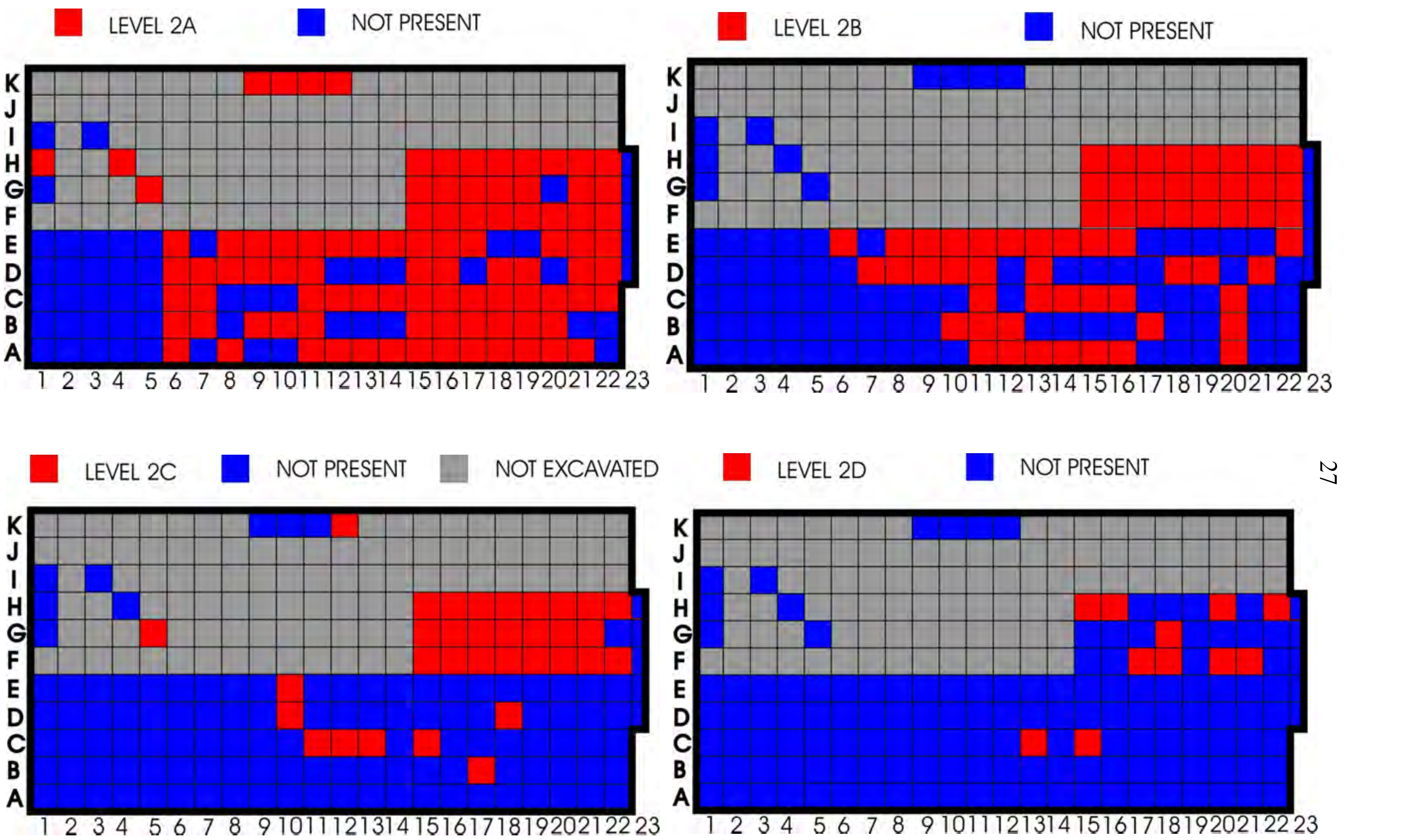


Figure 2.2-2: Excavation Areas Showing Presence/Absence of Level 2 Complex Layers

One possible explanation for the differing degrees of separation of the layers in the Level 2 Complex could be differing degrees of inundation. A high water episode would not move as far inland as would the waters of a major flood. Also a major flood would be more turbid than a high water episode, carrying higher densities of suspended silts and clays which would settle out when the water ponds. The difference in flooding due to differing water levels is illustrated in Figure 2.2-3.

Given the curvilinear nature of the Red River, ice jams would also result in localized flooding with resultant sedimentation which may not be replicated at other locations downstream of the ice jam. Other modifying factors would be the type of vegetation at the time of the floods. If the area was heavily treed, minimal ice scouring would take place. If the area was grass or herb covered and the ground had thawed, considerable erosion could occur.

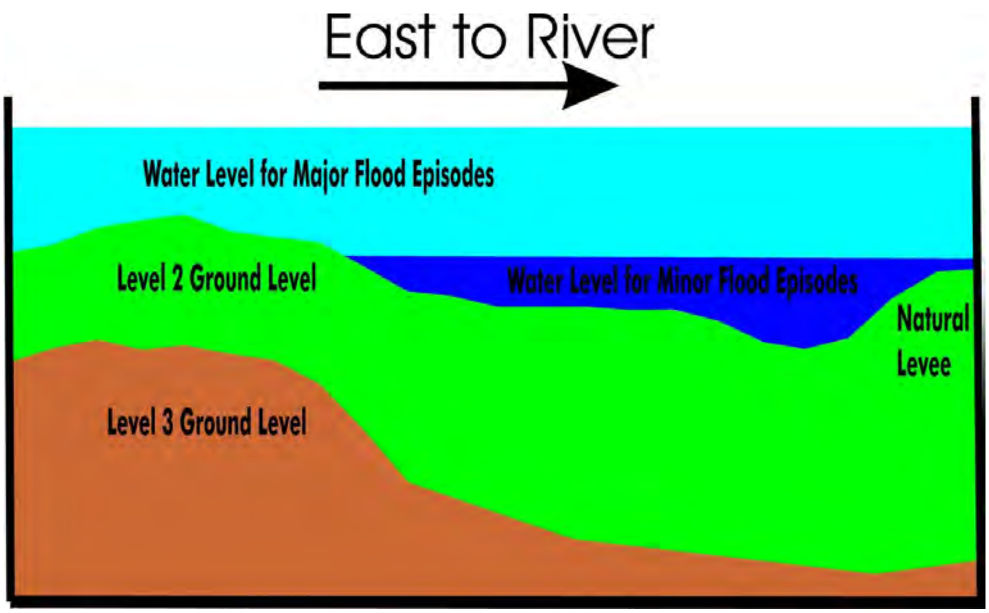


Figure 2.2-3: Possible Differing High Water Regimens

The micro-topography of the site was most pronounced at the Level 2 occupation zones. The western portion of the excavation area was level with a slight slope to the east beginning at a diagonal line from Unit E5 to Unit A15 (Plate 2.2-1). The surface of the Level 2 Complex again rose after the drainage trough at the eastern edge of the excavation area.

The excavations uncovered a topographic anomaly in the southeastern portion of the area. An ovate depression, greater than fifty centimetres deep was centred around Units D15 to E16 (Figure 2.2-4). The depression was approximately two metres wide and three metres long, with a steeper declination on the west side (Plate 2.2-2). It is possible that this hole resulted from a tree fall during a flood episode when heavy ice uprooted a large tree. This depression seemed to occur within a shallow drainage trough located on the eastern end of the site (Figure 2.2-4). If a heavy thunderstorm occurred during the occupation of Level 2C, surface run-off would have passed through this drainage channel, carrying and depositing light artifacts and sediment. Given the probability of clumps of vegetation which would have inhibited deposition and/or erosion, the presence of materials resulting from this precipitation event would have been patchy. This could explain the irregular presence of Level 2D (Figure 2.2-2).

Plate 2.2-1: Composite Photograph Showing Downward Slope Toward East

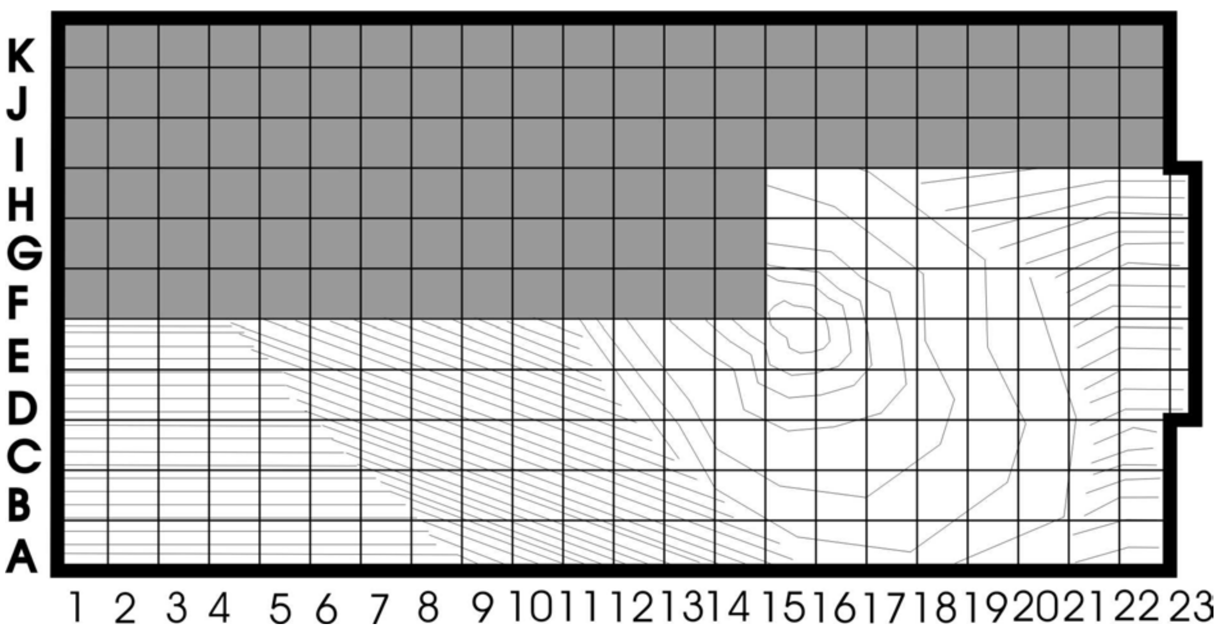


Figure 2.2-4: Micro-topography of the Level 2 Complex Occupation Zones
(Based on a Sketch by E. Reichert)

Plate 2.2-2: Photograph Looking West, Showing Depression in Left Foreground

The presence of large trees is supported by evidence of a tree trunk, located in Units D15/D16, which had burned *in situ*. The base of the trunk extended at least 60 centimetres (Plate 2.2-3) below the level at which the aboveground portion had been burnt off. This burning could have been the result of a natural fire in the riverine gallery forest or of cultural activity where fire was built up around the tree to assist in felling it.

Plate 2.2-3: Photograph of Cast of Large Tree Trunk

If there was a sparse gallery forest, a large individual tree would bear the brunt of ice shear and when toppled, create a hole due to soil clinging to the root ball. This hole would then be augmented by erosional action as water flowed around the fallen tree. The formation of this hole appears to have occurred prior to the occupation represented by the Level 2C cultural layer. Due to the depression, increased siltation occurred at this location in comparison to other portions of the area, leading to the hypothesis that the floods between Levels 2C, 2B, 2A, and 2 were minor episodes as illustrated in Figure 2.2-3. Not all of the occupation zone was inundated and slight elevations in the ground level would have resulted in minimal or no sedimentation, causing cultural levels to blend together.

Beneath Level 3A, under approximately 5 centimeters of riverine silty clay, lay a thin sand layer. This layer appeared to occur throughout the western excavation block. The Red River does not pass through areas where sand can be eroded. Thus, this deposit must derive from the sediment load of the Assiniboine River. The Assiniboine cuts through a glacial moraine or esker at the location of the Charleswood Bridge (Quaternary 1994:3-5) and is the most likely source of this particular layer. Another possibility is overland flooding but that would require a source of the sand and there are no known sand deposits west of the site at or near the surface. The historically known streams that drained into the Red River from the west—Logan's Creek which occurred slightly south of Point Douglas and Brown's Creek which crossed Main Street at Market Avenue and joined the Red River north of Water Avenue—would not have had a sand sediment load. The soils west of Waterfront Drive consist of a relatively thick A Horizon (humic loam) overlying unmodified riverine silts and clays which rest on lacustrine (Glacial Lake Agassiz) clay (Quaternary 2001, 2002, 2003c, 2004b).

There was some evidence, in the silt layer between Level 2 and Level 3, of sediment deposition resulting from water flow from the west or southwest. This would buttress the argument for occasional flood waters from the Assiniboine River flooding overland to join with the Red River.

2.3 Taphonomy

The term "taphonomy" was introduced to paleontology in 1940 and is the study of decaying organisms over time and how they become fossilized. In archaeology, it has come to mean the study of all processes that occur after the initial occupants of the site have left and the material they have left behind becomes incorporated into the soil as an archaeological deposit. It also examines processes that have occurred within the soil. Archaeologists study taphonomic processes in order to determine how plant and animal remains accumulate and differentially preserve within archaeological sites. In addition, taphonomic processes may alter biological remains after they are deposited. Some remains survive better than others over time and can bias an excavated collection.

At The Forks, preservation is extremely good for lithic and ceramic artifacts. Generally, bone and shell survive well, although occasionally the condition of the bone is poor. Botanical remains, other than those which have been charred, do not tend to survive in archaeological layers. Other organic artifacts like hide clothing and containers also tend to decompose rapidly and rarely become part of the archaeological record. In general, once the archaeological layer has become encapsulated by riverine deposits of silt and clay, the remains tend to be in an anaerobic environment. Ground water movement through the soils, tending to drain eastward toward the Red River, can often carry dissolved oxygen and calcium carbonate. As the archaeological layers, which are not as compacted as riverine sediments, and any sand layers provide a conduit for water movement, the dissolved oxygen can result in further decomposition of organic material, while the calcium carbonate can become deposited around artifacts and as a caliche layer.

One of the major concerns is the transmission of hydrocarbons derived from fossil fuel and deposited on archaeological materials. The Forks was an active rail yard from 1888 until 1988 with diesel locomotives being used after 1950. Prior to the use of diesel, coal was used to fire locomotives. Spills from diesel tanks and exhaust from motor vehicles can result in fossil fuel hydrocarbons being deposited on the ground surface and percolating downward. Coal dust is not readily transmissible underground but frost cracks and gopher holes can bring both of these fossil materials down into archaeological layers. In both cases, this will result in radiocarbon dates reading much earlier than they should. Sometimes the degree of contamination is slight, so that the dates appear feasible, albeit slightly younger than they should be.

In addition to preservation issues, taphonomy has also come to include processes at an archaeological site which alter the deposition. Aspects like riverine flooding and erosion must be considered as this can relocate artifacts from an earlier occupation and incorporate them into the soil layer upon which a later occupation occurs. Aeolian deflation and fires which remove the humic layer can cause sites to become collapsed wherein later occupations are no longer separated from earlier occupations. In instances where two occupations occur within two or less decades, the artifacts cannot be relied upon to separate the different occupations as the tool kit and diagnostic artifacts do not change rapidly.

Flood processes, as delineated above, can cause radical relocation and displacement of artifacts. Entire occupation zones can be eroded as was the case observed at the CanWest Global Baseball Park where isolated portions of an occupation zone were present with a different soil matrix occurring between, and around, them (Quaternary 2000c:Figure 2, 113-114). Ice scour can cause more localized displacement by displacing both surface and sub-surface artifacts, especially when the gouging is augmented by erosional effects of flowing water. Simple erosion can relocate artifacts and/or deflate archaeological layers.

The site is located in a region where intense thunderstorms can deposit more than 50 mm of precipitation in a very brief time. This can cause overland sheet flooding with attendant erosion and sediment deposition. If such a thunderstorm occurred during an occupation at the site, it may have had the result of relocating artifacts and depositing a thin sediment layer over the occupation living floor while the occupants were present. After the storm(s), activities would have continued in the same general locations, i.e., the same area would have been used for food processing. The discarded materials from the activities would have been placed in the same location but stratigraphically would be separated from the previous deposition by a thin layer of silt. This can result in an interpretation of two separate occupations while, in fact, the cultural layers would be the evidence of the same occupants at the same time, separated only by a short-term weather event of a few hours. It is hypothesized that this is the situation that resulted in the separation of Levels 2C and 2D.

Another process that causes vertical displacement of artifacts is cryoturbation. Freezing of soils, especially when there is a high water content, can cause denser artifacts such as lithic objects or ceramic sherds to be relocated upward or downward. As the water in the soil freezes and expands, the solid objects tend to be squeezed and pushed, most often upward. This phenomenon is well recognized by farmers who often have a new crop of rocks on their fields each spring. This process can explain some of the ceramic sherds from an upper level which fit with those from a lower level. Occasionally, the sherds would be displaced downward which would result in sherds from a vessel that occurs in an upper cultural level being recovered from a stratigraphically lower level. The same discussion would apply to lithic artifacts such as bifaces, projectile points, and fire-cracked rock.

During an occupation at a site, artifacts are continually displaced from their original point of deposition. This can occur through intentional site cleaning, i.e., gathering sherds from a broken cooking vessel and discarding them away from the active area of the site. It may also be inadvertent such as when flakes adhere to the bottom of wet or muddy moccasins and are relocated. Faunal objects probably are frequently relocated by the camp dogs. These actions can account for horizontal displacement where sherds from the same vessel can be located as much as ten metres apart.

One particular site disturbing factor was observed in all units and in all cultural levels. The site was riddled with the infilled casts of former rodent burrows. Richardson's and thirteen-lined ground squirrels are currently quite common at The Forks and likely would have been frequent in the past. As a rodent burrows through an archaeological layer, artifacts which are in its way are carried to the top of the burrow, thereby bringing older material to a more recent stratigraphic level. Also, if the rodent tunnels immediately below an archaeological layer, artifacts at the roof of the burrow will fall down onto an earlier stratigraphic level. Where the separation of cultural layers is on the order of one or two centimeters, this can have the result of displacing an artifact one or more occupations earlier than its original deposition.

2.4 Radiocarbon Dates

Radiocarbon dating is based upon the fact that carbon has two stable non-radioactive isotopes (the standard C12 and C13) and a third isotope (C14) which has a half-life of 5730 years. All isotopes of carbon occur in the atmosphere in the form of carbon dioxide. Plants take up CO_2 during photosynthesis and are consumed by animals so that every living organism is constantly exchanging C14 with the environment. This exchange ceases with the organism's death and the C14 contained in the tissues of the organism decays. The underlying assumptions are that the decay is at a standard rate and that the content of C14 in the atmosphere has remained constant. Both are to a degree invalid: the decay rate is an average of what is expected to occur and can vary with the individual atoms and the content of C14 in the atmosphere has varied as a result of varying cosmic ray activity (which creates C14 by bombarding nitrogen in the air).

The first problem, that of decay rates, is modified by using statistical means to produce an average date with a standard deviation. The standard deviation means that there is a 95% probability that the date occurs between the maximum and minimum dates, i.e., 500 ±50. This would state that the date, in terms of years before present, has a 95% probability of falling between 450 and 550 years ago.

The second problem, that of variation in the atmospheric C14 content, has been responded to by developing calibration curves which use external dating mechanisms such as tree-ring dating to nullify (as much as possible) variations in atmospheric C14 content, due to such disparate causes as cosmic ray activity which varies due to such factors as the earth's magnetosphere and climate change wherein carbon sinks begin emitting carbon dioxide.

The final condition for radiocarbon dating is that, due to the massive increase of C14 in the atmosphere in the 1950s as a result of atmospheric atomic testing, all radiocarbon dates are reported as years before 1950.

As an initial step, all radiocarbon laboratories report dates which have been corrected for isotope fractionation. These dates, reported in years B.P. (Before Present) are then calibrated using one of the calibration curves which have been developed. For this report, two calibration curves were used: CalPal (Cologne Radiocarbon Calibrator and Paleoclimate Research Package) and Fairbanks0107 (Columbia University, Lamont-Doherty Earth Observatory). The variation between the two calibration curves is relatively small (Table 2.4-1).

2.4.1 Initial Sequence of Radiocarbon Dates

Two samples were selected from each cultural level for radiocarbon dating. The samples were chosen from widely spaced locations from each level. The first preference of datable material was for large mammal bone elements, weighing more than 120 grams. These could be analyzed by standard radiometric procedures. Also, fish or shellfish samples are not preferred due to the freshwater lake reservoir effect which results in skewed dates. Adequate samples were obtained from Level 1, Level 2, Level 2A, and Level 2B. The lower levels did not have large mammal bone samples of adequate weight. As a result, charcoal samples were selected for Level 2C, Level 2D, Level 3, and Level 3A.

The standard radiocarbon dating was undertaken at the Department of Earth Sciences Radiocarbon Laboratory at Brock University, St. Catherines, Ontario. The AMS dates were obtained by Laboratoire de radiochronologie, Université Laval, Quebec City, Quebec who concentrated the carbon and forwarded the material to Keck Carbon Cycle AMS Facility, University of California, Irvine, California, where the actual count was performed.

The dates from each of the samples are listed in Table 2.4-1. There are problems with the dates which probably reflect contamination of the samples. The possible sources of contamination by older material are fuel hydrocarbons which could have derived from diesel fuel contamination of adjacent soils during the railroad era and which would have been dispersed throughout the soils by groundwater percolation.

Another contamination source is runoff from the adjacent parking lots which flooded the site several times until the surrounding berm was constructed. Even though there had been soil lying over a cultural layer, cracks in the ground, open adjacent excavation layers, unpacked fill in rodent burrows, and other possibilities, could give rise to contamination by fossil fuel residue. Also, as the materials were recovered by hand and laboratory processed, i.e., handled while cleaning and identifying, modern contamination through skin oils could have occurred. This may produce a higher degree of contamination on the small charcoal samples which were used for the AMS dates than on the large bone samples which underwent standard analysis.

The probability of contamination has resulted in the rejection of one date due to it having an inordinately old measurement in relation to the other samples. DlLg-33:08A/7427 (a bison vertebra) was collected from Unit E8 on July 17, 2008. As the soils in this portion of the site had been stripped to just above Level 1, the sample could have suffered deleterious effects from the numerous floods that had occurred prior to its removal. As such, cracks or rodent burrows could have allowed fossil fuel contamination to percolate downward.

While there appears to be inversion of the dates between upper stratigraphic levels and lower stratigraphic levels, it must be noted that all dates cluster very tightly. Two lines drawn from the upper and lower limits of two standard deviations from the date for Level 1 encompass almost all of the ranges of the dates for the subsequent cultural levels (Figure 2.4-1). As the difference between the mean dates for Levels 3 and 3A is on the order of twenty years, this falls well within the range of variability expressed as a standard deviation. A similar instance occurs with Levels 2C and 2D. Level 2A is the most problematic. The dates from the samples from this level cluster tightly but, intuitively, appear to be approximately 100 years too young. A similar displacement is noted when one compares Levels 2C and 2D with Level 2B.

Given the equivocal data provided by the radiocarbon dates, there are two possible interpretations. The first is that the dates are correct and that the variation and inversions are an artifact of the statistical probabilities of radiocarbon dating. This would hold truer for the samples which underwent standard radiocarbon determination, more so than for the AMS dates wherein individual C14 atoms are counted. Within this scenario, the eight occupation levels are tightly clustered within a century around A.D. 1100.

The second scenario examines the possibility of some degree of contamination affecting the samples submitted for C14 dating. If it is assumed that the uppermost levels were contaminated with fossil fuel residue, they would read too old. Thus, Level 1 and Level 2 could be more recent than they appear. If they were approximately 100 years younger, the chronological sequence would be smoother. To continue smoothing the curve, the AMS dates would also have to be modified (Levels 2C, 2D, 3, and 3A). By reducing the age of these dates by 150 years, the chronological curve would fit the stratigraphic sequence. This scenario is portrayed in Figure 2.4-2.While the chronological curve now fits the stratigraphy and, to a degree, the ceramic recoveries, it relies on the postulate that six of the eight dates are incorrect. The explanation of the assumed lateness of the upper two levels is somewhat feasible but it assumes that the degree of fossil fuel contamination by the bone artifacts in the two levels was equal, with equal adsorption of the contaminants by three of the four samples. There also needs to be an explanatory mechanism whereby all AMS dates read more than a century too late. This could be tested by submitting a carbon sample from Level 2A or Level 2B (or both) for AMS dating to see if it conforms with the standard dates from that level.

LV	CAT #	TYPE	C14	(±)	CAL PAL	(±)	Fair 0107	(±)	MEAN	(±)	AV	YEAR
1	780	Standard	925	40	850	51	844	59	847	55	825±58	A.D. 1125
	12682	Standard	880	40	819	65	787	55	803	60		
2	7427	Standard	1054	40	986	44	958	32	972	38	rejected	A.D. 1092
	12837	Standard	915	40	884	53	831	59	858	56	858±56	
2A	8370	Standard	848	40	774	49	751	44	763	45	753±42	A.D. 1197
	11029	Standard	832	40	749	37	736	39	743	38		
2B	12782	Standard	969	40	873	52	894	47	884	50	894±48	A.D. 1056
	11593	Standard	993	40	891	54	915	38	903	46		
2C	21888	AMS	870	20	773	21	768	29	771	25	756±23	A.D. 1194
	23133	AMS	835	20	747	22	735	18	741	20		
2D	21404	AMS	845	25	757	23	744	25	751	24	729±21	A.D. 1221
	22333	AMS	790	25	712	17	701	19	707	18		
3	16683	AMS	965	20	879	43	897	35	888	39	872±41	A.D. 1078
	19518	AMS	930	20	857	43	852	42	855	43		
3A	14924	AMS	950	25	866	46	877	43	872	45	850±47	A.D. 1100
	19182	AMS	900	20	841	50	812	45	827	48		

Table 2.4-1: Radiocarbon Dates by Cultural Level

A variant of this second scenario would be that the dates for Level 1 and Level 2 are considered to be accurate with Level 2A being anomalously younger. If Level 2A dated between 850 B.P. and 900 B.P., the upper four dates would conform with the stratigraphic sequence (Figure 2.4-3). This version also would require a mechanism for the lower four levels reading too recent.

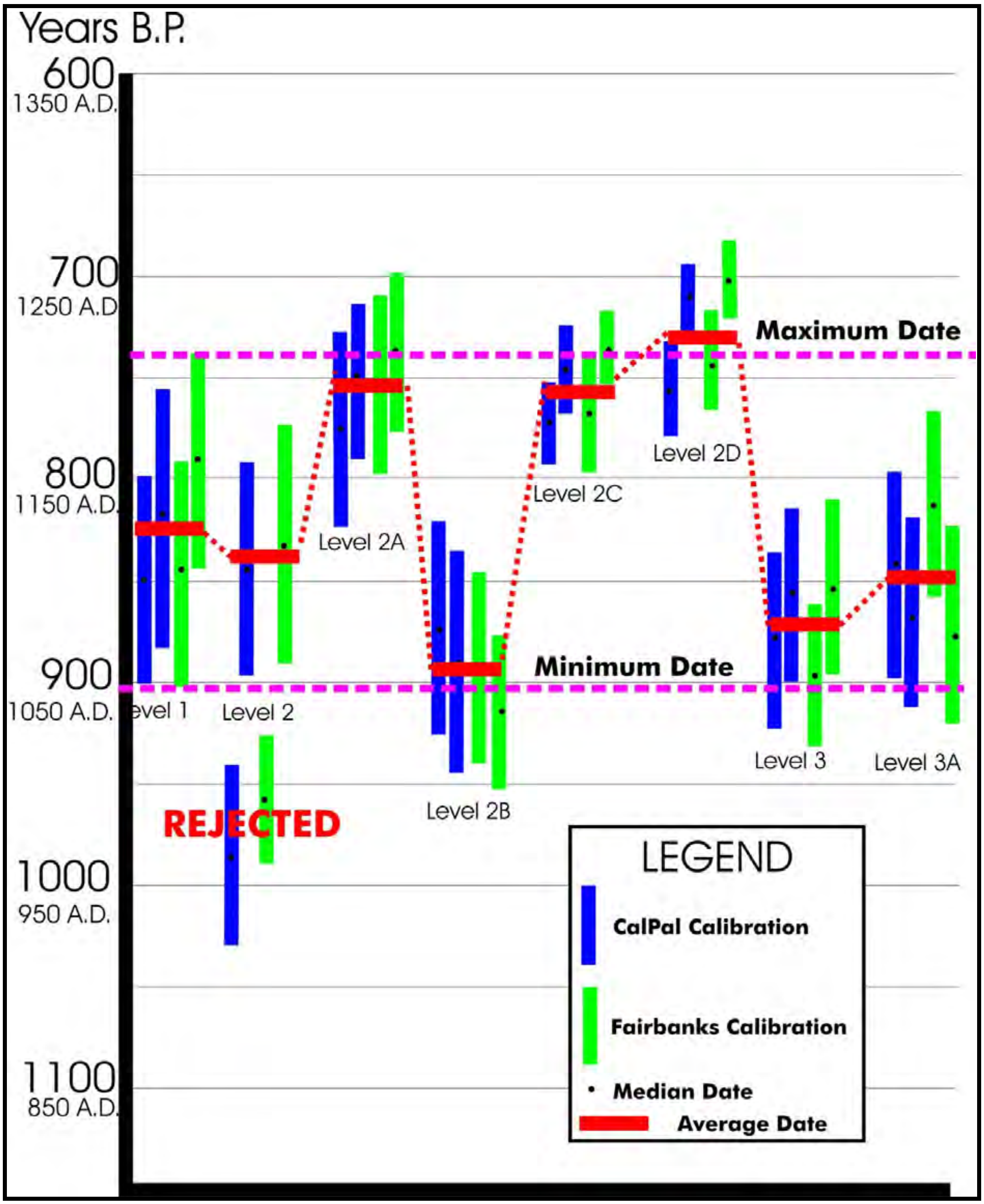


Figure 2.4-1: Chart of Radiocarbon Dates for Cultural Levels

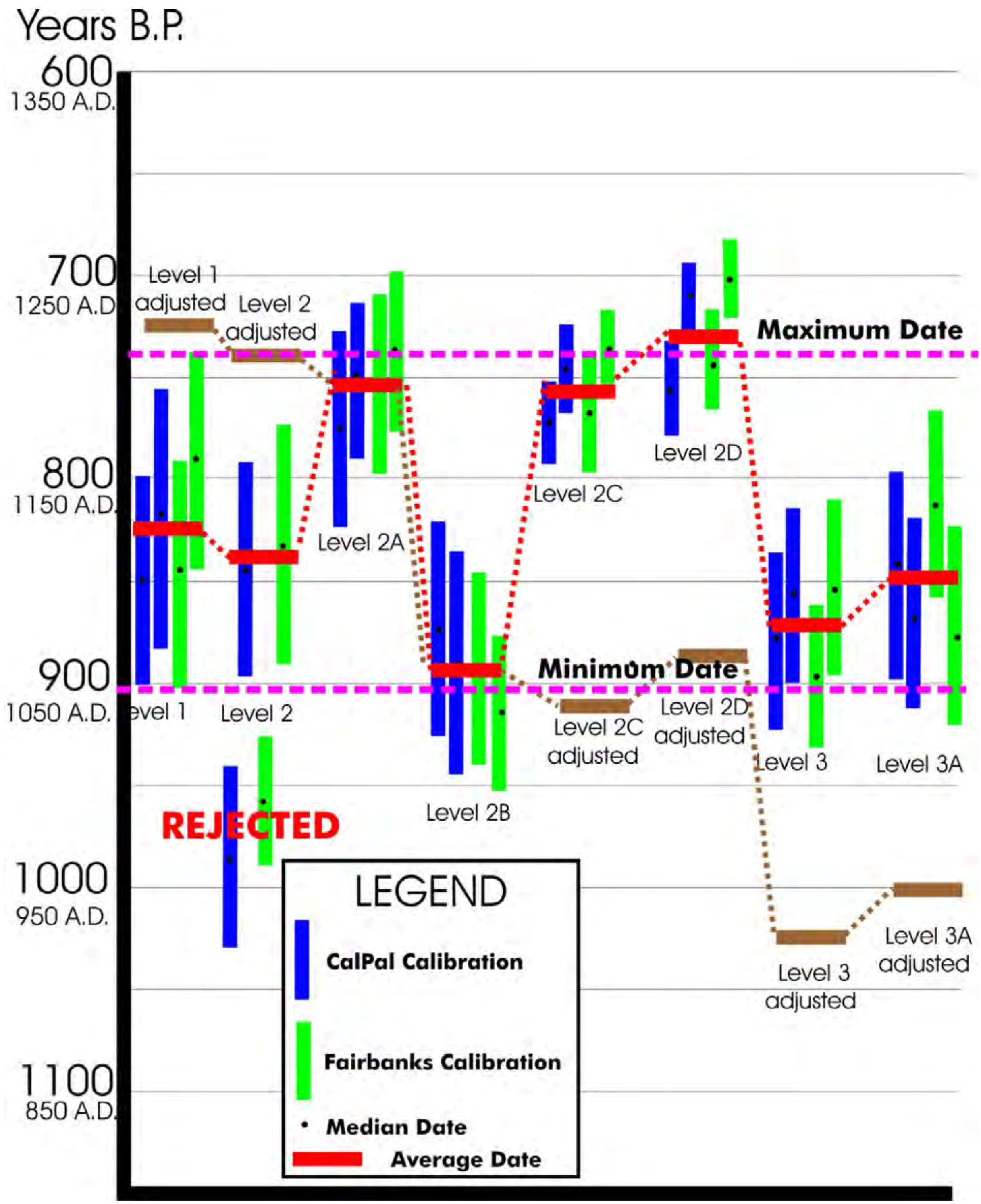


Figure 2.4-2: Chronological Chart Showing Adjusted Radiocarbon Dates (Scenario 2)

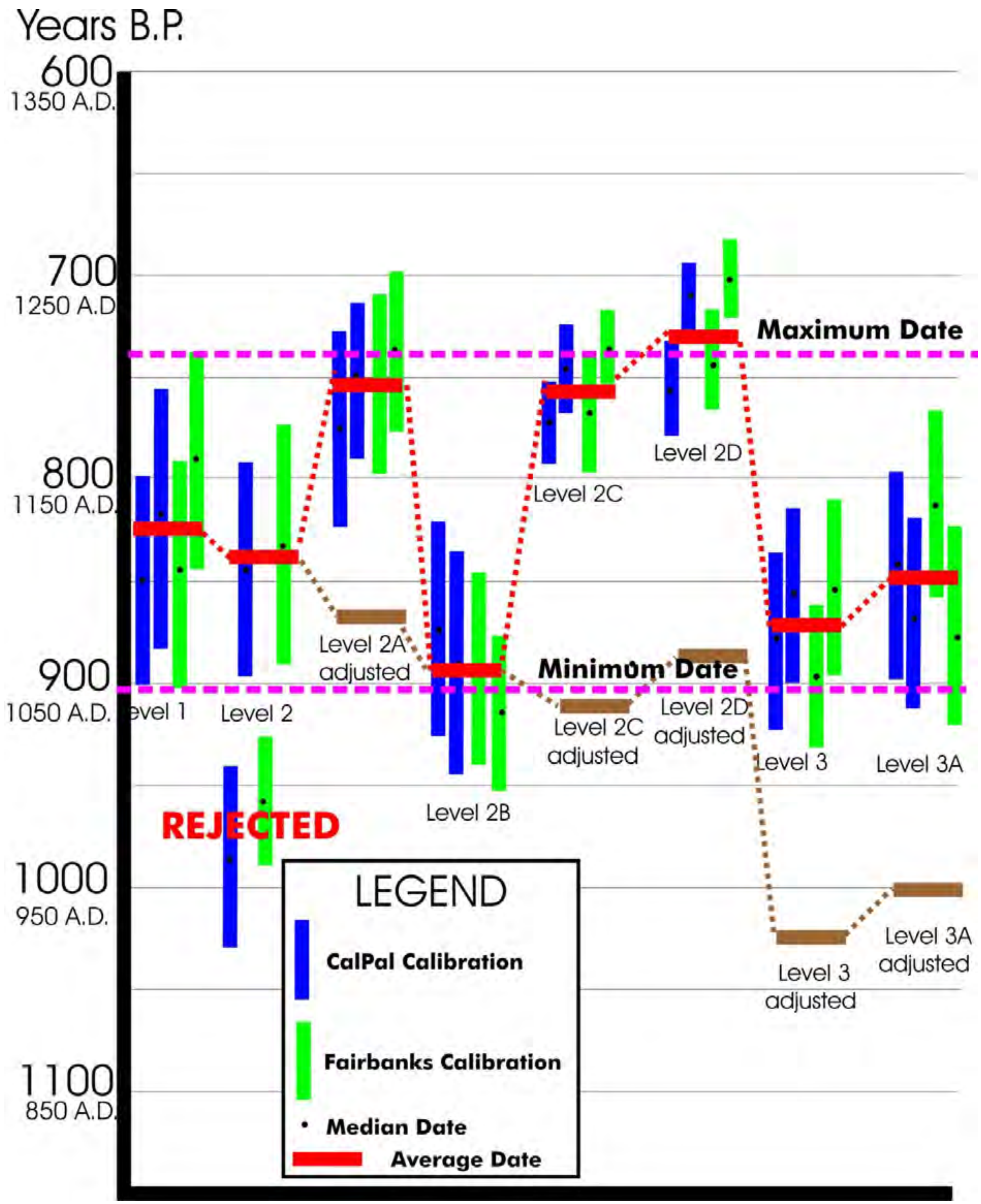


Figure 2.4-3: Chronological Chart Showing Adjusted Radiocarbon Dates (Scenario 2 variant)

The problem with either the second scenario or the variant is that it requires treating many of the radiocarbon dates as suspect, in addition to the outright rejection of one date from Level 2. For the second scenario, eleven of the accepted 15 dates are considered suspect and require adjusting. For the variant, ten of the dates require adjusting. Neither option is scientifically defensible. However, the dates, as recorded, do not conform with the stratigraphy and there is obviously a problem which needs to be addressed.

2.4.2 Later AMS Radiocarbon Dates

In conjunction with a project based upon specific recoveries during the excavation, the Winnipeg office of Parks Canada submitted four bone samples to Beta Analytic Inc. for AMS dating—two from Level 1 and two from Level 2. Aware of the potential contamination that had rendered the earlier sequence of radiocarbon dates somewhat unreliable, the selected samples were complete elements which lessened the possibility of hydrocarbon contamination as the cortex was unbroken and contaminants would not have been able to be caught in the interstitial spaces of the cancellous tissue. In addition, Beta was alerted to the possibility of fossil hydrocarbon contamination and their laboratory preparation of the samples took this into consideration. As a result, the dates for these two levels are considered more reliable than those obtained during the first radiometric dating assay.

In reporting their results, Beta Analytic provided the measured radiocarbon age and the conventional C14 dates which are the results after the raw date has been corrected for isotope fractionation. These were further calibrated for C14 fluctuation using INTCAL04. The resultant data is provided in Table 2.4-2.

LV	CAT #	LAB ID	TYPE	C14	CONV	CALIB	AV	YEAR
1	7862	Beta-269486	AMS	590±40	670±40	655±15	670±15	1280±15
	11763	Beta-269487	AMS	630±40	750±40	685±15		
2	21607	Beta-269488	AMS	610±40	800±40	710±30	690±20	1260±20
	22146	Beta-269485	AMS	700±40	710±40	670±10		

Table 2.4-2: Second Sequence of Radiocarbon Dates

The above data is plotted onto the original graph of radiocarbon dates (Figure 2.4-1) to provide a composite view of all received radiometric data (Figure 2.4-4). This version of the chronological chart appears to be more internally consistent and does not require manipulation of data sets to provide an earlier-to-later sequence. The AMS dates from Beta for Levels 1 and 2 are approximately 150 and 175 years more recent than those obtained from the conventional C14 determination. Coincidentally, this is relatively the same amount of time that Level 2B falls out of the date cluster for the sub-levels of the Level 2 Complex. However, Level 2A appears to fall reasonably in that grouping.

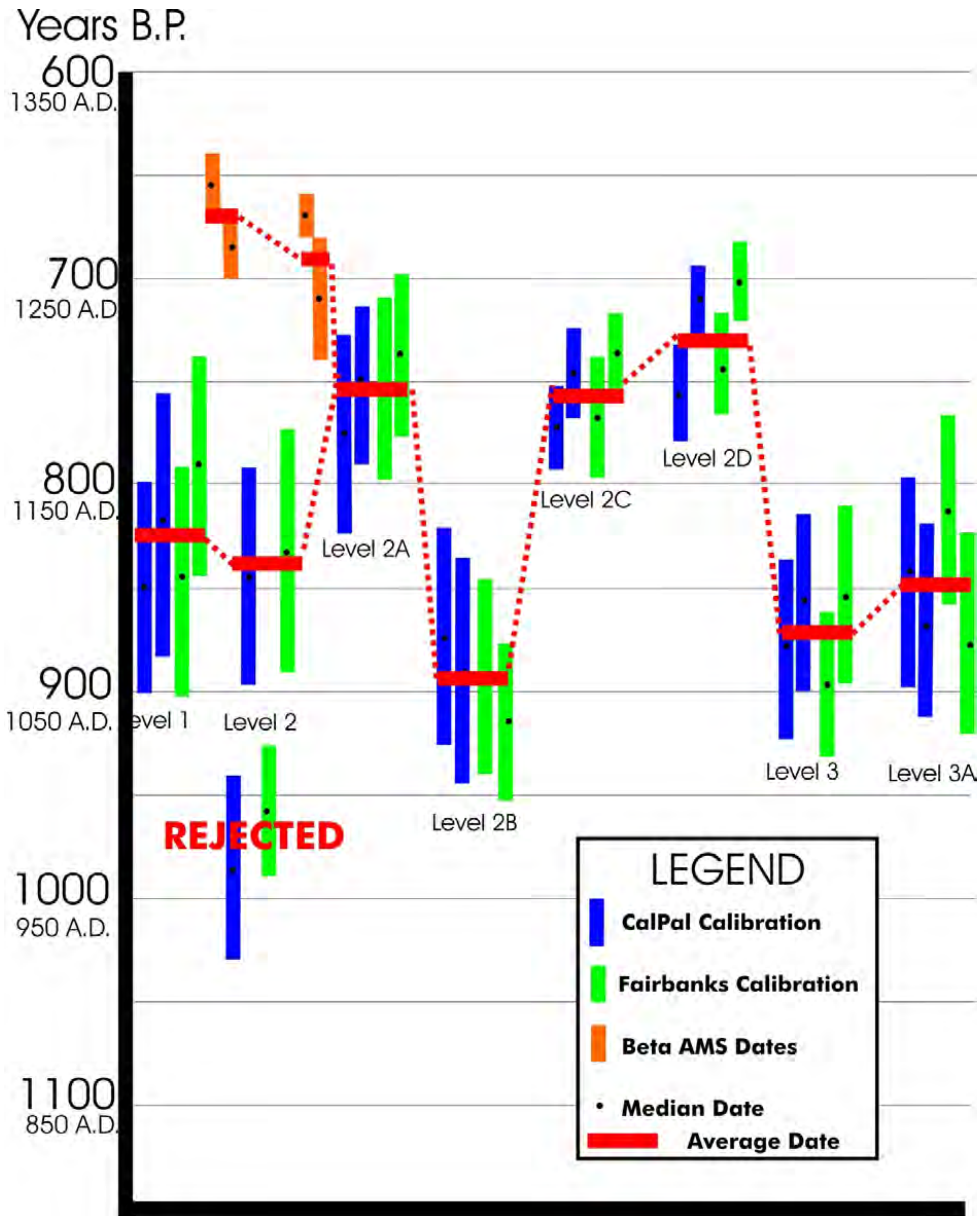


Figure 2.4-4: Chronological Chart Showing C14 Dates with Beta AMS Results

To summarize, the new AMS dates for Level 1 and Level 2 appear to be more reliable than the earlier dates. They are in temporal sequence and tend to conform to the material culture that was recovered from those levels (see Chapter 13.2.3.4). The only odd man out is the dates received for Level 2B, as they appear to be approximately 150 years too old. The inversions of the dates for Levels 2C and 2D is probably an artifact of the statistical nature of radiocarbon date determination, as is the inversion of the dates of Levels 3 and 3A. These inversions indicate that the two sets of levels occurred almost synchronously, likely with no more than a decade between them. In fact, the previous discussion concerning Levels 2C and 2D suggested that these are actually the same occupation, separated by a precipitation event causing sheet surface run-off, artifact relocation, and localized sediment deposition. The stratigraphic separation between Level 3 and Level 3A indicates that they were discrete occupation events. However, the time represented by the sediment deposited by a high water event could be as little as one year (as was the case in the 1820s with floods in 1824, 1825, 1826, 1828, 1829, and 1830) or as much as two decades. In either case, the radiocarbon dates would not be able to firmly identify the exact timeframe. Thus, the promulgated timeframe is:

- Level 1 A.D. 1280;
- Level 2 A.D. 1260;
- Levels 2A to 2D circa A.D. 1200; and
- Levels 3 and 3A circa A.D. 1100.

It is interesting to compare the C14 dates from this project with those of the impact assessment trench excavated along the east side of Waterfront Drive in 1997 (Quaternary 1999). At least eight discrete cultural horizons were encountered and apparently reliable radiocarbon dates were obtained for some of them. The uppermost significant cultural level, Horizon B, was dated at A.D. 1285 ± 60. This level, which contains cultural identifiers from a wide geographical area, has been considered as the manifestation of the 'Peace Meeting' of 500 to 700 years ago (Quaternary 1999:215). The dates of the other horizons are: Horizon C - A.D. 1270 (interpolated); Horizon D - A.D. 1250 ± 50; Horizon E - A.D. 1235 (interpolated); Horizon G - A.D. 1225 ± 50; and Horizon K - A.D. 1040 ± 50 (Quaternary 1999:Table 3). The upper levels tend to cluster just after A.D. 1200 which is similar to all levels above Levels 3 and 3A from the CMHR project. While it is tempting to link specific levels, it must be remembered that the topography of the site is variable and, based upon changes in elevation recorded in a twenty metre span (Figure 2.2-1), without actual physical linkages between horizons it devolves to slightly better than guesswork. Suffice it to say, the cultural layers recovered during the Canadian Museum for Human Rights mitigation project are further evidence of the long-standing use of this portion of the area surrounding the junction of the Red and Assiniboine Rivers.

3.0 ANALYSIS METHODS

3.1 Introduction

Just as people today use a wide range of materials and objects in their daily life, so did people in the past. This is reflected in the residue from an occupation site. Each different class of material, i.e., floral, ceramic, lithic, and faunal, has a role to play in interpreting the lifeways of the peoples of the past. Due to the different characteristics of each class, the analysis requires different methods to abstract data which can be applied during the interpretation of the choices and activities of these former inhabitants at the excavation site.

While this report is attempting to eschew technical jargon, the specialized requirements of the various analyses require terms which are not part of everyday parlance. In this section, each of the analysts will describe the methods they employed to examine the material. As in any discipline, the terminology has evolved to encompass practical analysis methods as well as the archaeological terminology for reporting these results to an archaeological audience. Hence, the specific terms pertaining to the analysis and the results will be defined.

Each of the specific artifact classes provide different information. The decoration on the ceramic vessels provides both information on cultural identity as well as diffusion of design elements between cultural groups. The different types of stone for tool manufacture can indicate both trading patterns and the previous travels of the group prior to establishing a campsite at The Forks. The botanical analysis, in addition to delineating wood utilization choices, also provides environmental information as to which species were present and, to some degree, the frequency of those species in the adjacent vicinity. The residue from the harvested food, i.e., butchering remains, also reflect choices made which weighed energy expended for harvesting versus energy accrued in terms of weight of available food. In addition, the presence and/or absence of expected species lends itself to environmental reconstruction or the interpretation of a cultural bias in favour of or eschewing a particular species. All of these parameters are brought to bear in the analysis of the archaeological faunal remains of each level in an attempt to determine the subsistence activities employed by the occupants.

3.2 Methodology for Ceramics Analysis

3.2.1 Introduction

Ceramic traditions were relinquished in favour of trade items soon after European intrusion. The copper pot was lighter and more durable and quickly supplanted the use of clay pottery. Unfortunately, there is little written information documenting the use and manufacture of ceramics amongst Aboriginal Peoples at the time of contact, and even less from before that time. Our current understanding of Pre-Contact ceramics has been gleaned primarily from careful excavation, analysis, and the subsequent construction of regional typological frameworks. It may surprise some but archaeological contributions in this part of the world have been building for only the last six to seven decades. And during that time, archaeology has changed and continues to evolve. We attempt to build and add to the story, correcting and evaluating our own approaches in an attempt to clarify and construct a picture that is as correct as possible. This is an on-going process.

Clay, the base material of ceramics, is an inherently workable material and is arguably subject to the highest level of manipulation of any of the materials utilized by the people living in this area. The clay sources in any given area were known and the unique working characteristics of the clay from these sources would have been tested and understood by the people who utilized them. They would have known what was required to achieve serviceable results or better. Today, only a few people have extensive experience with the working characteristics of regional local clays. Those people have differing personal motivations for their pursuits. Some are exploring local clays to further their own arts while others are pursuing replication work as part of a growing sub-field of archaeology. The accumulated knowledge is insignificant in comparison to the eons of experience distilled through generations of Pre-Contact Aboriginal peoples, but we are gradually building a view of the implications for ceramics in daily life and within the larger realm of social and political interaction.

The firing of clay objects has always been a complex manipulation of physical and chemical properties and, to attain a usable vessel, a certain mastery is required. Pre-Contact Aboriginal Peoples took an inert mass of clay and formed it into three dimensional objects for storage, cooking, and other uses. Archaeologists decipher the remnants of these pots, dissecting the decoration and reconstructing the sherds in order to interpret the form of the vessel. Other inferences can be made by analyzing cooking residues, providing insights into regional, seasonal, and horticultural preferences in food resources.

The fact that clay is such a plastic medium allows opportunity for personal and cultural expression. Variations in pot form and decoration have been identified and have been determined to represent particular regional populations. Understanding the mechanisms that encourage or repress these expressions, along with defining relationships between populations over time, are the challenges facing archaeologists. These populations changed their territories, their cultural make up, and resource reliances over time due to various environmental, social, and political pressures. These same pressures may also have direct or indirect influence on the decoration and manufacturing techniques. These shifts are reflected in the archaeological record and can have broad implications for archaeologists as they attempt to interpret what is found.

This report will try to not delve too deeply into these aspects of study, but this is a necessary part of integrating field findings into shareable knowledge. It became evident, during the field excavation component of the project, that the ceramics of this excavation would challenge our current frameworks. The period from which these materials derive was a period of diversification and the ceramics from all levels appear to relate in a continuum expressing that diversity. These sequential occupations may represent the development of a single group, or a small number of related groups, which allows us an opportunity to gain insight into the ways that ceramic form and decoration changed during a relatively short period of time. This assemblage of materials appears to exemplify an entire realm of typologically undefined ceramic types. Because of this, some effort was undertaken to isolate trends which may lead to the identification of new ceramic complexes.

3.2.2 Methodology

Of the three separate levels excavated, two had component sub-horizons. These sub-horizons were excavated as discrete deposits and the ceramics from each of these horizons will be reviewed and reported upon independently. In this way, we will be able to discover variations and similarities between these horizons and then look at relationships between the component sub-horizons of each level. By describing the material in this manner, we will be able to isolate these separate occupations and cultural components within.

The approach to descriptive analysis is dictated by the material. When working to define a particular type of ceramics or related groups of ceramics, researchers will often create their own approach to systematically describe their material, establishing physical parameters on form, decoration, and other attributes. When analyzing a multi-component site such as often occurs at The Forks, several of these types of references may have to be used.

The ceramics from this excavation share a common vessel form, a globular body shape with a defined constricted neck. The main areas of differentiation are found in the rim to shoulder section. The analysis in this report will use a system of characterizing these attributes based on the fundamentals of form and commonalities of decoration.

3.2.2.1 Material Terminology

Understanding ceramics requires a certain degree of technical knowledge but, for this report, discussions will be maintained at a non-technical level. A few points, however, need to be appreciated in order to understand the discussion and results.

Modern ceramicists rely on a scientific level of control in the manufacture and production of objects. Kilns are precise and the composition of clay is manipulated for colour, texture, and other technical characteristics. Aboriginal ceramicists did not have controls to that degree, but rather through generational accumulation of knowledge understood exactly what was necessary to achieve results. Pre-Contact ceramic material has ranges in character and quality influenced by a number of factors, including clay chemistry, temperature and oxidation control during firing, and tempering additives to control shrinkage and aid in the release of water vapour during firing. The degree to which the clay is worked prior to construction also will influence the density and porosity of the final product. With these points recognized, one can interpret the fragments that are being reviewed.

In order for clay to become a ceramic, it must undergo heating or firing. The process of solidification in high heat where particles begin to stick together is called sintering. If the firing process stops there, a porous, low-fired ware is produced, which will likely not hold water well. Taking the heating higher, spaces between particles will begin to be filled with melted silica (glass) reducing porosity—this is called vitrification. Vitrification requires levels of heat that are very difficult to maintain in an open wood fire and complete vitrification is not seen in Pre-Contact pottery from this area. An absorption test is typically how the extent of vitrification is measured. However, this is beyond the scope of this report and also absorption tests require complete emersion in boiling water, which in some cases would be destructive.

The materials reviewed here hover between sintered and vitrified. For this report, the quality of the clay body or matrix of a vessel will be restrained to subjective observations. Other analysts have described clay body or paste quality using terms like blocky or laminated, describing the nature of fragmentation. Fragmentation qualities are affected by variables in manufacture and these qualities can vary within one vessel. If enough of the vessel is identified, an accumulation of observations can be assembled to characterize its history of manufacture.

For this report, general observations regarding quality will be confined to degrees of consolidation. Consolidation is a subjective evaluation of how well the ceramic body holds together. A higher density equals better consolidation, a lower density creates poorer consolidation. This is a function of the quality of the clay, how well it has been worked, and how well it was fired. Evaluating each of these aspects independently will not be done across the board in this report.

3.2.2.2 Vessel Terminology

Despite the obvious utility of a ceramic pot, its inherent flaw is that it breaks and then is no longer usable. Archaeologists refer to the broken pieces as sherds and differentiate them by the portion of the vessel they came from. These portions can be broken down differently depending on the form of the vessel. Figure 3.2-1 illustrates the general definition of vessel portions to be reviewed in this analysis.

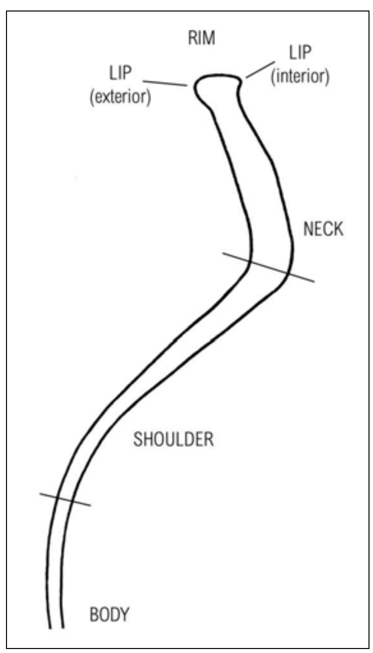


Figure 3.2-1: Cut-away Vessel Profile Showing Portions

The part of a vessel that holds the majority of the interpretive data is the portion above the shoulder. This portion illustrates what is called the rim profile and is the primary area of decorative expression. Everything below the apex of the shoulder is called the body of the pot and is constrained primarily by function. The body does, however, supply some information regarding manufacturing approach.

3.2.2.3 Surface Treatment

Surface treatment is an attribute describing the exterior of the vessel that indicates more than just texture. Late Woodland Period ceramics are highly varied. Pottery had been diversifying regionally and culturally for roughly a thousand years before the materials we are reviewing here were created. Over that time, many different approaches to manufacture and decoration had evolved. One variable characteristic is exterior surface treatment. For this report, surface treatments are characterized as follows: textile impressed, sprang impressed, obliterated textile impressed, vertical cord impressed, and smooth.

The 'textile' in textile impressed is any woven cord pattern with warp (the strands that run lengthwise) and weft (the strand(s) that runs from side to side). It is a relatively inflexible weave with a grid based structure. It should be noted that loom weaving has not been identified in this part of the world during the time period that encompasses the occupations recovered during the excavation. Warp and weft weaving without a loom is possible, using a frame, or a weight tensioned warp system which enables the warp to be kept taut allowing free hands for weft manipulation. There are many variations on this simple theme. Few have been identified from ceramic impressions thus far.

In a particular impression, the exact nature of the weave is often difficult to isolate. The weave pattern is often obscured. Whether this is due to the manner in which the textile is used in pottery production or is the nature of the textile itself, it is beyond the scope of this analysis to review on a case by case basis. Regardless of the specific weave pattern, these textiles create an impression pattern that is grid-like. Because of these vagaries, the 'textile impressed' classification is used to describe generic textile impressions where surface details are not clear or complete enough to identify a weave. Textile impressed as a surface texture identification is in a sense a default. As an analyst or cataloguer, one needs to be mindful of this. Also, cataloguers occasionally will enter textile impressed as an identification knowing that is not present on the sherd being catalogued, but is known to be present elsewhere on the same vessel. As a result, the statistical review of the propensity of textile impressed in an assemblage may not be perfect. The only way to avoid this problem is to do reconstructions of all vessels. This is not possible for this report.

One distinctive weave pattern, sprang weave, will be the only textile to be isolated. It is distinct in its appearance, function, and manufacture. Essentially produced with only warp strands (though not fixed), it may be familiar to some as a fish net pattern. Although where the strands intertwine, they are not knotted, so the textile is very flexible, and this is important. It has the ability to expand across the weave and was used to create reusable bags within which the vessel was formed. The bags were then removed prior to firing and reused. At this point, it is unclear if the textile impressed vessels were made in the same way. It seems unlikely that a warp and weft woven bag would have been flexible enough to be removable prior to firing. Currently, we think of textile impressed vessels and sprang impressed vessels as being formed in different ways.

The differences between the two different types of weave are illustrated in Plate 3.2-1. The sprang impression on a body sherd, DlLg-33:08A/14347, from Unit B17 in Level 2A and the plasticine impression of the markings are shown on the left side. The right side depicts one variety of textile impression on DlLg-33:08A/13898 from Unit I3 in Level 1.

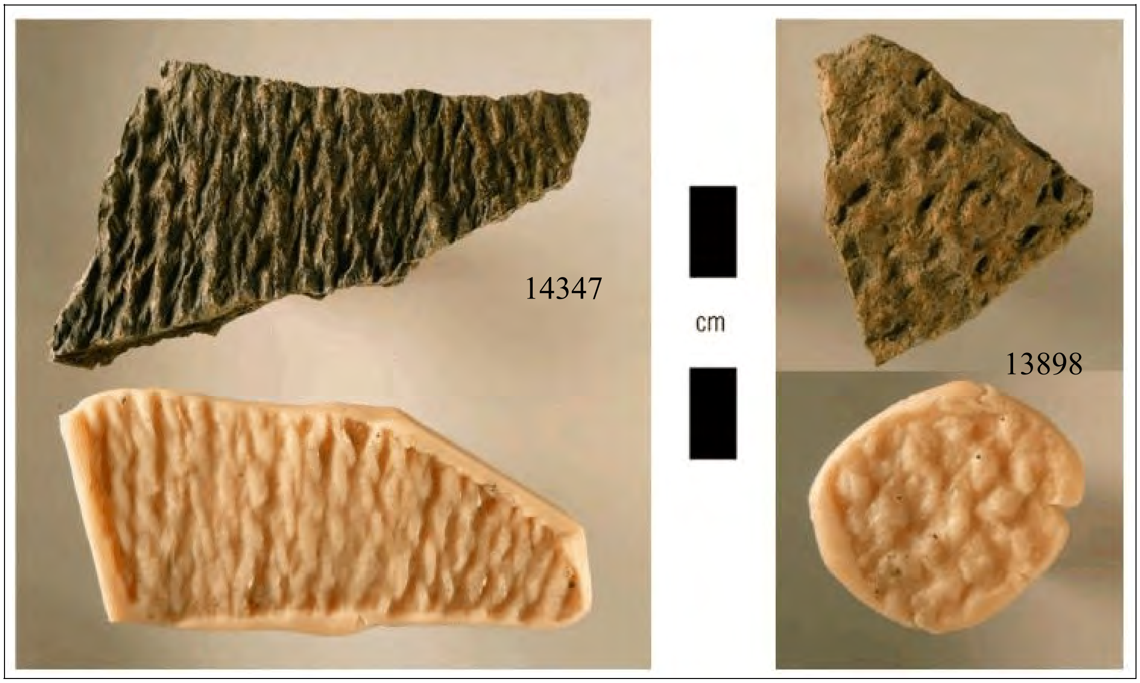


Plate 3.2-1: Difference between Sprang Impression (left) and Textile Impression (right)

Obliterated textile impressed is a category which identifies a textile impression that has been obscured by a secondary process of smoothing. This can show up to varying degrees on different vessels. Some vessels will exhibit this preparation consistently over the entire surface, while other vessels will show 'obliteration' in isolated areas only. These isolated obliterated areas are sometimes obviously intentional, as around the neck in preparation for the application of decoration. It is also commonly seen on the exposed shoulder surface and on the basal portion of vessels. In these areas, obliteration may not be intentional and may be smoothed simply as a by-product of the manufacturing process. The exposed high points on a vessel are rubbed or abraded during manufacture and pre-fire handling but, because obliteration also occurs intentionally over an entire vessel, it is worth noting in a general review. Because of this, this identification is to be taken as a general observation of presence or absence. It is a trait which can be used to differentiate between individual vessels or portions of a single vessel.

Smooth surface finish is occasionally identified from the Late Woodland Period. It can be a diagnostic along with other traits. It is not considered to be typical in this area though it does occur on a small number of vessels.

The impressions or textures on the surface of a pot are essentially a negative cast of the tools and materials used to manufacture the pot. By creating a cast of these impressions, one can often bring to life incredible detail in positive three dimensions. Fabric or textile impressions revealed in this manner offer valuable insight into a technology that does not survive archaeologically in this part of the world, namely the textiles themselves. Basic weave patterns will be identified when possible, but detailed analysis will remain outside the purview of this report. This data is less critical to evaluating cultural affiliation than is the rim to shoulder section. Therefore, particular attention will be given to the rim sherds. However, a statistical review of the identification of surface treatment was compiled.

Rim sherds with surface treatment identified were included in the overall statistics. Primarily, this information was gleaned from the analysis of the body sherds. In all levels, there was a portion of the total recoveries that had no surface treatment recorded. This sample included sherds too small to identify any particular surface treatment, exfoliated sherds with no observable surface treatment, and rim sherds where the surface was obscured by decoration. The only way to avoid these complicating factors for the surface finish statistics is to do reconstructions of all complete and partial vessels. This was not undertaken for this analysis.

3.2.2.4 Sherd Recognition and Portion

Curvature
The transition between body and shoulder is unique in globular vessels with constricting necks. The sherds from the transition area between body and shoulder will often exhibit two different curvatures, one on the horizontal axis (the vessel diameter) and one on the vertical axis (the curvature of the shoulder). The vertical axis curvature is often tighter giving a clue to the orientation of a particular sherd. If the shoulder and diameter curvatures are similar, the shoulder sherds may easily be indistinguishable from other body sherds. In some cases, this has likely occurred.

Orientation
The orientation of a sherd becomes significant when attempting to do reconstructions. For this analysis, orientation is only evaluated on sherds from the shoulder to the rim. Deciding which way is up for an individual sherd can often be challenging but some clues can help. As mentioned above, curvature can help. Another feature that can be used is the textile impression on the exterior, particularly if the textile weave has a directional character. Also, interior markings left over from manufacture and margins of encrusted cooking residues can be supporting evidence. Where there is decoration present on a sherd, knowledge of sherds from the same vessel and what might be typically expected on a vessel of a certain type can also provide insight.

Thickness
Wall thickness in a given vessel is usually variable and is influenced to a great extent by the expansion affected through shaping the vessel from the interior. The thickest areas in Late Woodland vessels tend to be the basal and upper shoulder to neck portions. The thinnest portions tend to be in the upper body and shoulder transition zone. This is the part of the vessel with the widest diameter. Working with this general rule, one can often use thickness in combination with curvature to understand the portion from which a given sherd may have originated, aiding in the reconstruction of singular vessels. For this analysis, reconstructions were not pursued and, thus, thickness was treated as a secondary trait and was not rigorously documented.

3.2.2.5 Decoration Terminology

As mentioned in the introduction, clay is an especially expressive medium. It can be manipulated and formed in an infinite number of ways. Once dried and fired these expressions are relatively permanent. This report focuses on two kinds of expression, modelling and impressions.

3.2.2.5.1 Modelling

Modelling is the three dimensional manipulation of form. In this assemblage, there is little modelling beyond the basic globular jar form. Most expressions are restricted to the lip and rim portions of vessels. For the most part, physical modelling will be seen only in the subtleties of the rim profile or contour. With the exception of only a few vessels, the neck forms analyzed here are limited to straight, flaring, or incipient S (Figure 3.2-2). The stance, or angle of the neck, was recorded because it was observed that the same profile could be used at different angles, usually a degree of outward lean.

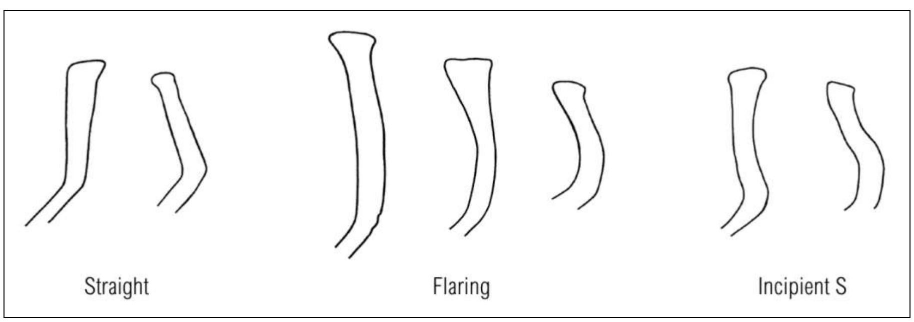


Figure 3.2-2 Typical Rim Profiles

Vessel Profile Characteristics
Another profile character observed is neck height (Figure 3.2-3). It is deemed to be a relevant trait which influences both the appearance of a vessel and the proportioning of the decorative motif(s). This along with thickness measurements illustrating proportioning of rim, neck, and shoulder will be used to characterize individual vessels. These measurements are taken from sherd(s) representing as much of the vessel profile as possible (when multiple sherds were required only those that refit were used). The shoulder thickness measurement is the minimum observed thickness and is likely

taken from different locations on the shoulder portion of each vessel. It is added only to suggest the rate of change of thickness below the neck and above the apex of the shoulder.

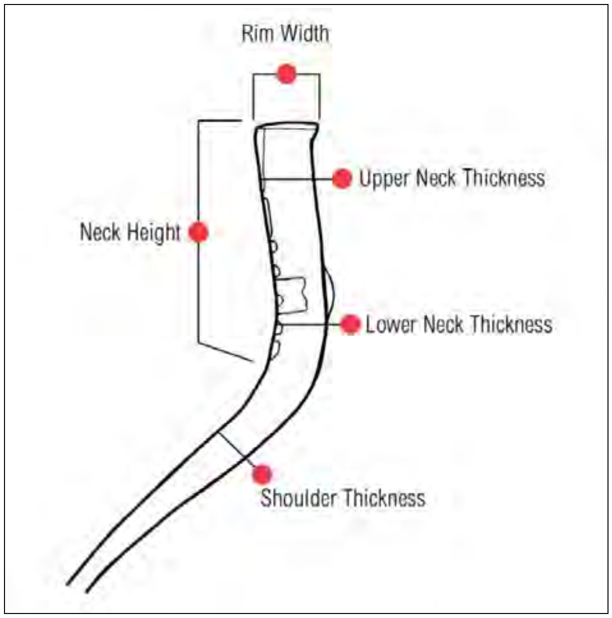


Figure 3.2-3: Vessel Profile Showing Points of Measurement

Vessel Diameter
The inner diameter of each vessel aperture (at the rim) is estimated and recorded where possible using a circumference template. This may further elucidate vessel variation within the assemblage. As most vessels are represented by incomplete portions, a diameter range is estimated and a mean diameter is produced. This measurement is based on the rim level aperture as this was available on most identified vessels. A more appropriate aperture would be the minimum opening, usually at the neck juncture with the shoulder. This portion is not affected by a vessel's neck flare or stance. This portion was available less often.

3.2.2.5.2 Impressions

In their myriad of forms, impressions are the primary manner of decorative expression seen on the vessels from the time period defining this excavation. Archaeologists have created a number of approaches to evaluate these markings based on the particular materials they are examining. Most impressions are defined by examining the physical action of making a mark using a tool. This is done in an attempt to standardize our language. However, the decorators of the vessels did not think in those terms and often altered their technique of application of a decorative element on a single vessel.

All of these marking methods are subject to the variability of human touch. Inconsistencies are commonplace. Variations among sherds of a single vessel often complicate vessel identification.

These impressions, or individual decorative elements, are often applied in combination and in particular patterns creating motifs. These applied decorative motifs, in conjunction with the form or profile of the vessel, are what analysts use to define how a pot fits into the ceramic taxonomy. The following are the most commonly described for this period and region.

Stamping
Stamps are created by pressing the narrow end of a tool into the clay creating a single mark. Modifying the end of the tool will alter the shape of the mark. But simply changing the angle of the tool can also create a different shape. Stamping is usually done in series to create lines or rows, but can also be seen in small sets or as individual marks.

Stab and Drag
Essentially the same as stamping but, instead of lifting the tool to make a series of distinct marks, the tool is not lifted off the surface entirely before pressing it back into the clay. This creates a continuous line of impressions that are connected.

Trailing
A trailed line is a simple line made by dragging the end of a blunt tool across the surface.

Incising
Incising is the process of making a simple line with a narrow, sharp edged tool. This creates a very precise and thin line, often deeper than a trailed line.

Cord-wrapped Object Impression
This will be referred to repeatedly in this text and will be abbreviated to CWOI. The word 'object' is deliberately vague as it could be made of a number of often undeterminable materials. It is most commonly understood as a rod or flattened rod of wood or bone with a thin diameter. Cordage of varying diameters and qualities is then wrapped around the object. The cordage can be wrapped in an open coil, meaning there is space between the individual coils, or in a closed coil where the wrapping is continuous with no space between coils. This form of decoration is made by laying the length of the cord-wrapped object on the surface of the still soft clay pot. This creates a linear impression which is usually applied in series to create a pattern encircling the rim and neck of the pot. There are three types of impressions produced using this method. Oblique CWOI are impressed into the clay in series creating a distinctive graphic and directional motif. They can be angled either right or left and are occasionally seen applied as compound impressions, creating chevrons, criss-cross, or alternating sets. The second type is horizontal encircling rows around the neck, where the tool is rocked along the curvature of the neck repeatedly and continuously until the row is connected. This is often repeated to create multiple rows. The third type of CWOI is actually a stamping technique using the end of the cord-wrapped object. This is called CWOI stamping. This type of decoration is somewhat problematic as it can be interpreted differently if the angle of impression changes. If the impression is produced more with the side of the tool, the impression becomes longer, creating a mark more like a typical oblique CWOI, which is not a stamp *per se*. This can become a matter of interpretation which is not without possible typological consequences. Cord-wrapped

object impressions are the singular most common mode of expression in this region during the Late Woodland Period.

Punctate and Boss

The punctate is fundamentally a stamp pushed deeper. Symmetrical and asymmetrical punctates are possible. Symmetrical round punctates can be created by twisting the tool before it is withdrawn. The general rule is that if the impression is deeper than its width, the impression is designated as a punctate. The definition of the punctate impression used here is somewhat looser. For this analysis, size, position, and graphic effect were also considered, not just the width to depth ratio. This impression will often create a corresponding boss. The boss is a bump of displaced clay produced on the opposite side from the punctate. The boss can become a decorative element unto itself. This scenario has many factors in play: the thickness of the clay wall; the diameter of the punctate tool; and the density and water content of the clay. All these things can affect whether a boss is created. Therefore, a punctate and a boss can actually exist without the other. For example, a boss can be created by a stamp.

Combing

This is a practice of creating parallel vertical lines by dragging a serrated or cord-wrapped object across the surface of the pot. For this analysis, it is treated as a decorative technique as it is observed only from the neck/shoulder juncture to the rim portion of a vessel. The execution is often quite precise but acuity of line does not always appear to be important. For this assemblage, combing was identified as present when parallel vertical lines were seen from the neck to the rim. They do not need to be continuous. On some vessels, this decoration was applied over a still rough but obliterated textile or even over previously applied decoration. This attribute should be noted as it relates to possible typological distinctions.

3.2.2.5.3 Non-Decorative Marks

Occasionally marks can be seen on ceramics which appear to be part of the decoration. However, they may be the result of manufacturing process rather than intentional decorative technique. Two of the most likely are discussed here.

Brushing

Unlike combing, brushing does not exhibit controlled application. It can be vertical, horizontal, or oblique, or all of these, though it is typically seen as horizontal. It appears to be related to surface preparation and vessel forming and is likely created with the use of a soft material (i.e., fibre, textile, or hide). It is not considered a decorative technique. It is distinguished from combing by its randomness.

Scraping

This is similar to both combing and brushing in that it creates parallel linear marks. It relates specifically to the physical shaping and thinning of a vessel from the inside using a hard bone or stone tool. As such, scraping is almost always defined on the interior.

3.2.2.6 Cultural Terminology

Taxonomy is a system of hierarchical classification based on lineages of shared traits. Archaeologists need a context like this to understand the variations in pottery which are seen over time and across the landscape. Hierarchical flow charts, as used in other scientific disciplines, help illustrate succession, which type came before and which type came after in a given region, and therefore what is related to what. In general, these 'big picture' relationships are built gradually by first observing similarities on a large scale. The largest entities, *configurations* and *composites*, are comprised of smaller groups of related ceramics called *complexes*. Complexes are made up of more narrowly defined types or wares. These terms represent finer and finer discrimination on broad cultural traditions, over shorter periods. In a practical sense however, the review of ceramics recovered from a single site usually only affords a view of a narrow window of time, limiting the scope of typological evaluation. In this way, smaller scale differentiation, at the type and complex level, becomes the position at which most discussion takes place. The types and complexes, when defined, are evaluated against other materials from the same period and general region and tested against the broader framework.

The term *tradition* is used in this report as non-specific, referring to any lineage or commonality that may tie vessels together in a conventional sense. This excavation consists of consecutive occupations and, because of this, certain terms are used to discuss the observed connections between the vessels. Terms like tradition, lineage, trend, continuum, and thread are used to relate perceived notions of connections, thus identifying types to be considered. The changes and shifts in form and decoration are reflections of the lives and history of the people who made these vessels.

Archaeologists use contrived names to identify distinct pottery types or traditions (e.g., Blackduck, Bird Lake, Mortlach, etc.). These terms are often used as 'Cultural' identifiers, but imply no particular relationship to modern cultural groups though they are obviously ancestral. That being said, the majority of ceramics identified from this excavation falls into a broad regional framework defined as the Western Woodland Algonkian Configuration (Lenius and Olinyk 1990). Algonkian is a linguistic term that defines ancestral Cree and Ojibway language groups, among others. There is potential at the CMHR site for materials from other ceramic traditions that may represent other language groups, for example Siouan.

The names used to differentiate pottery for the archaeologist are accompanied by temporal parameters. These associated date ranges are compiled from multiple excavations from across regions. Pottery sherds exhibiting the appropriate traits to be designated as a type are considered diagnostic and, in that sense, they can provide an idea of when and who occupied a particular site. As mentioned earlier, the most diagnostic portion of a pot is the shoulder to rim. For the sake of this report, detailed analysis will be confined to that diagnostic portion of the pottery.

3.2.3 Areas of Analysis

Ceramic analysis consists of examining multiple variables represented on singular artifacts and from that deriving an interpretation of the whole. As such, attention is paid to discrete attributes of the shape of the vessel, the type of decoration, the manner of decoration, the method of manufacture, and evidence of use.

Form

For the purposes of this review, observations of form will primarily be focussed on the shoulder to rim portion of each vessel. Neck profile, rim form, lip treatment, and thickness will be the primary focus.

Decoration

The analysis of the decoration will entail identifying the particular types of impressions, the patterns they create or motifs, and the combinations and positioning thereof. The decorative characteristics of a given vessel are considered in the context of the ceramic typology for this region and the other vessels from this excavation. In some cases, the quality of an impression will offer the opportunity for further insight regarding the shape and material origins of the tools themselves. These observations will be commented on during the discussion of each vessel. Tendencies in the manner of application of particular impressions and the unique characteristics of each potter's tools will help to define individual vessels and can work in concert with unique manufacturing traits to group vessels that may be the work of a single maker.

Decorative Structure

Decorative traits used in defining ceramic types can be described as components of the decorative structure. In this material, the decorative structure is usually made up of one to four motifs. In the review of this material, most of which is undefined, recognizing what constitutes a shared trait involves comparing the position of similar elements, as well as the structure, position, and variation of particular motifs. In this manner, threads of continuity are potentially isolated. If these are distinct from the rest of the materials, they may warrant being categorized as a new ceramic type. Decorative structure also involves a proportional relationship with the dimensions of the vessel itself, in particular, the height and profile of the neck. When viewed in this way, the makers' desired motifs must be considered in relation to the available decorative area. If more than one motif is to be applied, spatial positioning and balance become relevant. In that sense, proportionality might also be thought of as a decorative trait.

Manufacturing Traits

Surface treatments, degree of consolidation, temper, final fired colour, and evidence of moulding, i.e., lamination, modelling, joins, folds, burnishing, scraping, etc., will be reviewed.

The clay body itself, or paste, will be evaluated. There are again many factors influencing the clay body or paste quality. Terms like density and consolidation have many compounding effects influencing their definition. Clay source, additives, extent of physical manipulation, and firing environment are among the many contributing variables. These variables are nearly impossible to reconstruct after the fact. General observations regarding these qualities will be recorded for all the ceramic materials recovered, in particular where relevant to diagnostic specimens.

Various observations of structural traits will be presented: recognized seams or joins, variations of wall thickness which show up in transition zones, rolling over edges, and folding. These will be mapped in profile drawings which will help elucidate work strategies. Construction strategies, or methods of work, have to be consistent to achieve repeatable results and therefore are a significant part of a potter's approach to their work.

Evidence of Use

Physical modifications prior to deposition will be reported. Direct modifications, such as drilling and repair patches, and indirect modifications, like use wear and surface polish, will be reviewed. Also, samples of cooking residues have been submitted for third party analysis in an attempt to identify food resources.

Vessel Designation

After examining all attributes, discrete vessels will be defined and given vessel designation numbers. Vessel designation will be based on the rim/neck sherds and adjoining sherds. The entire decorative treatment and complete rim profile will not necessarily have to be present, but enough must be available to determine dissimilarity with all other vessels. This will give a basic calculation of the number of vessels broken and abandoned in the excavation area of each horizon and will help to develop a picture of spatial distribution and scatter for individual vessels.

All attempts were made to maintain a vessel number sequence by the catalogued sequence which reflects the sequence of discovery. Unfortunately, very late in the process, some vessels, defined by single sherds, were identified as parts of other already identified vessels and were thus merged. In these cases, the previous vessel numbers were left blank (Vessels 5, 65, and 68). This is not ideal but a significant amount of work would be required to adjust all numbers and the relevant texts and could give rise to possible errors.

Statistical Review

Data illustrating the depositional distribution by weight in the excavation area will be presented in the form of density maps. Overall recoveries will be characterized by surface treatment and presented in table form to illustrate trends and for quick review of proportional distribution.

3.2.4 Non-Vessel Ceramics

3.2.4.1 Heat Modified Clay

A common find in the excavation was fragments of solidified and heat discoloured clay, sometimes laminated or sometimes in amorphous chunks. To the untrained eye, it appears to resemble pottery. Confusion is also seen in the terminology. It is often designated as daub or hearth clay. Properly defined, daub is a term which identifies a rudimentary form of cement for architectural use. Hearth clay is a more accurate term, though in many cases this material was found without association to a hearth. In many soils, including those typical of the Red River valley, a campfire built directly on the soil will create a discoloured patch beneath. Depending on the intensity of the heat emitted by the fire and the iron content in the soil, a lens of brown to red-brown to orange earth will be created.

Some structural fusing can take place within the substrate, producing erosion resistant fragments. The problem with the hearth clay definition is the simple fact that it was so readily found without the presence of a hearth. This was likely because of the high level of natural disturbance (floods, surface run-off, animal and human activity). Also, the possibility that natural fires are a source for this material resulted in the term 'heat modified clay' being adopted during the analysis. Being unable to attribute this material to a particular source, it was decided a single term which encompasses both should be used.

Identification of heat modified clay required differentiation from ceramic production by-products, here designated as 'cast-offs'. The absence of evidence of manual manipulation and temper material were the two primary factors of differentiation.

3.2.4.2 Cast-Offs

Cast-off clay is defined as well worked clay showing evidence of manipulation. If temper was identified, it was considered part of the production of pottery vessels. If not, it was considered as evidence of clay modelling for other intent. This type of artifact only survives well after deposition if it is fired, this can happen inadvertently. These items will be evaluated and grouped on their own and discussed within each level section.

3.2.5 Residue Analysis

Generally speaking, residues tended to build up on the interior and exterior of vessels in the shoulder to neck region during repeated use. Exterior residues appear to be carbonized to a greater degree than those on the interior since the exteriors of cooking vessels were exposed to soot and ash from sitting in or being suspended directly in the fire. Budget limitations curtailed the extent of residue analysis that could be undertaken for this report and also influenced the choice of specimens to be submitted. Interior residues were chosen in preference because it was thought that they would have a higher likelihood of being food-based with less external contamination, i.e., soot and dirt. Rim/neck sherds were selected in an attempt to maximize the return of information—food source information as related to a particular vessel type and cultural affiliation. The resultant data will be presented in each level from which a sherd was submitted for residue analysis.

3.2.6 Reconstruction

The reconstruction of vessels is a time consuming process which falls beyond the mandate of a mitigative project. Often significant portions of vessels can be reassembled affording a greater depth of interpretation and increased insights into the ceramic manufacturing process. However, this portion of archaeological analysis must be left for future researchers.

3.3 Lithic Analysis

In order to discuss the stone tool assemblage recovered at the CMHR site, it will help if some terms and ideas about stone tools and their manufacture are elucidated. A glossary of lithic technology terminology is provided in Section 3.3.1.

Some stone is formed in a way as to make excellent material for tool production. Generally, a micro-crystalline structure (glass-like) of the lithic matrix is optimum. The more like glass that a stone is, the easier it is to work and the better it will hold a sharp edge. For edged cutting tools, stone that can be shaped without resistance from the material itself and will hold a good edge is preferred. For ground stone tools, stone that will respond to carving and maintain a cohesive form and perform well under use is the preferred type.

The majority of stone tools recovered from the various living floors of this site are the product of knapping. Knapping (or more properly, flintknapping) is the process of creating a tool by chipping flakes of stone from a larger piece of stone, reducing it in form until it is the desired shape. The stone itself is chosen for its ability to be fashioned into a tool. Generally, stone that does not have strong cleavage planes will react to the knapper's work in predictable ways. In some ways, this could be analogous to slapping a palm on water where, if one were to slap one's palm on still water repeatedly in exactly the same way under exactly the same conditions, the same wave would result each time. Similarly, if the knapper has enough skill and experience, he can predict and direct the ways in which the flakes will be detached from the parent rock (core).

Everyone within a band (both men and women) would have had the basic knowledge about how to manufacture the necessary lithic tools, projectile points, scrapers, and knives. Naturally, some were more skilled than others as a result of both aptitude and experience. It is obvious when looking at a tool from the past, whether the knapper was a skilled artisan or just an average person who needed a tool.

A probable scenario of the manufacture of a stone implement begins with someone using a medium-sized nodule of Knife River Flint (a semi-translucent brown type of chalcedony). The knapper sits down with the Knife River Flint (KRF), some pieces of antler, a few oblong stones, and some leather. He picks up the KRF (often holding the nodule in a piece of leather to prevent cuts from the sharp stone), picks up one of the oblong stones (often a good quality granite) and, after selecting an appropriate spot on the nodule, strikes it with the oblong stone. A large chip of stone (flake) flies off the nodule. Striking the nodule with one of these oblong stones is called 'hard percussion' as the knapper is using another piece of stone to strike the nodule.

The chip that flew off, depending on the knapper's intentions, could be considered a waste flake (called detritus by archaeologists) or a blank for a tool. If the knapper were to decide that the blank was of sufficient size and shape for the tool he wished to create, he might put down the KRF nodule, pick up the flake, and begin working on it. The flake (or blank) is held in leather and worked, perhaps by striking it with a piece of antler tine or bone, flaking off several long, thin waste flakes.

This type of percussion is called 'soft percussion' as the knapper is using a relatively soft striking tool.

As bone and antler will both flex momentarily as they contact the edge of the blank, this sends the force of the strike into the body of the blank and overcomes the resistance of the matrix of the KRF. This results in the detachment of a flake from the original piece of stone. If this is done skillfully, the direction and size of the flake can be shaped by the application of the proper forces. After a succession of these soft percussion flakes, the general outline of the intended tool will appear. If the knapper wishes to further define the shape of the tool, he could pick up an antler tine and, holding the blank in a piece of leather, press the tip of the tine against the edge of the tool and sharply push inward and downward. This type of flaking is called 'pressure flaking' and this stage is the final forming and finishing stage of tool production. The knapper, satisfied with the tool, can either move on to other tool production or use that tool instantly.

Knapped tools result in a great deal of detritus. Were the knapper to pick up one of those flakes and briefly sharpen an edge, that flake would now be called a 'retouched flake'. It is a flake but the work resulting in a sharpened edge has changed its designation. Were that flake to be used without modification, due the naturally sharp edge, it would be called a 'utilized flake'.

One problem encountered in this kind of research is that humans stubbornly and insistently continue to be human; tools are half-finished, or oddly shaped, or clearly meant to be a multi-purpose tool. For example, a modern hammer has at least two uses, to pull nails and to drive nails. Usually the hammer drives nails, and a carful look at a hammer's face will show multiple small indents, proof of that face's use. In archaeological terms, that is known as 'use wear'. The tines that pull the nails hide the majority of their use wear as they wear out mostly on the inside of their faces but there are still indications of their use visible. But who has not, just occasionally, used the tines to tear at a broken 2" x 4" or to pull plywood away from a corner? A careful analysis of the use wear and work polish (highly polished spots or lines on the various faces of a tool) may show that several different types of use have occurred. Yet, most people would say a hammer is for driving nails. Stone cannot be formed as discretely and repetitively as cast metal and the material used and its quality, the skill and patience of the knapper, and even the requirements of the moment, are all variables that will influence both the manufacture of a stone tool as well as the way it was used. Some tools defy categorization.

3.3.1 Glossary of Terms

Lithic analysis, like any other specialized research, has its own language. In many instances, the words are self-explanatory but occasionally the word can be used in a sense that is not the same as in mainstream English. To assist the reader in understanding the analysis of the recoveries from this project, the following glossary is provided. This glossary has been adapted from *A Glossary of Manitoba Prehistoric Archaeology* (Historical Resources Branch 1989).

Adze: an axe-like implement in which the **blade** is hafted such that the cutting edge lies perpendicular to the handle similar to a hoe. A special case is a **trihedral adze** which is an adze with a triangular cross-section. These tools are used primarily for woodworking.

Arrowhead: typically made of stone or bone, the pointed tip of an arrow. If the means of propulsion cannot with certainty be identified as a bow, the term **projectile point** is used.

Awl: a pointed hand tool; frequently made of bone, used for punching holes in leather.

Axe: a heavy chopping tool of stone which may be handheld (a handaxe) or **hafted**. In the latter instance, the head is attached such that the cutting edge parallels the handle.

Basal thinning: the removal of **flakes** from the base of a **projectile point** or **blade** in a lengthwise fashion in order to facilitate **hafting**.

Bevelled surface: one that meets two others at angles other than right angles. The working edge of a **scraper** would be an example of such a surface.

Biface: a stone tool which has had **flakes** removed from both faces. No particular function is implied by this term as **projectile points**, **knives**, and **drills** may all be bifacially flaked.

Bipolar flaking: a technique used in stone tool manufacture in which the **core** is rested on an anvil while being struck from above with a hammer. The waves of force are therefore not only directed downward from the hammer, but also reflected back upward from the anvil. Hence, the **flake** may appear to have been struck at both ends. A **pièce esquilleé** is a tool that is the result of bipolar flaking.

Bit: the cutting edge of an **adze**, **axe**, **drill**, etc.

Blade: 1. the cutting edge of a tool.
2. a cutting tool.
3. that portion of a **projectile point** or **knife** which extends beyond the **haft** element.

Blank: an incompletely manufactured stone tool which has the general outline of the intended final form, also known as **preform**. The rough fashioning of blanks at a quarry would allow one to avoid transporting greater amounts of unmodified stone to camp or fashioning all stone tools at the source of the stone.

Bulb of percussion: a bulb-shaped feature on the **ventral** face of a **flake** immediately below the **striking platform**.

Bulbar scar: a minute surface irregularity which is occasionally present on the **bulb of percussion** of a man-made **flake**.

Chipping station: (also known as a **knapping station**) a restricted area or “floor” within an archaeological site which yields stone **flakes** to the virtual exclusion of other kinds of artifacts. Such features are frequently interpreted as places used for knapping of stone.

Chitho: a disc-shaped stone tool, often used for the scraping of hides. It is made of a type of rock (granite, sandstone) which, under strong pressure, crumbles rather than cutting through the hide.

Chopper: an **axe**-like tool, generally fashioned from a **cobble** or large **pebble**, usually worked only on one face.

Cobble: a medium-sized stone (larger than a **pebble**) which has been rounded and occasionally polished by erosion.

Concave: incurvate, as the interior surface of a sphere. The term is typically used in reference to the working edge of a **spokeshave** or to the “indented” base of a **projectile point**.

Conchoidal: literally “conch-like”; shaped like the exterior surface of a clam shell. The term is used to describe the fracturing properties of certain kinds of stone. In fine-grained materials such as flint, a fractured surface will exhibit roughly circular ridges radiating outwards from the point of impact.

Convex: bulging outwards; excurvate as in the case of the exterior of a sphere.

Core: the stone from which **flakes** have been removed. A “prepared” core is one which has been specifically modified in such a way as to permit a high degree of control over the shape of subsequent flakes. The core itself may be modified into a tool (core tool).

Cortex: the weathered, outer surface or rind of unmodified stone.

Detritus: debris; waste products or by-products of the manufacturing process. **Lithic** detritus would thus include unused **flakes** and exhausted **cores**.

Distal: the end of an artifact furthest from the user or observer; the end of a **lithic** artifact opposite the **striking platform**.

Dorsal: 1. the **convex** (excurvate) face of an artifact.
2. that face of an artifact which is furthest from the centre or the core from which it was manufactured.

Drill: a stone **bit** attached to a shaft and used to perforate dense materials by a rotary action.

Fire-cracked Rock: stone that has been fractured by exposure to heat.

Flake: a thin chip of stone detached from either a larger flake or a **core** by the application of pressure or a blow (percussion). (See **percussion flaking** and **pressure flaking**). Characteristically, manufactured flakes have a **bulb of percussion**, a **bulbar scar**, compression rings radiating outward from the point of impact on the **ventral** face, and the remnant of the **striking platform**.

Flaking: **knapping**; the act of removing **flakes** from a **core**, **blank**, or **preform**. Flaking can be either **percussion** or **pressure** flaking.

- ♦ **Percussion flaking**: a kind of flaking done by striking a **core** or tool with either a **hammerstone** or a bone or antler percussion flaker. Generally, percussion flaking is used to either remove **cortex** or roughly define the shape of a tool and will result in **primary decortication**, **secondary decortication**, and **secondary shaping** flakes.
- ♦ **Pressure flaking**: a kind of flaking done by utilizing the tip of an antler tine to apply pressure to the edge of a tool. Generally, pressure flaking will result in **thinning/sharpening flakes** but may also result in the creation of **secondary shaping** flakes.
- ♦ **Primary decortication**: a kind of flaking (generally **percussion flaking**) that serves to remove the weathered outer surface (**cortex**) of a **core** or tool. The **dorsal** face of **flakes** defined as primary decortication will have more than 70% of its surface covered in **cortex**.
- ♦ **Secondary decortication**: a kind of flaking (generally **percussion flaking**) that serves to remove any remnants of the weathered outer surface (**cortex**) of a **core** that remain after **primary decortication** has taken place and will have 30% or less of its surface covered in **cortex**. This flaking is also often the first stage of the shaping of a tool. Once enough of the **cortex** has been removed from a **core** via **primary decortication**, the knapper can judge the quality of the stone being worked and decide on the shape and size of the next flake.
- ♦ **Secondary shaping**: a kind of flaking (both **percussion** and **pressure flaking**) that further defines the shape of the tool being manufactured after the processes of **primary** and **secondary decortication** have taken place. Generally speaking, minimal or no **cortex** remains on these **flakes**. Some flakes that have been used as tools of opportunity may have **cortex** remaining and some tools have **cortex** remaining as well. This kind of flaking can finalize the overall shape of a tool.
- ♦ **Thinning/Sharpening**: a kind of flaking (generally **pressure flaking**) that deals with edge creation and maintenance. The shape and angle of that edge depends on the intended function of the tool. Resharpening that edge once it has been dulled from use will create similar flakes as those resulting from a thinning process. A tool that is sufficiently dulled by use that it has to be more or less completely re-knapped would leave behind flakes that could fit into either **secondary shaping** and thinning/sharpening.

Flint knapping: the **flaking** of stone for the purpose of manufacturing tools regardless of whether the stone is in fact flint.

Graver: a small, sharp-pointed tool used for engraving or incising bone, antler, ivory, wood, etc.

Grinding: the shaping of an object or the dulling of an edge by means of abrasion with another object or substance.

- **Basal grinding**: the smoothing of the **proximal** end of a tool (especially of a **projectile point**) so that it will not cut through its bindings after **hafting**.

Grinding stone: **whetstone**; any coarse-grained stone used to sharpen, dull, shape, or polish other tools by abrasion. Specialized function tools which are found in other archaeological sites have various names such as abrader, shaft smoother, etc.

Haft: (noun) the handle of a **knife**, the shaft of a spear, etc.; (verb) to equip with a shaft.

Hafting: the process of equipping a **blade** or other tool with a handle; the handle itself together with its bindings.

Hammerstone: a rounded or oblong **cobble**, sometimes equipped with a groove to facilitate **hafting**. Signs of use may include **pecking** facets or battering at the working end.

Hinge fracture: a kind of cleavage produced by a **flake** which does not run its full length. The point of termination is abrupt, and the flake is rounded on its **ventral** face at the **distal** end.

Knapping: the production or shaping of stone artifacts by the means of **pressure** and/or **percussion flaking**.

Knife: an occasionally subjectively determined function for a sharp edged lithic tool. Usually a knife is **hafted** and functions similarly to the same implement used today.

Lithic: of or pertaining to stone and rock.

Lithic reduction sequence: the entire process of manufacturing stone tools by **flaking** from the removal of the **primary** and **secondary decortication flakes** to the **thinning/sharpening flakes** that serve to create the final product.

Manuport: an object, often a **cobble**, which has been moved from one place to another by humans. Manuports need exhibit no other evidence of cultural modification to warrant classification as artifacts.

Microflakes: very small flakes that sometimes result from **pressure flaking** or from shattering or breaking **cobbles**, etc. These flakes can also occur as byproducts of **percussion** and **pressure** flaking, as well as tool use.

Multipurpose tools: tools whose forms lend themselves to more than one task. A **scraper** with a utilized **knife** edge, for example, or a tool shaped so that it can be used as both a **knife** and a **spokeshave**.

Notching: a V- or U-shaped indentation, usually used in describing the areas at or near the base of a **projectile point** which are used to facilitate **hafting**.

- ♦ **Basal notching**: in **projectile points**, a deep, often narrow indentation into the base; narrower and often more pronounced than a basal concavity.
- ♦ **Corner notching**: in **projectile points**, an indentation at the junction of the base and blade edge.
- ♦ **Side notching**: in **projectile points**, an indentation in the lateral blade edge, usually very near the base of the point.

Ochre: a general term for any of the clays or earths containing ferric oxide, silica, and alumina. Ranging in colour from yellow through red and brown, ochre was widely used as a pigment for decorative and ceremonial purposes throughout much of prehistory.

Pebble: a rounded stone, smaller in size than a **cobble**.

Pecking: a method of shaping stone artifacts by hammering them, thus wearing away the surface. Pecking facets are readily discernible on tools unless they have been erased by subsequent polishing.

Pièce esquilleé: literally "stepped piece"; a stone artifact, often wedge-shaped, with evidence of **bipolar** battering and reduction. These may have served as wedges for the splitting of bone or antler, or they may simply be used up **cores**. In the latter instance, the crushing at one end may be the result of the necessity of resting the **core** on an anvil due to its diminutive size.

Plains Side-notched: one of the small **side-notched projectile point** styles during the Late Pre-Contact Period. These specimens, which were probably used as **arrowheads**, range in length from approximately 10 to 34 mm and bear small, deep narrow rectangular side notches above frequently squared-off bases. Bases are generally straight or occasionally **concave** and at least as wide as the **blade**. **Basal grinding** is often present.

Prairie Side-notched: one of the small **side-notched projectile points** (probably **arrowhead**) styles of the northern plains during the Late Pre-Contact Period. These specimens range in length from 11 to 41 mm and bear large, wide, rounded but shallow side notches above squared or rounded bases. Bases are generally straight but may be slightly **concave** or **convex**. Generally, the basal width is less than the maximum width of the **blade**. **Basal grinding** is sometimes present.

Preform: see **blank**.

Pressure flaker: an implement of bone, antler, stone, or other material, used to remove flakes from a core or preform.

Projectile point: the detachable tip of an **arrow**, spear, harpoon or dart. In various times and places, projectile points have been made of metal, bone, wood, or stone. The latter are the most common in the archaeological record, largely because they are non-perishable. Stone points may be **unifacial**

or **bifacial** and may be manufactured by **flaking** or **grinding**. The **proximal** end may be modified to facilitate **hafting**. Included here are such attributes as **basal thinning** and **side notching** as well as **corner notching**. Because of the variety of forms which these weapons may take, the care that was often taken in producing them, and because of the frequently rigid adherence to a particular style by members of a culture, projectile points are particularly useful time markers for archaeologists.

Proximal: the end of a **lithic** artifact that was originally a part of the **striking platform** of the core. Also used when speaking of the end of a tool whose **striking platform** has been obscured by subsequent flaking, in which case it refers to the **hafted** end of a tool, or its equivalent if the tool was not **hafted**.

Reworking: modification of an object so that it may be used again. The reworking of stone artifacts after breakage was particularly common in times and places where suitable **lithic** resources were scarce. A **projectile point** which had been broken at the tip could easily be resharpened and some were probably reworked several times in this fashion, becoming shorter relative to their widths each time. **Drills** and some **scrapers** with bases similar to those of **projectile points** with which they are associated are often considered to be examples of reworking.

Scraper: an artifact used to remove the fat from the underside of a hide or to smooth wood, bone, or antler.

- ♦ **End scraper**: one which is worked at one or both ends. The end may be defined as the shorter of the edges in a rectangular specimen or the end which initially formed part of the striking platform or the edge opposite it. The working end will often have a steep working angle.
- ♦ **Side scraper**: a scraper which is sharpened on one or both sides. The side may be defined as one of the longer edges or one of the edges adjacent to the striking platform.
- ♦ **Thumbnail scraper**: a small, often domed, scraper shaped like a thumbnail.

Serrated: having a notched, toothed, or saw-like appearance.

Shouldered: having a lateral extension or protrusion. This term may be used to describe **knives** and **projectile points**.

Spall: a **flake** which has been produced naturally (such as by exposure to heat or freezing).

Spokeshave: a **scraper** with a pronounced **concave** working edge used for scraping **arrow** or spear shafts or any other bone or wooden artifacts to produce a smooth surface.

Striking platform: that portion of a **core** which is struck in order to remove a **flake**.

Sucking tube: a hollow cylinder, often made of a cut section of longbone and sometimes stone, through which a shaman or other healer removes disease.

Tools of opportunity: those tools that have been either used contrary to their original intent (a **scraper** being used as a **pièce esquilleé** for example) or are flakes that have been utilized due to their unintended shapes.

Uniface: a **lithic** artifact which has been worked on one side only.

Ventral: the face of an artifact, often a **flake** which was nearest to the centre of the **core** from which it was removed.

Wear pattern: the distinctive way a tool is dulled or abraded through use. Examinations of wear patterns can often more reliably identify the function a tool served, than can consideration of size and shape alone.

Whetstone: a sharpening stone.

3.3.2 Analysis Methods of Lithic Tools

The lithic analysis method utilized for the artifacts from the CMHR site followed a tree of analysis promulgated by Odell (2003). This resulted in the categorization of types of artifacts based upon the technology involved in the manufacture. The tree is as follows:

1. **Typing by Material**
   Chert versus limestone, Knife River Flint versus chalcedony, and so on.
2. **Typing by Technology**
   A. Ground stone implements
      Tool Identifications, e.g., palettes, chithos, whetstones.
   B. Chipped stone tools
      After typing by material and then technology, artifacts were then separated along these lines:
      i. Edge versus Surface Retouch
         If surface retouched then:
      ii. Unifacial versus Bifacial Retouch
         If Bifacial then:
      iii. Reduced versus non-reduced biface
         If reduced then:
      iv. Specific reduction versus generic
         If specific reduction then on to:
      v. Tool identification, e.g., projectile points, scrapers, knives, etc.
3. **Recording Measurements**
   Once the type of tool had been designated, then the standard sets of measurements were taken. For projectile points, these include length and width of the blade, length and width of the base, depth and angle of notches (if present) and tip angle (Figure 3.3-1). For other tools, such as scrapers, bifaces, knives, retouched flakes, the length and width of their working edge or edges, as well as edge angles were measured (Figure 3.3-2).

4. Describing the Artifacts

Each tool was described in terms of:

i. material type;
ii. the techniques most likely used to create the tool;
iii. the presence or absence of cortex;
iv. the presence or absence of hematite staining;
v. flaking type and size, with measurements of flake scars, depending on the type of tool;
vi. the presence/absence of use wear, polish, and hafting marks. This latter element is problematic as hafting wear is difficult to discern; and
vii. evidence of post-depositional processes, such as patination.

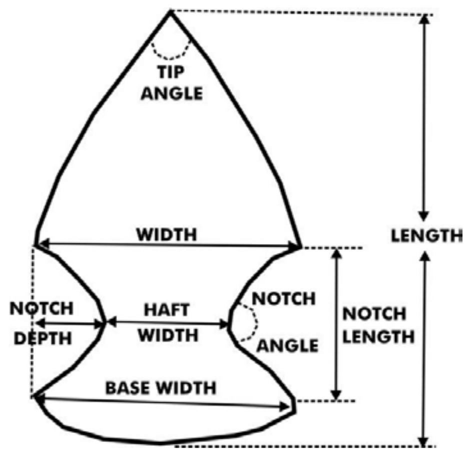


Figure 3.3-1: Measurements Taken on Projectile Points
(Manitoba Museum of Man and Nature 1986)

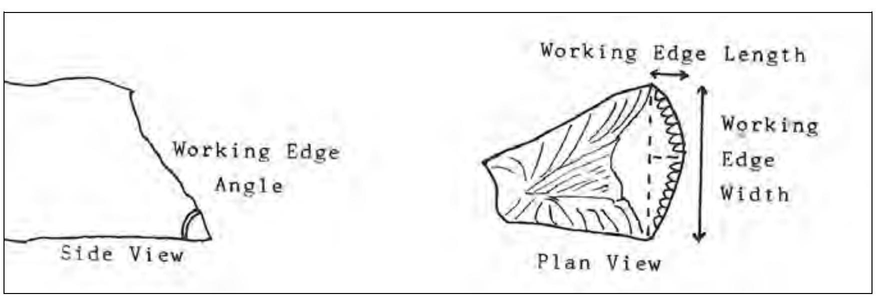


Figure 3.3-2: Measurements Taken on Scrapers and Other Edged Tools (Quaternary 1988)

5. Basic Microwear Analysis

This analysis did not go beyond a basic analysis to answer these questions: Does the tool have microwear? If so, does it have distinctive patterns? Can these patterns be compared to known use wear patterns? As the intent of the completed report is primarily descriptive in nature, any use wear encountered was described, photographed and, if possible, identified.

6. Cultural Affiliation

For many types of artifacts, form follows function and, as such, object styles remain relatively constant over millennia, i.e., hammerstones. Some artifacts, such as projectile points have shapes and technological attributes which have been identified as characteristic of specific archaeological cultures as well as temporal periods. These styles are given names often based on location of discovery and, in no way, reflect the ethnological characteristics of the people who used them. Where possible, diagnostic artifacts have been allocated to specific cultural affiliations.

7. Photography

The relevant artifacts were photographed for illustration within the report. The scale of magnification depended upon the artifact and the attribute of the artifact that is being portrayed.

8. Residue Analysis Selection

In keeping with the decision made during the excavation period that specific artifacts, especially projectile points and cutting implements, should not be washed to eliminate the possibility of future blood protein analysis, no further cleaning of these particular artifacts was undertaken during this analysis. In addition, tools which appeared to be candidates for residue analysis were noted.

3.3.3 Analysis Methods of Lithic Detritus

The analysis of the waste products of stone tool manufacture, in part, followed a similar tree to that of the tools:

- separation by material;
- counting and weighing artifacts in each catalogue number;
- reassigning of catalogue numbers, if necessary;
- frequency counts by material and by excavation unit;
- basic categorization of detritus by stage of manufacturing process; and
- sizing of flakes. While not definitive, breaking flakes into size categories will help define work areas on the site, i.e., knapping stations versus areas where tools were sharpened for continued usage.

3.3.4 Analysis Methods of Other Lithic Material

There are other lithic objects that occur in a campsite situation which are not part of the tool manufacturing process. These include stone which was used to line hearths, boiling stones for heating food, and ochre which was used for decorative purposes. Different analytical methods were used for each of the following categories.

1. Fire-cracked Rock (FCR)

Fire-cracked rock is often, but not necessarily, granite or other igneous stone which tends to be cohesive. It is used as hearth liners and/or boiling stones and shows the effect of thermal-alteration. The FCR was weighed and measured. The location of FCR recoveries was plotted on site maps to help define activity areas such as firepit features.

2. Limestone

It was decided in the field that limestone was not a critical cultural material and that only representative samples would be collected. All lithic material at this site would have been carried in as there are no nearby rock sources. The presence of limestone could be attributed to recovery of a type of chert (Selkirk Chert) found in limestone beds a slight distance north of this site (at St. Andrews) or it could have been used as hearth liners.

3. Ochre

Both red (hematite) and yellow (limonite) ochre were recovered. The quantities were weighed and the locations of recoveries plotted on site maps. This material is thought to be used primarily for decorative purposes. It would be finely ground, mixed with a suspending medium (fish oil, tallow, bear grease) and used as a paint.

3.3.5 Analysis Process

A large portion of the lithic analysis was undertaken at space provided in the Anthropology Laboratory at the University of Winnipeg courtesy of Val McKinley. The analysis began with a comparison between the field recorded data from DlLg-33:08A and the assemblage as received. The assemblage was broken into several general categories based on the material as identified in the field: flakes, tools, limestone, ochre, and fire-cracked rock. Each category was further separated into levels and sub-levels. Due to the relative abundance of flakes recovered, the database proofing began with this category.

Flakes were assembled for analysis by utilizing the field identifications of material type and level. For example, all flakes and flake concentrations designated *chert* and *Level 1* were assembled together, regardless of artifact number. This re-categorization allowed for a more consistent pattern of identification, while maintaining artifact numbering integrity. Thus, for example, all chert could be more precisely identified by comparing it to the University of Winnipeg comparative collection, resulting in appropriate designation as Swan River Chert or Selkirk Chert or St. Ambrose Chert.

Each artifact bag was individually opened and a recount and re-weighing of the flakes took place without the loss of artifact identity. This method enabled correcting the database if counts, identification, or weights were inexact. In cases, where a cluster-catalogue group of flakes consisted of more than one lithic type, a new catalogue number was assigned by the Database Manager for the second (and third and fourth) type(s). Use of a medium-power microscope enabled further identification of utilization (use wear, knapping scars, etc.) which resulted in the reassignment of that flake to utilized or retouched status. Following the KISS principle, utilized flakes and other tools identified during the analysis of the flakes remained within the flake collection until the analysis of flakes was completed and all corrections or changes, in conjunction with the Database Manager, Pam Goundry, were completed. All utilized flakes, cores, nodules, etc. were placed with the tool assemblage for further analysis.

The tool analysis began with the same method of database proofing as the flake assemblage. After basic proofing, the tools were typed by material and then by technology, that is flaked tools versus ground tools. If a tool was identified as a ground tool, then basic tool metrics were recorded. This included the overall length which is measured from the base of the tool or, if broken, from a point furthest from the working edge to the working edge. The overall width was measured using the same parameters. The thickness, both at the thickest point and at the narrowest, non-edge point, was recorded. Working edge angle measurements were taken as a mean of the recorded angles. Working edge lengths were taken by placing a length of waxed hemp string along the extremity of the working edge, then removing it and placing it alongside a ruler with millimetre markings. Waxed hemp string does not stretch easily and the slightly tacky nature of beeswax prevents slipping, mitigating measurement error when dealing with a non-uniform surface. Use wear, when identified, was noted and where possible compared to resource material for further identification.

The analysis resulted in a description of the lithic component of the archaeological record for each cultural horizon. A description of each level's lithic assemblage contains maps, frequency counts (flakes, distribution patterns, etc.), and other pertinent information.

3.3.6 Lithic Source Areas

An examination of source areas of lithic detritus can provide information about the movements and trade patterns of the occupants of an archaeological site. Often, suitable lithic material for tool manufacture is collected when encountered and carried until used. Among nomadic peoples, higher quality stone will be retained longer than more common, lower quality material and would be used to manufacture tools which are intended to be retained.

During the analysis of the lithic component of the archaeological assemblage from the Canadian Museum for Human Rights mitigative project, 36 different types of stone were identified (Table 3.3-1). The locations of specific types are depicted in Figure 3.3-3.

Agate	Hudson Bay Lowland Chert	St. Ambrose Chert
Basalt	Ironstone	Sandstone
Cathead Chert	Jasper	Schist
Chalcedony	Knife River Flint	Selkirk Chert
Chert (Undifferentiated)	Lake of the Woods Chert	Shale
Chert - Black	Limestone	Siltstone
Denbeigh Point Chert	Mica	Soapstone
Diorite	Phyllite	Swan River Chert
Feldspar	Porcellanite	Syenite
Gabbro	Quartz	Taconite
Granite	Quartzite	West Patricia Recrystallized Chert
Gronlid Siltstone	Rhyolite	Winnipeg River Chert

Table 3.3-1: Listing of Different Lithic Types

Regionally, the lithic material types that have been curated from the CMHR project can be organized into seven groups:

Group I: Materials found throughout the western portion of Manitoba. This group includes Swan River Chert from the Swan River Valley region near the Saskatchewan border. Other materials, such as agate, chalcedony, jasper, and porcellanite, are found in deposits like the Souris Gravel Pits.

Group II: Materials found in the central portion of Manitoba. This group includes Cathead Chert, Denbeigh Point Chert, St. Ambrose Chert, and soapstone.

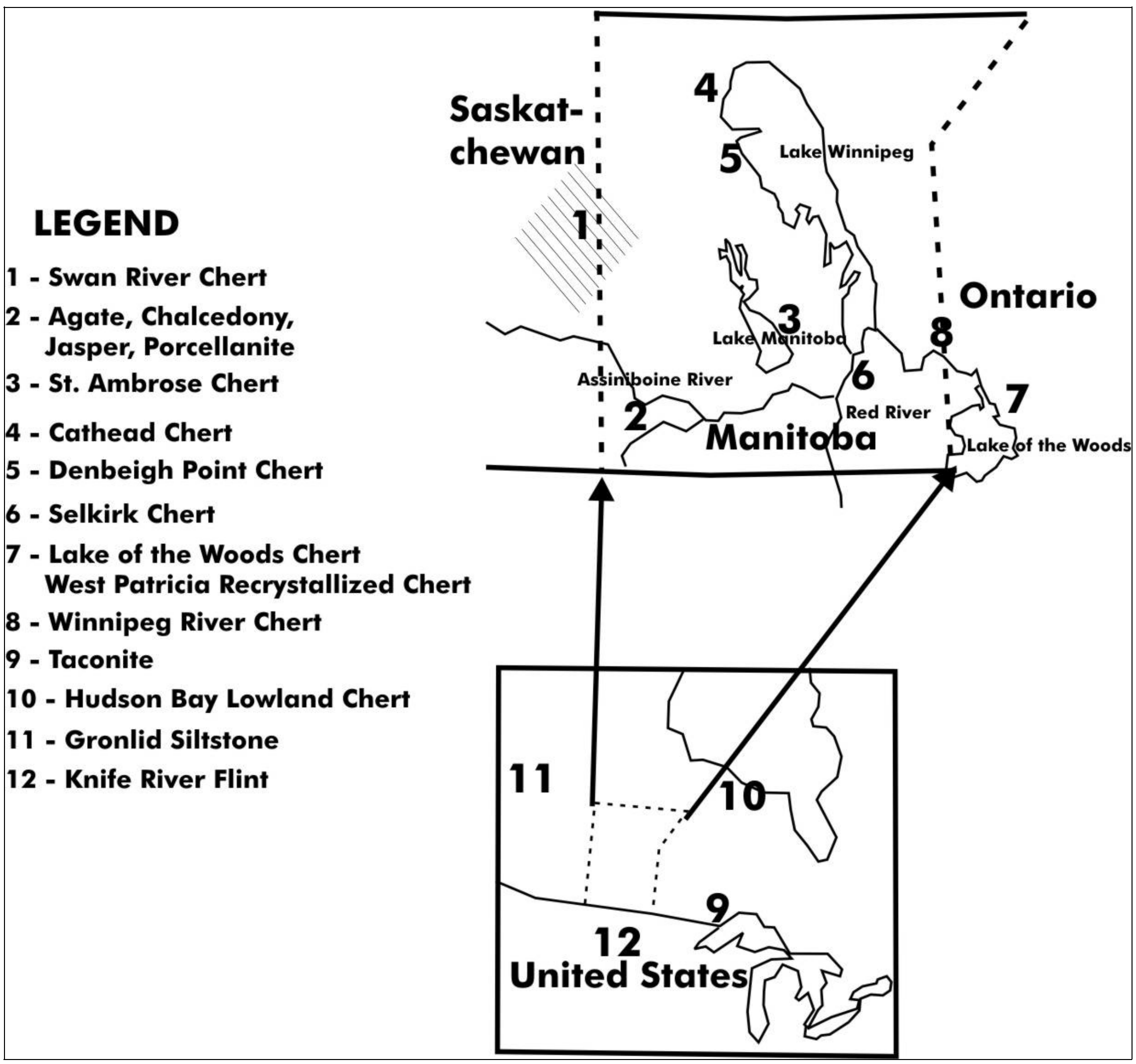


Figure 3.3-3: Locations of Source Areas of Specific Lithic Types

Group III: Materials found to the south. The primary example of this group is Knife River Flint which occurs at quarry locations in North Dakota (Burns 1995:33-34).

Group IV: Materials found in the Canadian Shield. This group contains basalt, diorite, gabbro, Gronlid Siltstone, Hudson Bay Lowland Chert, quartz, rhyolite, schist, syenite, Winnipeg River Chert. These materials can often be found in gravel pits as a result of glacial transport.

Group V: Materials found east of Manitoba. This group includes Lake of the Woods Chert, taconite, and West Patricia Recrystallized Chert.

Group VI: Materials whose distribution is a result of glacial transportation and can be found throughout the province. This group is represented by feldspar, granite, ironstone, mica, phyllite, quartzite, sandstone, shale, siltstone, and the various types of undifferentiated chert.

Group VII: Materials from nearby quarry sources. This group is represented by Selkirk Chert and the limestone matrix in which the nodules occur.

An explanatory note should be provided for the presence of two northern lithic materials. Hudson Bay Lowland Chert (#10) is common in archaeological sites on the western periphery of Hudson Bay but no source area has yet been identified. The source of Gronlid Siltstone (#11) has been identified at quarries on the North Saskatchewan River (Young 2006). Both could have been brought to the site through trade. While possible, an alternate explanation would be that glacial action transported nodules of these two lithic types and deposited them in a moraine or esker which served as a quarry site. It is tempting to postulate extreme long-distance trade patterns, but occasionally Occam's Razor must be acknowledged.

3.4 Floral Analysis

Charcoal specimens were analyzed for wood species identification from 332 samples. Ten seed and nut specimens were identified as well as eight other types of organic material.

The charcoal samples represented eight occupation levels dating to the Late Woodland Period and represented the vegetation that was native to the Red River valley. Questions regarding wood use were tested using the charcoal data to determine if there were cultural preferences for wood selection or if there was a change in the vegetation regime between time periods.

The objectives of this analysis were:

- To identify seed, nut, and other organic material collected from the site;
- To identify the types of wood represented by the charcoal specimens; and
- To analyze the results for:
    a. Vegetation reconstruction; and
    b. Evidence of cultural selection for specific wood use.

3.4.1 Modern Vegetation

The modern native trees growing along the Red River consist of willow, poplar, elm, maple, oak, and ash. Willow grows directly along the river with Manitoba maple or white elm dominating the flood plain. Other trees on the flood plain are green ash, cottonwood, peach-leaved willow, and rarely American basswood. Shrubs include chokecherry, alder, sandbar willow, and red-osier dogwood (Hilderman *et al.* 1980). The upper terrace is dominated by burr oak, with white elm, Manitoba maple, and aspen poplar. Shrubs include saskatoon, American hazel, chokecherry, wild plum, gooseberry, wild rose, raspberry, downy arrowwood, and high bush cranberry (Deck 1989; Deck and Ward 2007).

3.4.2 Methodology

Trees have characteristic anatomical structures that enable species identification. This cellular structure is preserved in the form of charred wood or charcoal. Charcoal can be broken along three different planes to reveal different views of this cellular structure. These planes include the transverse, tangential, and radial sections. Different types of wood require analyzing one or more of these views for identification.

The charcoal from DlLg-33:08A was identified using a Wild Heerbrugg binocular microscope at magnifications between 12x and 100x. Each specimen was snapped along the transverse section and then, if necessary, along the tangential and radial sections. The snapped charcoal specimens were mounted in plasticine for viewing with the microscope.

Charcoal reference samples, written descriptions, keys, photographs, and wood thin sections were used as reference material. The specimens were identified to the lowest taxonomic level possible. Higher taxonomic levels were used depending on the size and condition of the charcoal specimen. The term "unidentifiable" refers to specimens that were charred to the degree that the cellular structure was destroyed or the piece was extremely fragile and easily crushed, obliterating detail.

The terminology used for the identified wood types is outlined in Figure 3.4-1. The term "cf." or "compare" was used when: (1) it was not possible to give a 100% determination due to the size and/or condition of the specimen; or (2) for some of the *Salix/Populus* (willow/poplar) specimens as it was necessary to view all three planes of these two types in order to distinguish the difference between them. Often the charcoal specimen was not large enough to have sufficient detail to make this level of determination.

After identification, pieces from each species were placed in a bag by taxonomy per sample. For example, if one catalogue number contained three charcoal specimens identified as *Fraxinus* (ash), then these were placed in a separate bag under the same catalogue number with the quantity of three. If more than one taxon was present within one catalogue number, then a new number was assigned to each new species.

All of the charcoal specimens analyzed were hand-collected specimens during excavation. A maximum number of ten pieces of charcoal per catalogue number were randomly chosen for identification. Previous research has shown that ten specimens represent a reasonable number to obtain a list of potential species variability within a sample (Statistical Advisory, University of Manitoba 1988:pers. comm.).

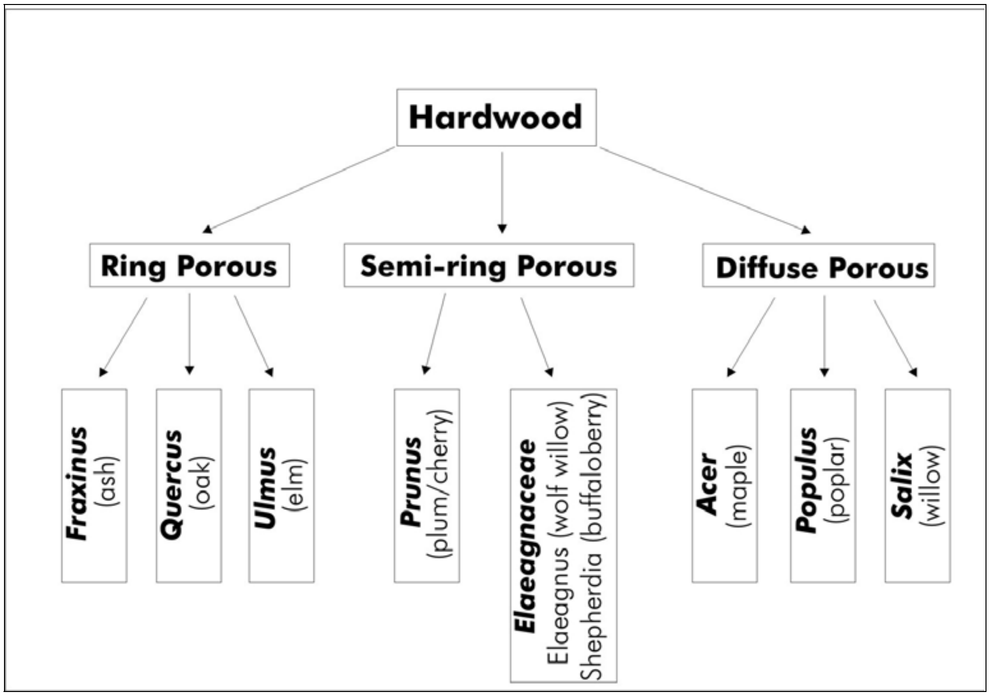


Figure 3.4-1: Terminology Used for Identified Wood Types

Three methods of quantification was used for interpreting the charcoal data:

- Abundance: the absolute count of the number of specimens represented by a particular taxon within a sample;
- Occurrence or Ubiquity: the presence of a taxon within a sample, regardless of the number of fragments; and
- DAFOR: the ubiquity of a sample was converted to a percentage and recorded based on the DAFOR scale: Dominant (76-100%), Abundant (51-75%), Frequent (26-50%), Occasional (6-25%), and Rare (Trace-5%).

The advantage of using ubiquity to interpret the charcoal results is that it "provide(s) information on the relative importance of taxa" (Hastorf and Popper 1988:61). Ubiquity or occurrence…

> *…disregards the absolute count of a taxon (it assumes that the absolute counts of any particular taxon are too influenced by the degree of preservation to be meaningful) and instead looks at the number of samples in which the taxon appears within a group of samples. Each taxon is scored present or absent in each sample. The taxon is considered present whether the sample contains 1 remain of the taxon or 100, thereby giving the same weight to 1 or 100* (Hastorf and Popper 1988:61).

Seed and nut identification was verified with reference material from the Seed Reference Collection, Anthropology Department, University of Manitoba. Where possible, identifications were made to the lowest taxonomic level, i.e., species.

3.4.3 Interpretive Considerations

Interpreting the charcoal data recovered archaeologically from a site should take into account a variety of cultural and archaeological factors (Figure 3.4-2). The results may represent cultural activities through wood selection for specific purposes or random selection of available wood species growing on or near a site. It is possible to compensate for sampling bias through combined analysis of charcoal from flotation and hand-collected samples.

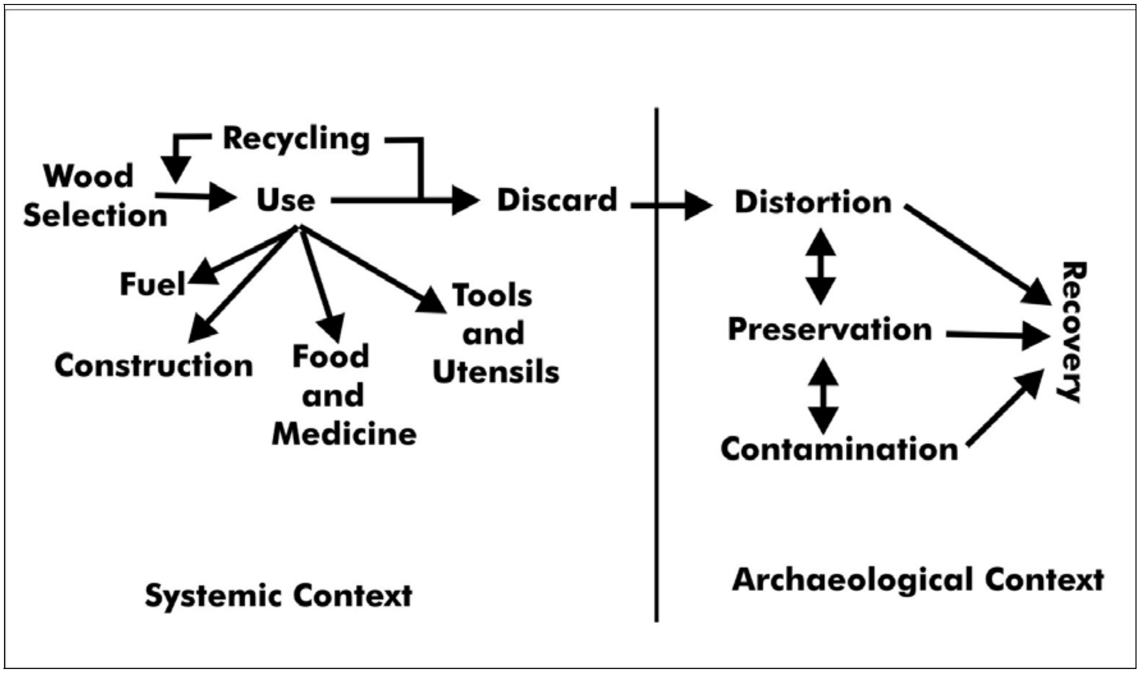


Figure 3.4-2: Flow Model for Wood Use (Deck 1989)

A number of factors may contribute to the differential breakdown of charcoal. These could include differences in anatomical structures of specific wood-types (i.e., ring porous versus diffuse porous woods), cultural activities, natural occurrences such as grass fires, or post-depositional disturbance. Variation in cultural activity or specific events can also affect the charcoal assemblage. For example, the length of time the fire burned, differing heat intensity of different wood types, or reuse of the same hearth may affect the amount and type of wood recovered from a hearth situation. All of these factors will affect the size and condition of the charcoal remains.

A total of 345 floral samples were analyzed from the Canadian Museum of Human Rights Archaeological mitigation project. Charcoal specimens were analyzed for wood species identification from 332 samples, seed and nut specimens from eight samples, as well as other types of organic material from seven samples.

Charcoal examined for species identification totaled 1,277 pieces from 331 samples in eight occupation levels. There were eight species present, six of which were trees and two types of shrubs. Wood identified as "*cf.*" was lumped with the same wood type for purposes of interpretation, for example, if *Acer* and cf. *Acer* were present in a level, feature, or sample they were combined as *Acer*. The samples were quantified by abundance, occurrence, and with a DAFOR scale. The overall results were the same using these three methods of quantification. The predominant species was ash followed by maple and then elm. All three of these tree species rated as “Frequent”. This was followed by poplar, willow, and oak which all rated as “Occasional”. The two shrub species—Oleaster Family and plum—were rated as “Rare” as they occurred in one sample each.

A small number of seed and nutshells were collected during excavation. There was a charred *Prunus americanus* (plum) pit fragment and three samples of charred *Corylus* (hazelnut) fragments. There are two species of hazelnuts that are common in the Boreal Forest and Parkland regions of the prairies: *Corylus americana* (American hazel) and *Corylus cornuta* (beaked hazel) (Looman and Best 1979). One sample from the site was broken into three fragments and was too small to determine species. The other two samples were both American hazel.

The remaining seeds were uncharred and likely modern intrusions. They were two *Lithospermum* (puccoon) seeds and a clay clump imbedded with multiple Gramineae (Grass Family) seeds.

The other organic material included four samples of uncharred wood, three of which were conifer. This was likely wood that splintered from shoring or excavation stakes. The other wood piece was too thin to identify. There was also a charred fragment of organic material, possibly bark (Elizabeth Punter 2009:pers. comm.).

An interesting artifact was a partial leaf impression on a small piece of hardened clay. This impression appears to be that of an elm leaf (Plate 3.4-1). This specimen was identified by Elizabeth Punter, Botany Department Herbarium, University of Manitoba.

Plate 3.4-1: Leaf Impression on Hardened Clay

Seven of the occupation levels had hearth features. The hearths that occurred in units sampled for charcoal were designated with a feature number. For example, 1-F2 was the designation for feature 2 from Level 1. It is interpreted that the wood charcoal collected from these units were associated with the corresponding hearth features and will be presented in this format.

3.5 Mammal, Avian, and Reptilian Analysis

3.5.1 Introduction

Faunal materials encompass any and all remains that are produced by animals after they die. There are two main types of animal remains found within an archaeological excavation. The first are the remains of animals that had been hunted and processed for food. Second, a number of animals may enter the site at some point in the intervening years. Small rodents, reptiles, and amphibians are all common and are typically seen as being later additions to the archaeological record.

Analysis of the non-piscine (non-fish) faunal remains began with the organization of the materials into their respective levels (Level 1, Level 2, Level 2A, etc.). This allowed for particular patterns to be revealed as the initial analysis was being done, such as distribution of the types of animals and areas of bone concentration throughout each level and differences and similarities over time. It also enabled possible areas of activity within the site to be discerned. This was approximated by determining the total amount of faunal material per excavation unit per level and what types of materials were contained within them such as charred bone or tools.

3.5.2 Methodology

The primary identification of the faunal remains, recovered from DlLg-33:08A, was undertaken by the laboratory crew on site. Both during the field identification and the subsequent analysis phase, various faunal reference manuals were used (Gilbert 1973; Olsen 1960, 1964, 1968, 1979; Schmid 1972). The materials were reexamined using the Zooarchaeology collections at the University of Manitoba and Brandon University. The site materials were assessed against the collections to attempt to determine family, species, and genus. In many cases, this was not possible. Often, broader categories of small rodent, small mammal, medium mammal, large mammal, and large ungulate were used in cases where more refined identification was not feasible.

Additional aspects of each specimen were also assessed. For the vast majority of the materials, this was limited to their quantity and weight. Many of the remains are very degraded either because of processing or environmental factors. These materials fall into the general categories of *unidentifiable*, if there is no possibility of identifying the original component, or *undetermined* for cases where a more advanced analysis might be able to recognize a particular element.

For elements that were identified (Figure 3.5-1), there were several additional features that were examined. Where possible, the side (left or right) of the body was determined. If there was only a portion of the object, then certain terms (distal, proximal, epiphysis) were used to identify what piece was present. *Distal* indicates that it was the section furthest from the torso and *proximal* represents the closer section. *Epiphysis* refers to the segment of a bone that would have articulated with other bones. The state of the bones was also noted and conditions such as charred (fire blackened) or calcined (superheated to a white colour) were added to the database. Finally, it was important to determine, whenever possible, the age of the animal in question. Certain markers such as the degree of fusion on the epiphyses and the amount of weathering were observed. This could also aid in determining the season when the site was active.

Objects of interest, especially those which had been made into tools, were analyzed further. Tools and specimens with markings were analyzed in a number of ways. The tools were ordered into categories based upon their particular features (spatula, awl, etc.). Markings, such as tooth puncture, butchering, chop, or gnaw marks were noted, but an in-depth analysis of these marks and their likely causes will have to be a topic of future research. All tools were also measured to provide their exact dimensions for possible comparison. All tools and modified bone artifacts will be discussed in the individual level chapters. Photographs were taken of most objects of interest.

3.5.3 Analysis

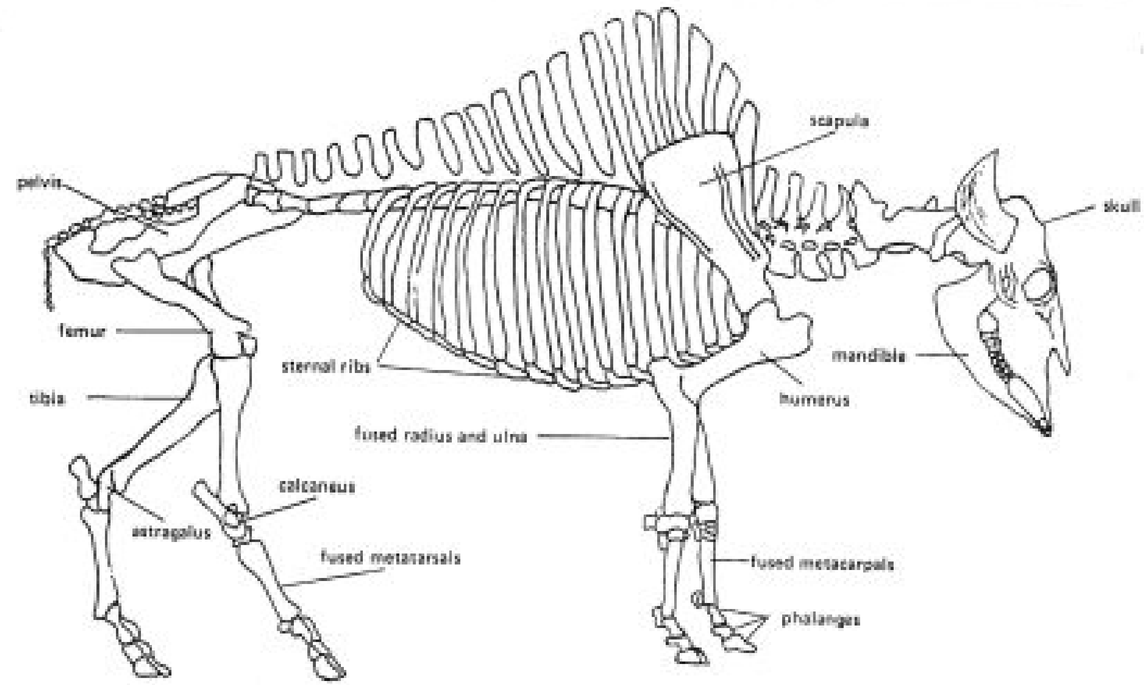
In addition to these physical examinations, some statistical evaluations were done in order to determine the amount of "food" that was present at the site. Several important elements involved in this analysis included MNI, which is an abbreviation for the Minimum Number of Individuals. MNI uses the number of elements present to determine the number of individual animals and, in turn, the amount of meat available at the site.

In addition to the numbers of animals present, the possible season of the site usage was also obtained through the examination of faunal materials including the presence/absence of foetal remains, the presence of juvenile remains, and the aging of species.

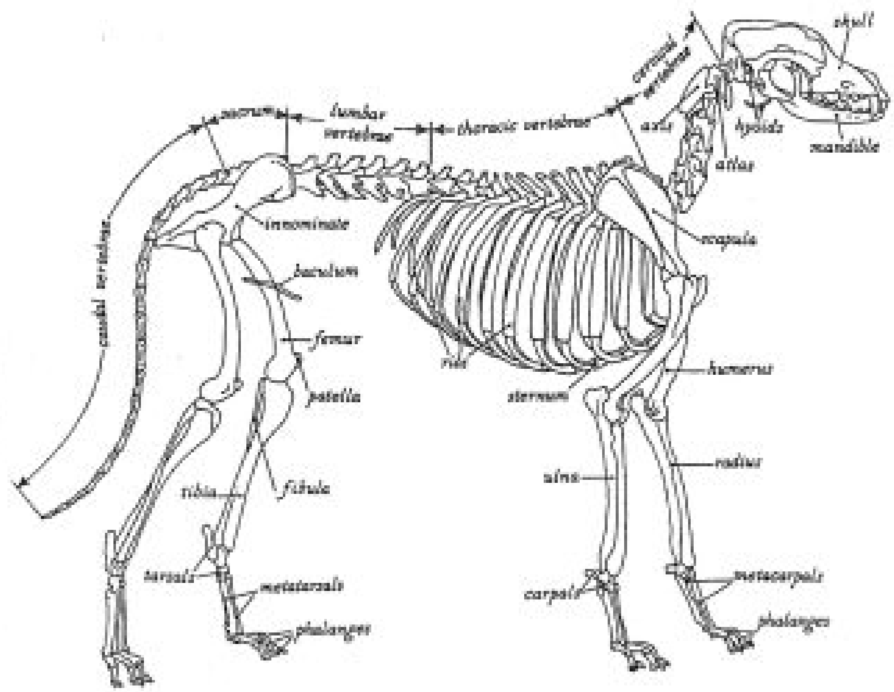
3.5.4 Identified Species

The various animals identified throughout the whole of the faunal assemblage over the entire site and all levels will be provided and described here to provide a clear understanding of the exact nature of the animals being encountered and make reading through the subsequent results sections more straightforward as a familiarity with these numerous species will already have been established.

Many of the measurements of animal sizes and range characteristics are abstracted from Banfield (1974). Due to the date of publication of this primary reference, many of the metric values are in Imperial rather than metric units.



Generalized skeleton of a bison.



Generalized skeleton of a canid.

Figure 3.5-1: Illustration of Mammalian Osteology (Brown and Gustafson 1979; Olsen 1964)

Artiodactyla

The largest of the animals present in the non-fish faunal remains consist of Artiodactyla, a term basically referring to cloven-hoofed mammals. There are two distinct groups that exist within this larger category, those of the cow family called bovids and the deer family or cervids. Of the bovids, only bison were identified and are, in fact, the only bovids likely to have been encountered in Manitoba during the time to which the various cultural levels date. The term *Ungulate* also covers the vast majority of these animals.

Bison (*Bison bison*)

Plate 3.5-1: Bison (M. Evans)

The bison, often referred to as the buffalo, is the largest living land mammal in North America. The animal is noted for its large triangular head, large hump on its back, and coarse brown hair. By six years of age, the male bison can reach a weight of upwards of 1300 lbs. Bison had a migratory subsistence pattern moving throughout the year from summer feeding grounds in the north, with the upper limit in the Northwest Territories, down to wintering grounds throughout the United States. These animals were an essential part of the subsistence economy of Plains Aboriginal peoples and it is not surprising that some would be found at The Forks. Due to the large amount of meat on a single animal, they were usually worth the hunting effort. In addition, many other products (such as clothing and tools) could be made from the remains.

Of the Family of cervids, there are four different species likely to be present in Manitoba: moose, elk, white-tailed deer, and mule deer.

Moose (*Alces alces*)

Plate 3.5-2: Moose (Wikipedia.com)

Moose are found throughout the northern portion of North America. Moose do not exist in any type of herd structure common in many of the Artiodactyla. They tend to be loners who forage the marshes found within the northern forest environments. Moose has a very distinct image; its massive size mixed with long slender legs and large head and antlers make for an interesting silhouette. The male can weigh as much as 1200 lbs and the females can reach almost 800 lbs. The range of the moose in modern times is seldom south of Lake Winnipeg and Lake Manitoba in the west and the Whiteshell region in the east. It is possible, though unlikely, that the moose remains at The Forks were transported from a great distance. It might also be that at the time that the site was occupied, the range for moose was further south than currently known.

Plate 3.5-3: Elk (Wikipedia.com)

Elk (*Cervus canadensis*)

The elk, or wapiti by its original name, is another large mammal and, although not as large as bison or moose, the males can range from 590-1120 lbs and the females from 419-600 lbs. The habitat of the elk is different from that of the moose in that they inhabit more open terrain. Thus, they are not typically found in coniferous forest areas, preferring the open prairies or aspen parklands.

Plate 3.5-4: White Tail Deer (www.smcaraiders.org)

Deer (*Odocoileus virginianus*)

The white-tailed deer is a quintessential American species, its range encompassing basically all of southern Canada right through into South America. Named for its white tail that stands like a flag when it is alerted, the deer is an agile and swift animal. The average male or buck weighs between 189 and 211 lbs and females or does can vary from 126-137 lbs.

Mule Deer (*Odocoileus hemionus*)

The primary difference between white tailed deer and mule deer is that mule deer is larger and has a heavier build. Their coat also tends to be darker than the white tail. The mule deer typically range into the hills and mountainous regions of western Canada, although they do occur in the south-western corner of Manitoba. Males weigh from 50-215 kg and females from 31-72 kg.

Plate 3.5-5: Mule Deer (www.jdwaggoner.files.wordpress.com)

Plate 3.5-6: Woodland Caribou
(www.fly-incanada.com)

Woodland Caribou (*Rangifer tarandus*)
Caribou are a distinctly northern animal which is divided into two groups: tundra caribou and woodland caribou. Woodland caribou (the more likely subspecies to be found in southern Manitoba) are the larger of the two. Caribou are somewhat similar in shape to elk. One of the initial visual differences is the antlers. Both males and females have antlers, but those of the male are much larger. Within any given group there is a large range of different shapes of antlers. Caribou avoid mountainous, hilly areas and open plains. They are found throughout much of northern Manitoba and have been recorded in the Boreal Forest in the southeast corner of the province. Males weigh from 81-153 kg and females weigh from 63-94 kg.

It is very likely that the smaller ungulates present at the site are deer. However, from the comparative collections being used, it was not possible to state this definitively and they might, in fact, be smaller elk or moose.

The residue analysis of some of the ceramic vessels indicated the presence of pronghorn antelope. While never identified within the assemblage due to the lack of an available individual in the comparative collections, it is being included here for completeness.

Pronghorn (*Antilocapra americana*)
The pronghorn is a small compact ungulate typically not more than three feet in height. Both sexes have horns that are lost in the winter; those of the males are much larger and more robust. The average weight of a male is 113 lbs and a female about 92 lbs. The pronghorn is a herd animal and is usually found in large numbers. The historic range is through much of the southwest corner of Manitoba although it is currently considered extinct in the province.

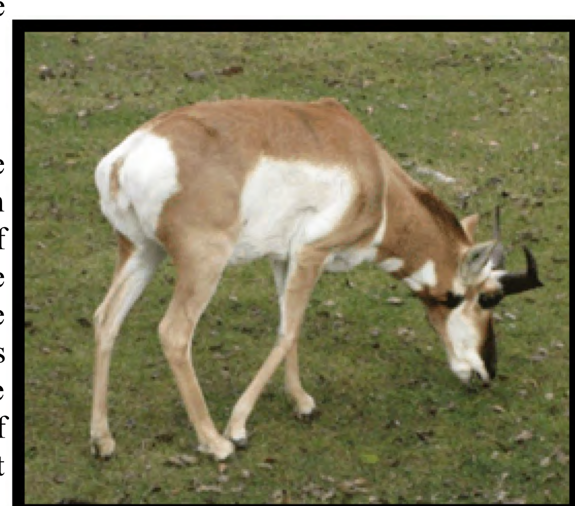


Plate 3.5-7: Pronghorn (M. Evans)

Another unexpected animal find resulting from the residue analysis was evidence of bighorn sheep blood residue on a Swan River Chert biface.

Plate 3.5-8: Bighorn Sheep (Wikipedia.com)

Bighorn Sheep (*Ovis canadensis*)

Another pack animal, the bighorn live in family groups led by an older ewe (female). Obviously named after their large curved horns, the bighorn is an adept climber at home in mountainous terrain—something not found on the Manitoba prairie. While Banfield (1974) has their distribution set around the Rocky Mountain range, Shackleton (lead researcher for International Union for the Conservation of Nature) had compiled a map showing the historic presence of bighorn sheep in the hilly regions of both North Dakota and South Dakota (www.ultimateungulate.com).

Carnivora

All of the meat eating species fall under the category Carnivora. A vast range of different sizes and types of animals that fall within this category was identified in the materials from the excavation. This included small members of the weasel family, including mink, marten, and fisher, various canines such as dog, coyote, and wolf, and bear. Some of the species within this group are, in fact, omnivores. Both grizzly and black bears depend on plants, often berries, for the vast number of calories that they require for their long hibernation.

Badger (*Taxidea taxus*)

The badger is one of the larger members of the weasel family. The form of the badger is an unusual round flat sort of frame, feet equipped with wicked long claws, and a large robust head that displays the striped marking that the animal is known for. The badger is also known for its aggressive demeanor, likely taking a cue from its larger cousin, the wolverine. The size of a badger can vary substantially. Banfield (1974) lists the weight of four individuals as ranging from 8-17 lbs with records of some as heavy as 25 lbs.

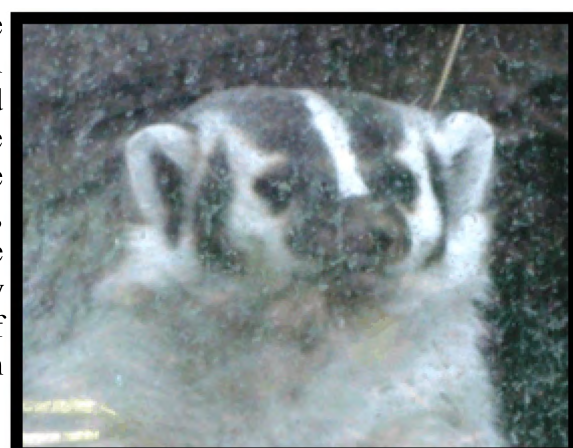


Plate 3.5-9: Badger (M. Evans)

The next three species are also Mustelidae—members of the weasel family. These, however, are all variations on the typical long thin weasel body.

Mink (*Mustella vision*)

The mink is renowned for the quality of its fur and would have been valued for that reason. The tail of the animal is covered in bushy fur and is about the equivalent of half the body in length. They have a short face that is triangular and pointed. The males average about 2 kg in weight and the females just under 1 kg. Mink are found throughout much of Canada and are typically found in close proximity to a body of water. The range of habitat varies widely from tidal flats to stream banks to swamps and marshes.

Plate 3.5-10: Mink
(retrieverman.files.wordpress.com)

Marten (*Martes americana*)

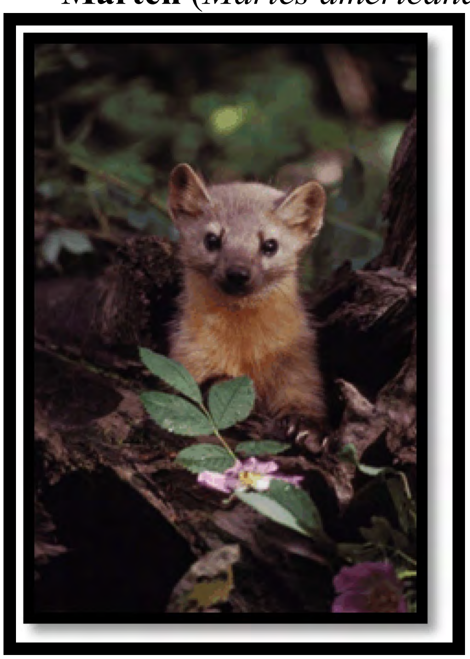


Plate 3.5-11: Marten
(Wikipedia.com)

The marten is very similar in shape and size to the mink. The main difference is that the marten is highly adapted to life in trees. Although they are considered tree dwellers, they often hunt on the forest floor, going for a number of different small rodents, but also foraging for fruit and berries. The marten is normally smaller than the mink with the males averaging just under 1 kg and the females about 660 grams, possibly due to their life in the trees. The primary habitat of these animals is the coniferous forests. It is worth noting that the presence of this species might have some implications as to the environment around The Forks area at the time of the site occupation. However, due to the small size of these animals, there would have been no issue in transporting whole animals over a considerable distance.

Fisher (*Martes pennanti*)
Another of the weasels, the fisher is the largest of these species present, weighing in at 3.7 kg for a male and 2.1 kg for a female. The fisher is a solitary animal. They only really come together during the mating season. The fisher shares similar habitat to that of the marten, but where the marten will not go into burned areas, the fisher will venture in.

Plate 3.5-12: Fisher (Wikipedia.com)

Dog (*Canis familiaris*)
The exact form of the dogs common in native camps is not really clear as there are no longer living examples of the breed. However, the importance of these animals prior to the arrival of the horse, as both a means of transportation and pack animal, has been well documented. It is likely that they were similar to the larger modern breeds with robust form and high endurance (e.g., sled dogs, retrievers, guard dogs, etc.). It is likely that these dogs were also similar to, and most likely derived from, the wolf and there may have been an actual or inadvertent cross-breeding program.

Plate 3.5-13: Coyote (M. Evans)

Coyote (*Canis latrans*)
The coyote is a small canine that lives throughout much of North America. They are in many ways much like a small dog such as the border collie. Coyotes are not really pack animals and tend to a more solitary existence, only coming together to mate and raise young. The northern coyote typically weighs around 29 lbs.

Plate 3.5-14: Wolf (Wikipedia.com)

Wolf (*Canis lupus*)
The wolf is an infamous animal often used as a villain in stories. This animal, however, is reclusive and rarely comes in contact with humans. The comparisons between a wolf and a large dog are striking; the two species even share a number of habits including hunting in packs and a pronounced social hierarchy. Wolves, however, tend to be much more robust than even the dog breeds to which they are similar, such as huskies. The weight of an adult wolf can range from 57-175 lbs dependant on factors such as gender and geography.

Bear (*Ursus americanus*)

Plate 3.5-15: Bear (gotpetsonline.com)

The only bear found within the southern portion of Manitoba is the black bear. The form of the black bear is well known, a large round lumbering body with deft paws and a large thick head and neck. Males are markedly larger than females: 115-270 lbs for males versus 92-140 lbs for females. Inactive for much of the year as they hibernate through the winter, the black bear is voracious in the summer months in order to provide for its massive calorie needs.

Striped Skunk (*Mephitis mephitis*)
Another well known species, the skunk, although a member of the Carnivora order, is quite omnivorous. Its range is widespread preferring aspen parkland and riverine gallery forests. Due to its excellent natural defences, the skunk has very few predators. The marking of twin strips down the back and tail are an instantly recognized warning, but other subtle variations of the marks do appear. Weights of the two genders are similar: 1.27-2.44 lbs for males and 0.95-2.1 lbs for females.

Plate 3.5-16: Skunk (Wikipedia.com)

Rodentia

There are a number of different species that fall within this group. The first of which is not particularly small.

Beaver (*Castor canadensis*)

Plate 3.5-17: Beaver (www.nationalzoo.si.edu)

The beaver is an aquatic mammal, meaning that it spends much of its life in the water. The form of the beaver with its large flat tail, robust body, and webbed feet is common knowledge for a country that has the animal as an image on its currency. Standard beaver practices of building dams and cutting down trees with its massive front teeth are also widely known. The adult beaver typically weigh around 44 lbs, but specimens have been recorded as big as 77 lbs.

Muskrat (*Ondatra zibethicus*)

The largest of the actual rodents, the muskrat is another aquatic species much like the beaver. Like the beaver, muskrat build homes in ponds and waterways and favour bank burrows. Similar in shape to the beaver, the muskrat is smaller with a longer, rounder tail. Males weigh between 0.75-1.16 lbs and females from 0.8-1.37 lbs.

Plate 3.5-18: Muskrat (Wikipedia.com)

Plate 3.5-19: Red Squirrel (M. Evans)

Squirrel

There were two different squirrel species identified in the faunal remains, the larger grey squirrel, *Sciurus carolinensis*, and the red squirrel, *Tamiasciurus hudsonicus*. The main difference between these two species is size. The grey squirrel is larger and more robust compared to the red squirrel. The basic habits and lifestyles of these two creatures is similar; both are tree dwellers and subsist primarily on vegetation that changes with the season.

Vole (*Microtus* sp.)

There are at least a dozen possible species within the Cricetidae family that could fall within this category, a large number of which can be found in Manitoba or may have lived here in the past. It is unlikely that these animals were part of the subsistence and likely burrowed into the site at some point after the occupants had left. These species would have more bearing on the later environment rather than the active archaeological horizon.

Plate 3.5-20: Vole (Wikipedia.com)

Lagomorpha (the rabbit/hare family)

The lagomorphs include both snowshoe hares, jackrabbits, and their relatives. These species provide both food as well as fur for clothing. They tend to frequent prairie situations as well as riverine habitats and, as such, could have been readily harvested at or near the occupation site.

Rabbit/Hares (*Lepus* sp.)

Plate 3.5-21: Rabbit (M. Evans)

It was not possible to determine the exact species of rabbit that was present in the materials from the excavation at The Forks. However, these animals have a distinct morphology to their remains that allows the general category to be identified very easily. The white tailed jack rabbit, *Lepus townsendii*, and the snowshoe hare, *Lepus americanus phaeonotus*, are the two most likely species and both are present within Manitoba. There is, however, the possibility that other rabbit species had ranges extending into southern Manitoba at different times in the past.

Aves

Numerous birds provide sustenance. Migratory waterfowl tend to concentrate in spring and fall seasons enabling considerable return for minimal hunting effort. Other species of birds, more solitary, are also welcome additions to the diet.

Mallard Duck (*Anas platyrhynchos*)

The mallard is a species primarily found in wetland environments; it can be found in appropriate climates throughout most of the world. The mallard is a migratory bird that, in North America, winters in Mexico. To a certain degree, the presence of migratory birds is suggestive of summer and/or fall site occupancy. The average mallard weighs from 0.9 to 1.2 kilograms.

Plate 3.5-22: Mallards (hoglezoo.org)

Snow Goose (*Chen caerulescens*)

The snow goose is a large northern bird. It is named for both its white plumage and the fact that it breeds in northen climates. These birds can often be seen in very large groups throughout Canada during their migration. The snow goose is basically found throughout all of North America during different times of the year. The wingspan of the largest birds ranges from 135-165 centimetres.

Plate 3.5-23: Snow Goose (fortephemera.blogspot.com)

Plate 3.5-24: Whistling Swan (www.birdinggeek.blogspot.com)

Swan (*Cygnus columbianus*)

The swan is one of the largest birds with the ability to fly. There are two species in North America: the trumpeter swan and the tundra or whistling swan. The flyway for the trumpeter swan is to the west of Manitoba, therefore it is more likely that the tundra swan was present at the site. Northern swans are known for the classic swan colouring of white feathers and the black band across the beak. These migratory birds are usually found in close proximity to water.

Reptiles and Amphibians

Rarely are remains from these orders considered as significant components to the diet. Usually, they are considered to be intrusive into the archaeological record. Both snakes and frogs tend to burrow underground (often using ground squirrel burrows) to hibernate during the winter. Seasonal mortality often results in their remains becoming incorporated within the cultural level.

Plate 3.5-25: Garter Snake (Wikipedia.com)

Snake (*Thamnophis* sp.)

The garter snake in the family of *Colubridae* is the most widely spread snake in North America. It is non-venomous and averages under 60 cm in length. The colouring can vary depending on geographic location and it lives primarily on small insects, amphibians, and small rodents.

There are a number of different frog species found in Manitoba, of which the wood frog (*Rana sylvatica*) is the most common. These small amphibians are found in close proximity to bodies of water, both permanent and ephemeral. Frogs survive the long winters frozen in a state of hibernation. The remains of frogs found within the site are likely individuals who dug down into the soil and died *in situ*, and, as such, are considered intrusive rather than part of the occupational faunal assemblage.

3.5.5 Tools

Two types of bone tools occur throughout most of the cultural levels. They are described here as an introduction. The specific recoveries are described in each level. Other, less common, tools are described within the pertinent chapters.

Awl

An awl is typically any object with a formed point designed to fit into the hand. In effect, the tool is a large needle that can be used to puncture hides and perform other tasks needed for the manufacture of clothing (Plate 3.5-26). Bone is commonly used for this type of tool due to the hard yet easily shaped nature of bone. The length, width, and bone source varies depending on a number of possible factors—the available material and the user’s preference.

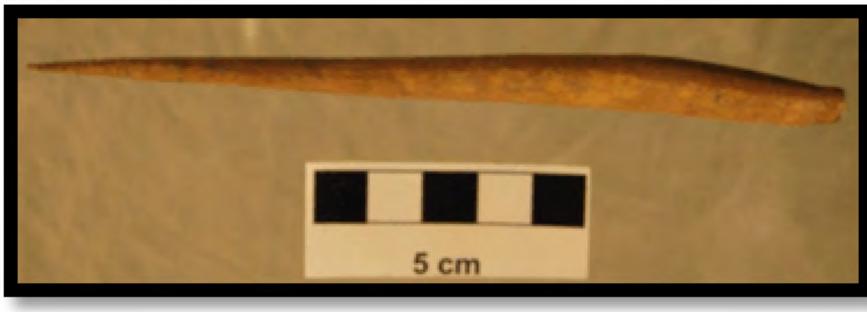


Plate 3.5-26: Bone Awl

Spatula

The spatula is a mysterious tool (Plate 3.5-27). Its exact usage is not clear. Some spatulas with minor variation have been employed as pottery decorators in the past. However, based on the pottery present, this does not appear to be the case at this site. There is also the possibility that this object was used in food preparation and has often been suggested as a means of extracting marrow from within the long bones. Whatever their purpose, they are common in archaeological sites throughout Manitoba.

Plate 3.5-27: Bone Spatula

3.6 Fish Analysis

3.6.1 Introduction

The in-depth study of the fish remains from the 2008 excavations at the future site of the Canadian Museum For Human Rights at The Forks was formulated with the primary objective of proofing the database to confirm identifications and quantities of artifacts. This research was carried out with the ultimate goal of achieving accurate assessments of the minimum numbers and frequencies of individual species present, as well as the number of skeletal elements (specimens) represented in the archaeological sample.

Prior to the present study, the fish remains—like all the other artifacts—were processed in a field laboratory housed in a mobile construction trailer on-site. There, soon after excavation, artifacts were washed and sorted according to artifact class, given a preliminary identification, bagged accordingly, and catalogued on an in-house database system. This initial examination was undertaken with limited resources and by numerous individuals with varying degrees of expertise.

In reality, compared to studies of other significant diagnostic artifacts such as worked stone tools, exotic ceramic pottery, and (predominantly mammal) bone implements or adornments, there is not much glamour for archaeologists in analyzing vast quantities/amounts of fish remains. And truth be known, the study of fish remains from archaeological sites, particularly in great numbers, is monotonous and tedious work. Thus it requires a more patient and persistent approach, and the investigator has to be dedicated and disciplined.

3.6.2 Methodological Considerations

Systematic studies of fish remains from archaeological sites, and fishing practices in general, have been widely described by many authors. Problems inherent to each study, and to analyses involving fish as a whole, have also been discussed by many of the researchers. Richard W. Casteel (1972, 1973, 1976a) has probably best outlined the wide variety of uses of fish remains when analyzing the archaeological assemblage of a site, including seasonal dating, absolute dating, estimating the live-weight of the specimens, estimating Pre-Contact food resource locations, and environmental change.

Given the value of analyzing fish remains, special attention is now often being given by some researchers to the technical analysis of specific skeletal elements of the fish, in particular, scales, vertebrae, and otoliths. These elements can provide seasonality indications, live weight estimations, age determinations, and the calculation of the minimum number of individuals. Using fish scales for seasonal dating is perhaps the most popularly employed study when analyzing and interpreting fish remains to answer archaeological problems associated with a site. Casteel (1972, 1973, 1974a, 1975, 1976a:65-68) describes this application in great detail, and similar methods have been employed in the majority of research on fish remains, including Hanna (1981), Martin (1981), and Yerkes (1980, 1981).

Vertebrae have been used as a method to determine live weight estimations (Casteel 1972,1973, 1974b, 1976a, 1976b) and seasonal dating (Casteel 1972, 1973), as have otoliths (Casteel 1972, 1973, 1974b). Otoliths (ear-stones) are located in the fish's inner ear and are part of the system which controls its equilibrium and hearing. They continue to grow in size for the duration of the fish's life and characteristically have a distinctive banding which marks an annual layer which corresponds to the fish's age. These yearly increments can also reflect the food and surrounding environmental conditions, such as the water temperature (Pannella 1971). Huddleston and Barker (1978) noted the value of recovering and identifying otoliths when present at an archaeological site; more specifically, they may demonstrate the presence of certain species that would not have otherwise been identified from other remains in the same archaeological sample.

Thus, from the preceding discussion it should be apparent that there is great value in studying fish remains from archaeological excavations because of the important contributions they can make in the interpretation of a site.

3.6.2.1 Scope of Present Analysis

The artifacts were examined with the goal of obtaining data to provide information on, but not restricted to, the following:

- ♦ the frequency of skeletal elements by species;
- ♦ computations for the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI);
- ♦ the distribution of the fish remains by species from each level;
- ♦ the distribution of the fish remains showing the density per unit (by weight) from each level; and
- ♦ documentation of cut marks or butchering, in addition to any indications of processing methods, as well as further cultural modification of the fish bone (e.g., ochre staining).

3.6.2.2 Preliminary Work

Preliminary work involved becoming more acquainted with the anatomy of (bony) fishes, preparing a valid list of fish bone names (skeletal elements), and establishing a standard nomenclature. Relevant literature describing the anatomy and osteology of fish (Cannon 1987; Casteel 1973,1976a; Moyle and Cech 1988; Mundell1975; Olsen 1968; Rojo 1991; Villee *et al*. 1989) was consulted. There are several different lists used in the nomenclature of the fish skeleton and there are many variations of the same list, which can be very confusing to archaeologists trying to keep up with the changes in other scientific disciplines.

Initial work also involved becoming familiar with the species accounts for this watershed, including preferred habitat, spawning season, seasonal movement, and so on. The current distribution and life histories of fish species indigenous to the province are well documented, as are the species known to be recently introduced into this area (Carpenter 1986; Filisky 1989; Hinks 1943; Lee *et al*. 1980; Manitoba Department of Natural Resources 1992, n.d.a, n.d.b; McPhail and Lindsey 1970; Page and Burr 1991; Robison 1992; Scott and Crossman 1973; Stewart and Watkinson 2004). A summary of fishes found in Manitoba is shown in Table 3-6.1.

Manitoba has four distinguishing physiographic regions—the prairies, the Manitoba Great Lakes, the Canadian Shield, and the Hudson Bay coastal plain.

> "*Each region has watersheds with distinctive characteristics and assemblages offish species. The geographic pattern of our watersheds determines which areas are accessible to fish, and watershed characteristics determine which species can survive there*" (Stewart and Watkinson 2004:6).

Working on the assumption that the fish remains at the site were caught locally in the adjacent Red and/or Assiniboine Rivers, one can select only those species accounts from these two watersheds for review. Stewart and Watkinson (2004: xiv-xvii; Appendix I) provide a checklist of the freshwater fishes of Manitoba (Table 3.6-1). From this, a list of the local species that could be present in the immediate proximity of the site near the junction of the Red and Assiniboine Rivers can be developed.

SUMMARY OF FISHES FOUND IN MANITOBA	
Total Orders:	14
Total Families:	19
Total Genera:	53
Total Species:	95
Native Freshwater Species:	79
Native Species Reintroduced To Former Range After Extirpation:	1
Native Species Transplanted To Native Range In Manitoba:	8
Introduced Species:	10
Human-Made Hybrids:	2
Marine Species Found in Estuaries on Hudson Bay Coast:	4

Table 3.6-1: Summary of Fishes Found in Manitoba (from Stewart and Watkinson 2004:xvii)

The other purpose in narrowing down a list of fishes that you would expect to find is to aid in determining the right species in faunal reference collections with which to compare the archaeological specimen. Using comparative reference collections is a standard, if not absolutely necessary, tool in faunal identification. Past archaeological research by the lead analyst (Simonds 1993, 1994) was useful during this phase of the project.

One could conceivably encounter the odd fish skeleton that is non-native to the Red and Assiniboine Rivers watersheds, but then context would be a major consideration in interpreting its presence. It is not improbable to expect the odd occurrence, since it could be close enough to have been manuported in the course of a day's travel journey. One might expect to have preliminary processing such as gutting done at the exact spot of capture, be it in another drainage system, and then further processing such as filleting carried out in another locale altogether. This practice remains today where fish are often processed on board the vessels and the bodies are brought back to the factory for additional filleting and further preparation such as preserving and canning. In other words, there has to be consideration of possible secondary deposition, say of whitefish which is not common to the watershed but is caught farther away in Lake Winnipeg (a different watershed). Whitefish could have been eaten for a meal nearby at The Forks and discarded amongst other fish. Similarly, trade items such as ornaments and even tools made from fishes that are not local cannot be discounted, particularly where these objects are identified in the archaeological assemblage.

In reference to the common names of fishes, Stewart and Watkinson (2004:25) note that they

> "*change from in different languages and from place to place, even in areas where the same language is spoken. In Manitoba, for example, the freshwater drum is called "silver bass" or sheepshead by anglophone anglers, "sunfish" by anglophone commercial fishers, and "malachigan" by francophone Manitobans. Notably, the French common names for several species of fish in our area are the same as, or derived from, an Aboriginal name for the species. In Manitoba, the Cree, Ojibwe, and Saulteaux languages have contributed French common names to fishes. "Malachigan" (freshwater drum), "laquiche" (goldeye and mooneye), "omisco" for the troutperch, and "achigan" for the smallmouth and largemouth basses are examples.*"

3.6.2.3 Species Present

Within the data listed in Table 3.6-1, only certain species are of a sufficient size and availability to be considered as part of the subsistence pattern. Only the species that would be found in the Red and Assiniboine Rivers are considered in the following listing of probable taxa that would be found in an archaeological site near The Forks. The following descriptions are abstracted from Simonds (1993). Simonds (1993:182) notes that the descriptions are a composite from several sources. As information booklets for trophy fishermen were used, the size range for the species are often maximum or record sizes rather than an average of the resident populations. More detailed information can be found in Scott and Crossman (1973) and McPhail and Lindsey (1970).

Lake Sturgeon

Order: Acipenseriformes
Family: Acipenseridae
Genus/Species: *Acipenser fulvescens*

Identification:

"Primitive" features include bony plates in the skin called "scutes". Sturgeon are large (2.4 m/9 ft.) with an average weight of about 90 kg (200 lbs). They are often grayish in colour and their snout is conical with four barbels (subequal and smooth, not fringed). The lower lip has two lobes and the tail has an upper lobe that is larger than the lower one (heterocercal). The skeleton is made of cartilage rather than bone.

Distribution:

Found sporadically in lakes and large rivers throughout the province, but because of their slow reproductive rate, the sturgeon population has been quickly depleted due to overharvesting and hydro-electric development. Sturgeon were once plentiful in Lake Winnipeg and the Nelson, Winnipeg, Red, and Assiniboine Rivers. Sturgeon Creek in the west end of Winnipeg was once a sturgeon spawning ground. Only northern rivers such as the Nelson and Saskatchewan, and the Winnipeg River in the south, now harbour sturgeon.

Location:

Rivers; rapids.

Spawning Season:

In spring in shallow water, often at the base of falls, and usually when the water temperature reaches 13° to 18ºC. Sturgeon spawn in about their 20th year of life when they reach a length of about one metre. Subsequently, mature females only spawn every 5 to 7 years.

Affects On Habitat:

Barriers to migration, e.g., dam or weir construction.

Comments:

Adults mature at 14-20 years of age, occasionally reaching 150 years. Ranks as one of the largest freshwater fishes of North America.

Cultural Relationship:

Sturgeon is prized for its meat as well as its caviar. Aboriginal groups in Manitoba harvested them for food and other domestic uses. Early Europeans were intensively harvesting sturgeon by the late 1800s as a popular food item.

Goldeye

Order: Clupeiformes
Family: Hiodontidae
Genus/Species: *Hiodon alosoides*

Identification:

Silvery with a large mouth with well-developed canine-like teeth on jaws and tongue and large, golden-yellow eyes. Goldeye are similar to herring but the dorsal fins are set farther back. In fact, the dorsal fin origin is situated *behind* the origin of the anal fin and they have no adipose fin. They are about 51 cm (20") and weigh about 1.4 kg (3 lbs).

Distribution:

Occur mostly in Lake Winnipeg and the Red, Assiniboine, Winnipeg, and Saskatchewan Rivers.

Location:

Frequent quiet, turbid water of medium-sized to large rivers, but also are found in reservoirs, lakes, and marshes.

Spawning Season:

In spring, when the water is about 10º-13ºC, mature goldeye move into pools in rivers or backwater lakes of rivers to spawn. By September, goldeye that hatched from semi-buoyant eggs are approximately 10 cm long. Male goldeye mature in 3-6 years while females take a year longer. It takes about eleven years to reach the average weight of 0.5-0.7 kg.

Comments:

Primarily a nocturnal species, the large eyes are adapted to dim light conditions and to turbid habitats. Feed near the surface on small fish, terrestrial and aquatic insects, and amphibians.

Affects On Habitat:

Stream channelization, flooding caused by dam construction.

Cultural Relationship:

Prized for its meat, by the late 1800s, goldeye became a gourmet dish and stocks were quickly depleted. They have only recently recovered. They can be caught on a dry fly or a small baited hook.

Mooneye

Order: Clupeiformes
Family: Hiodontidae
Genus/Species: *Hiodon tergisus*

Identification:

Greenish in colour, mooneye are also similar to herring, but have dorsal fins set farther back. In this species, the dorsal fin origin is slightly in *front* of the anal origin. It has a fleshy keel, and large silvery eyes. The length is 28-38 cm (11-15") and the weight is 0.3-0.9 kg (12 ozs-2.1 lbs).

Distribution:

Occurs mostly in Lake Winnipeg and the Red and Winnipeg Rivers.

Location:

Large, clear rivers and lakes, and seems to be less tolerant of turbid waters than the goldeye.

Spawning Season:

In March, April, and May in tributary streams over swift gravel shoals.

Comments:

Feeds on aquatic macroinvertebrates and small fish under low light conditions at night or dusk.

Affects On Habitat:

Same as with goldeye.

Cultural Relationship:

Similar to that of goldeye.

Northern Pike, Jackfish

Order: Clupeiformes

Family: Esocidae

Genus/Species: *Esox lucius*

Identification:

The dorsal and anal fins are set far back and pike has big toothy jaws with five sensory pores on each side (giving the snout the shape of a duck's bill), features which give it an advantage when lunging at prey, usually smaller fishes, aquatic mammals, and waterfowl. It has a pattern of small, pale white or yellow oval spots to conceal itself in among water weeds, from which it lunges at its prey. The cheeks are fully scaled and the upper half of the operculum is also scaled. The size about 1.3 m (52") and pike may reach 18 kg (40 lbs).

Distribution:

Native to nearly all rivers and lakes in the province, the northern pike also dwells in northern Europe and Asia (the most extensive natural range of any freshwater fish).

Location:

Cold, weedy lakes, rivers, streams, and reservoirs with little current and dense aquatic vegetation (e.g., marsh/shore). It hunts by sight and prefers clear water.

Spawning Season:

An early spring spawner, pike move into marshy or heavily vegetated areas as soon as the ice begins to melt to deposit eggs. The eggs hatch in about 12 days and the young begin feeding on any living thing, including each other. They continue voracious feeding habits throughout their life.

Comments:

The northern pike has the greatest tolerance for cold environments of any esocid. Feeds almost entirely on fish and other vertebrates. They are a solitary fish and may live up to 24 years of age.

Affects On Habitat:

Barriers to migration, loss of marshes, increased turbidity.

Cultural Relationship:

Widely sought by anglers as a sport fish, pike continues to be an important commercial species, as well. They are easily caught by baited hook and line, but require ingenious methods of filleting due to the numerous bones in the skeleton.

Channel Catfish

Order: Cypriniformes

Family: Ictaluridae

Genus/Species: *Ictalurus punctatus*

Identification:

The colour ranges from dusty-gray to dark gray-blue and the young are covered with dark spots, which disappear with age. Catfish have four pairs of barbels. It has a deeply forked tail, a free adipose fin, and an anal fin which is rounded with 24-29 rays. The size is about 1.2 m (47") and the weight is about 10 kg.

Distribution:

Native to southern Manitoba, and common in the Red and Assiniboine Rivers, it has been widely introduced elsewhere on the North American continent.

Location:

Usually inhabit large, deep, slow moving rivers with sand, gravel, or cobble bottoms. Also found in ponds, lakes, and reservoirs.

Spawning Season:

In late spring and summer, at about 25ºC, in the dark, catfish nest under rocks, logs, and undercut banks. The male channel catfish fans water over the eggs to aerate and clean them. Once they hatch, he protects the young for several days until they swim off on their own.

Comments:

Channel catfish use their barbels like a nose to find food. Often thought of only as bottom-feeders, their food includes not only clams and crayfish from the bottom but also fish, particularly goldeye, and other minnows and insects.

Affects On Habitat:

Industrial and municipal waste discharges and barriers to migration affect habitat.

Cultural Relationship:

This is the most popular of North American food and sport catfishes and there is still a very high demand for them as a food product. They can be caught easily by still-fishing with a baited hook or by nets.

White Sucker

Order: Cypriniformes

Family: Catostomidae

Genus/Species: *Catostomus* spp.

Identification:

Suckers are characterized by a slender, short dorsal fin (11-13 rays) and a rounded snout with fleshy papillose lips. The area between the eyes is flat, not concave, and the lateral line scales are small in size and number (57-76). The size is 46 cm (18") and the weight is 2.7-3.2 kg (6-7 lbs).

Distribution:

Occurs widely throughout Manitoba and most of Canada. It has the widest range of any sucker.

Location:

Lives on the bottom of lakes, ponds, and streams.

Spawning Season:

In spring, they prefer lakes and streams on the gravel or rock.

Comments:

Like all suckers, they have thick lips covered with many fleshy growths. With these sensitive "feelers", they probe in the gravel for worms and other small prey, sucking them up with their powerful mouth. Young suckers are a staple food of pike, walleye, and other predatory fish and are an important link in the food chain.

Affects On Habitat:

Stream channelization and siltation affect spawning success.

Cultural Relationship:

Suckers are not prized as sport fish and, because of their sensitive mouths, they can often avoid detection by hook and line but still retrieve bait. They are known to be used as a commercial food product and can be easily caught by dip netting during spring spawning runs. Their hardiness and the fact that they are a food source for many other species makes them a suitable live bait.

Redhorse

Order: Cypriniformes
Family: Catostomidae
Genus/Species: *Moxostoma* spp.

Identification:

These fish have a convex or straight-edged dorsal fin (14-16 rays) and a ventral mouth with lower lip which is distinctly bi-lobed and papillose with its posterior margin forming an acute V-shaped angle. Caudal fins are slate coloured.

Distribution:

It occurs widely throughout Manitoba and most of Canada, although in a more limited range than the white sucker.

Location:

Large or deep sluggish pools of moderate sized, clear streams, and large rivers over rocky or gravely substrates.

Spawning Season:

Spring.

Comments:

Similar to that of the white sucker.

Affects On Habitat:

Same as for the white sucker.

Cultural Relationship:

Similar to that of the white sucker.

Burbot, Maria, Ling cod

Order: Gadiformes
Family: Gadidae
Genus/Species: *Lota lota*

Identification:

Very elongate in shape, burbot is often mistaken for an eel. The head is quite flat with tubular nostrils and it has a long, slender chin barbel. The body is supple in appearance with a rounded tail. The pelvic fins are placed far forward and the 1st dorsal fin is short. Both the 2nd dorsal fin and the anal fin are quite long and narrow. Only the pelvic fins are pale, the other fins being quite darkly mottled. It has very small, smooth scales giving it the impression that it is scaleless. Its size is about 96 cm (38") and it can reach a maximum weight of 8.4 kg (18 lb 8 oz), but weighs on average just over 1 kg.

Distribution:

Burbot occurs throughout Manitoba in both rivers and lakes.

Location:

They reside in deep, cool waters, preferably rivers and lakes and prefer temperatures below 19°C.

Spawning Season:

Spawns in early winter, under the ice, in shallow water over sand or gravel. When the water temperatures are around 1°C, burbot move to their spawning grounds. Balls of 10-12 fish, intertwined and constantly moving, roll across the bottom and deposit their eggs on gravel bars or rocky shoals. The eggs hatch in spring when the water warms to a cool temperature of 6°C.

Comments:

This is the only freshwater member of the cod family. They eat aquatic insects, crayfish, and fish.

Affects On Habitat:

Water temperature increase and nutrient pollution.

Cultural Relationship:

Burbot are known to be a widely-used food resource. They are readily caught in early winter during the spawning runs. The exceptionally large liver can weigh over 1 kg and, when smoked, is rich in nutrition as well as taste.

Sauger

Order: Perciformes

Family: Percidae

Genus/Species: *Sander canadense*

Identification:

Sauger are often difficult to distinguish from walleye, as both have a round body shape, two separate distinct dorsal fins on the back, strong sharp teeth, and a colouring that shades from a dark olive on the back to a white belly. Sauger, however, have no white on the tail, scaled cheeks, and rows of dark blotches on the dorsal fin. While the first dorsal fins contain black spots, there is no black blotch at the posterior end of the first dorsal. Other features include an elongate body with three to four saddles extending obliquely forward to the middle of the sides and a large mouth with canine teeth and a serrated preoperculum.

Distribution:

Located throughout the southern half of Manitoba and rarely found north of Lake Winnipeg.

Location:

Inhabits large, shallow, turbid lakes or rivers. Lives in many of the same waters as walleye, but prefers a somewhat more turbid habitat than that of walleye.

Spawning Season:

Sauger spawns in early spring over gravel shoals. They may use the same spawning pools as walleye, but at slightly different times. Sauger have been known to spawn immediately after walleye when temperatures are still only about 5°C.

Comments:

Feeds on small fish and invertebrates over rocky gravel shallows or along sparsely weeded sandy bottoms. Maximum lifespan is seven years.

Affects On Habitat:

Stream channelization and siltation affect spawning.

Cultural Relationship:

They are an important commercial fish in southern Manitoba fisheries and are often sold as walleye. They can be caught with hook, lure, and line, or by still-fishing with minnows.

Walleye, Pickerel

Order: Perciformes

Family: Percidae

Genus/Species: *Sander vitreum*

Identification:

There is a distinctive white tip on the lower lobe of the tail fin, no scales on the cheeks, and a single dark blotch at the base of the spiny dorsal fin. The preoperculum is serrated and the body has dusky, saddle patches on it. The size of pickerel reaches about 1 m (41") and about 1-2 kg in weight.

Distribution:

It is found throughout most lakes and rivers of Manitoba, except in the extreme north. Common in the Red River and widely stocked in reservoirs.

Location:

Generally located in large streams, rivers, and lakes in deep areas over sand, gravel, or rock substrates.

Spawning Season:

In the early spring, in streams or lakes on gravel or rock, often when ice still covers the water. Just behind the males, the egg-laden females search out coarse gravel in streams or on shoals in lakes. Given suitable temperature, the eggs hatch in about three weeks.

Comments:

Feeds on fishes and a variety of aquatic vertebrates.

Affects On Habitat:

Stream channelization and siltation affect spawning success.

Cultural Relationship:

This is one of the most desired species commercially and has replaced lake whitefish as the staple of the fishing industry in Manitoba. Pickerel are also the most sought after sport species. They can be caught by hook, lure, and line.

Freshwater Drum, Silver Bass

Order: Perciformes

Family: Sciaenidae

Genus/Species: *Aplodinotus grunniens*

Identification:

Freshwater drum is a large, silvery or gray fish with a highly developed lateral line system extending on to the caudal fin, a high arching back with a robust body, and a subterminal mouth. They have conjoined spinous and soft dorsal fins, two anal fin spines, and a triangular caudal fin. They are often confused with other fish having two dorsal spines, but the first ray of the anal fin is a single, thick, heavy, and stiff spine in the drum, and unlike those on the dorsal spine. The freshwater drum possess extremely strong, flat teeth located in the throat to crush its food. The size is about 89 cm (35") and they usually weigh under 5 kg, although they can grow much larger.

Distribution:

Abundant in the southern half of the province, primarily the Red River and Lake Winnipeg and their drainages.

Location:

Resides in medium to large shallow lakes and rivers, or else deep pools and large impoundments. Since they prefer large bodies of water, they can adapt to turbid conditions.

Spawning Season:

Generally in summer when the water temperature becomes a warm 21°C. The released eggs float to the surface and drift with the wind and current, making it difficult to tell when and where they were spawned. The young hatch approximately 25-30 hours after the eggs are laid.

Comments:

Feeds on snails, clams, insect larvae, and other vertebrates such as small fish and crayfish. Freshwater drum have the unique ability to make loud booming sounds by contracting muscles along the walls of the gaseous swim bladder. Its otoliths (earstones, the stony growths from the inner ear that aids in the fish's balancing system) are relatively large in size.

Affects On Habitat:

Siltation and pollution reducing its food supply. Barriers to migration.

Cultural Relationship:

They are not a commercial species nor are they a popular sport fish. The meat is quite edible and is often prepared as a soup. Otoliths are sometimes used as lucky charms.

3.6.3 Methods of Investigation

Initially, the exact number of current catalogued specimens transferred to the designated laboratory facilities were accounted for by cross-checking the artifact listing provided by Quaternary Consultants Ltd. in a compatible spreadsheet form with the actual count of bags. A qualitative review of the nature of the specimens was made at this time, as well. After confirmation of all listed items, the investigative protocol carried out included, but was not limited to, the following steps:

1) beginning with all known specimens (i.e., previously catalogued to species and/or element), confirming their preliminary field identification and, initially, developing an on-site archaeological comparative reference collection from the excavated remains;
2) addressing “Unidentifiable” catalogued specimens and ensuring none are actually identifiable or at the very least “Undetermined” in nature;
3) processing the “Undetermined” specimens to determine, if possible, species and/or element, and designating select artifacts for further study; and, lastly,
4) re-examining designated specimens for additional research.

The basic procedure used to process the vast numbers of fish remains included a visual examination of each individual artifact for identification; comparison of the specimen with reference collection material; determination of the species and element wherever possible; collection of metric data regarding weight, number of object components, etc., and non-metric data such as body position, marks, condition, and so on; quantification and re-bagging of the artifacts accordingly; and finally recording the new information and updating the database catalogue. Various organizational methods were employed, such as pulling all of the identifiable elements already catalogued first, and grouping and sorting them by species/element during Step #1 of the investigative protocol.

This systematic process for carrying out the study of the fish remains was modified throughout the project as various conditions were encountered. For example, given the numbers of identifiable specimens that were found in the assemblage originally catalogued as “Unidentifiable”, many were simply changed to “Undetermined”. Also, since many “Undetermined” artifact assemblages contained far too many identifiable specimens, it would be too time consuming to identify them all. Therefore, the practice here was to pull out those elements that could have an effect on any MNI or NISP calculations. This was based on previous experience (Simonds 1993, 1994).

3.6.3.1 Specimen Identification

All specimens previously catalogued as to element name (that is, where the Object field in the database was not valued as "Unidentifiable" or "Undetermined") were carefully examined first and, if possible, positively identified according to the skeletal element (Figure 3.6-1), and/or genus and species. Identification of some specimens to higher taxonomic levels (e.g., Family) was made when the specific genus/species could not be determined, either as a result of similarities between species, or because of difficulties in making an accurate distinction between species (due, generally, to the incompleteness or poor preservation of the specimen).

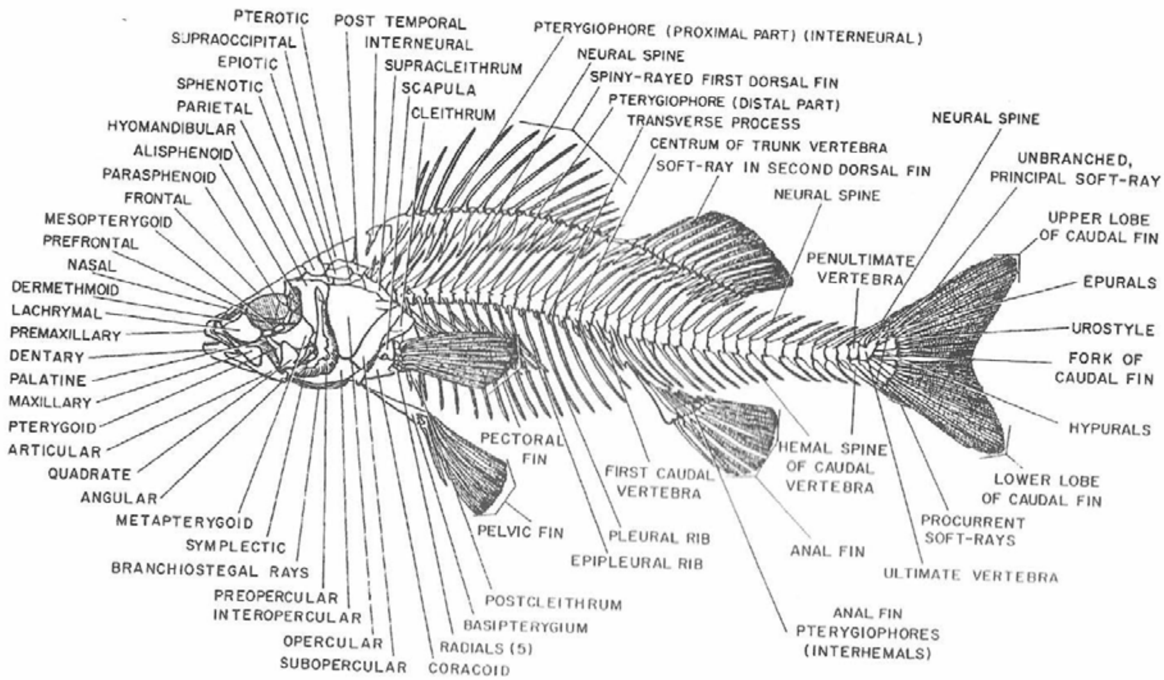


Fig. 13. Skeleton of a spiny-rayed bony fish (*Perca flavescens*). The name alisphenoid should be replaced by *pterosphenoid*. Courtesy of the late Dr. K. F. Lagler.

Figure 3.6-1. Nomenclature of Generalized Fish Skeleton
(Note that the name alisphenoid should be replaced by *pterosphenoid* (Rojo 1991:241)).

To make a positive verification of the artifacts, existing reference collections of comparable specimens of species indigenous to the province (available at the Manitoba Museum and the University of Winnipeg) were consulted. Thus, there was first-hand comparison to known elements of fish species and identification was not based solely on books or manuals (which were used as initial and supporting documentation but alone not sufficient to aid in a positive identification). Consequently, too, the identifications are also consistent (rightly or wrongly) with prior research conducted from earlier excavations at The Forks, which used the same comparative collections.

Anatomical names used to record the skeletal element (entered in the OBJECT field in the database) followed, for the most part, Rojo (1991). Scientific names of the fishes follow Stewart and Watkinson (2004). Previous research at The Forks (Simonds1993, 1994) used Scott and Crossman (1973), which has older, less recommended usage of taxonomic identification by ichthyologists. Since only the preferred binomial (i.e., genus/species) name has changed with respect to the way data was recorded for the 2008 fish remains, and there has not been any separation of a previously larger designation of an existing Family into newer species accounts, it is still quite easy to compare results of the different analyses from previous research of the fish recoveries from other excavations at The Forks.

3.6.3.2 Database Procedures

The results of the examination and identification were entered into a generic database program modified for the 2008 CMHR project, based upon the University of Winnipeg Archaeology Curatorial System. To that extent, the database was built "on-the-fly" and was revised as necessary. New catalogue numbers were assigned to artifacts separated out of their original assemblage and the existing data for that original record was duplicated for the new record; both records were then updated accordingly with any new or revised values for the fields. Cards were printed for new catalogued specimen numbers only (i.e., those separated out of the original assemblage for whatever reason), otherwise changes to the artifact record were marked by hand on the existing catalogue card (thus amending the original card to reflect the record updates in the database).

3.6.3.3 Determination of the MNI and NISP

The calculation of the Minimum Number of Individuals (MNI) is based on the duplication of skeletal elements within each identified species and then the greater total of which side of the body they came from. To facilitate this method, a 'counting location' on each element was chosen, which was a specific part of the element that had to be present in order for it to be considered when tabulating the MNI. Since there were only a couple of counting locations chosen for each element, and the computations drawn from database queries, the results do not include any intensive examination to include or exclude additional specimens that may be considered as another, separate individual. Therefore, the results are just basic counts.

The one exception is accounting for the number of sturgeon in the sample because they do not have a skeletal structure like that of other boney fishes, but are comprised of cartilaginous tissue that does not preserve in the archaeological record. They do have bone scutes which can be quite identifiable, and a great number of them were recovered during the 2008 excavations. However, because each sturgeon can have up to seventy-eight scutes, which can be indistinguishable from one another, one cannot accurately determine how many individuals there are.

The Number of Identified Specimens (NISP) is the count of each identified skeletal element, which can be further sorted by species. This provides more information on which to base interpretations of the site.

3.6.4 Bone Tools

There are some elements in the fish skeleton which lend themselves to the use as tools, with no modification or only slight alteration. Figure 3.6-2 indicates where these elements occur on a generalized fish skeleton. During the analysis, these elements will be carefully examined to see if there is evidence of use or modification.

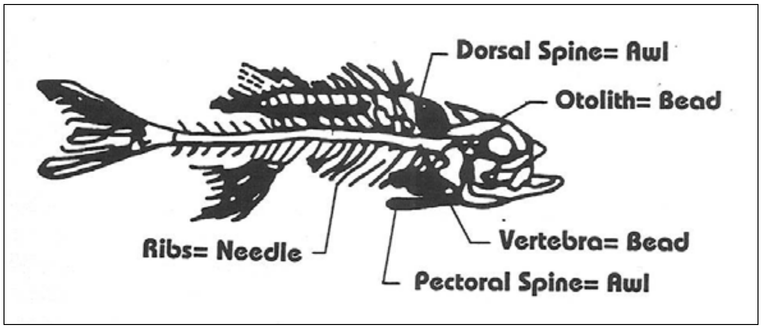


Figure 3.6-2: Locations of Elements Which Can Be Modified into Tools (Simonds 1994)

3.6.5 Further Research/Discussion

In-depth analysis of the fish remains is largely beyond the descriptive nature of a mitigation report. The in-depth analysis of the fish remains provides a more extensive, broader examination than afforded during field operations and greater time can usually be given to identifying the skeletal objects in this later stage. Preliminary identification in the field has the advantages of the immediate *in situ* context to go by; this association gets more tenuous later in the laboratory.

Additional research can include some, or all, of the following:

- ♦ reconstructing (i.e., mending and cross-mending) intact finds *in situ* but which later became separated or artifacts which have components in more than one cultural level;
- ♦ use of the photo record to determine depositional patterns;
- ♦ determination of relative frequency of identified diagnostic elements with consideration of the over-representation of certain elements, particularly, pectoral spines, vertebra, etc., due to differential preservation; and
- ♦ more technical analysis and study of pertinent fish remains to aid in interpreting the site using scale, vertebrae, and otoliths to determine seasonality, age of the harvested fish, and available meat quantification. These studies fall beyond the scope of a mitigative project, but the potential does exist, and the present artifact processing will aid greatly in providing preliminary work for future researchers from which to start.

As Needs-Howarth (1999:62) remarks:

> "*Fish remains are not necessarily a passive reflection of local availability or ease of capture. In order to understand the nature of fish subsistence strategies, we have to examine collections of fish bones in more detail, going beyond traditional bone fragment counts*".

3.7 Shellfish and Snail Analysis

3.7.1 Introduction

The clam and snail recoveries from the archaeological project at the site of the future Canadian Museum For Human Rights (CMHR) consist of those specimens derived from cultural activities such as food gathering and the manufacture of tools and/or decorative items. It also includes naturally deposited specimens.

During the field portion of the CMHR project, this category of artifact was entered into the computer system at the most basic level of identification—the object field was entered as shell and the taxonomic designation was entered only at the Pelecypoda level (Class). None of the artifacts were identified as to valve or snail and there were inconsistencies in the entry of Natural versus Butchering Remains, i.e., naturally deposited specimens versus those that were the result of human activity.

The term butchering remains assumes that the clam/mussel was harvested primarily for food. Clams are a nutritious source of protein. As well, they provide calcium, iron, sodium, potassium, Vitamin A, thiamin, riboflavin, niacin, Vitamin C, Vitamin B6, Vitamin E, and folic acid (Silverman *et.al.* 1986:312). The discarded shell was occasionally modified into an ornament or a tool. Ethnographically, valves were used as the bowls of spoons (Miles 1963:57) or modified into beads, pendants, and other ornaments (Karklins 1992:29, 119, 239; Miles 1963:138-143, 236; Yenne 1986:92, 127, 187).

3.7.2 Method of Investigation

The first step undertaken in the analysis process was to go through every catalogue number of the shell and separate them into four distinct categories:

- butchering remains where the species could not be identified;
- butchering remains where the species could be identified;
- shell that had obviously been worked, i.e., bead or tool; and
- naturally deposited specimens.

It was felt that breaking the shell down into these categories first, rather than separating all of the material into the levels and then analysing the material, made more sense. The first objective was to clean the database, making all pertinent fields consistent for further analysis. After this basic identification process, the artifacts could be divided into their appropriate levels.

To illustrate frequency of utilization patterns, the recovered weights of the shellfish for each excavation unit are plotted for each level. In addition, the identified taxa are plotted by excavation unit.

3.7.3 Clam/Mussel Identification

Identification is a visual process taking into consideration the shape of the specimen, i.e., elongate, ovoid, triangular, etc., and the configuration of the hinge where the two halves of the shell fit together. Species determination was based on Clarke (1981), research on the Internet, and discussions with Dr. Lane Graham, Associate Head, Department of Biological Sciences, University of Manitoba.

A total of 1814 specimens were catalogued as butchering remains. Every specimen was looked at for possible identification. Each specimen had to have certain landmarks in order to identify that specimen (Figure 3.7-1).

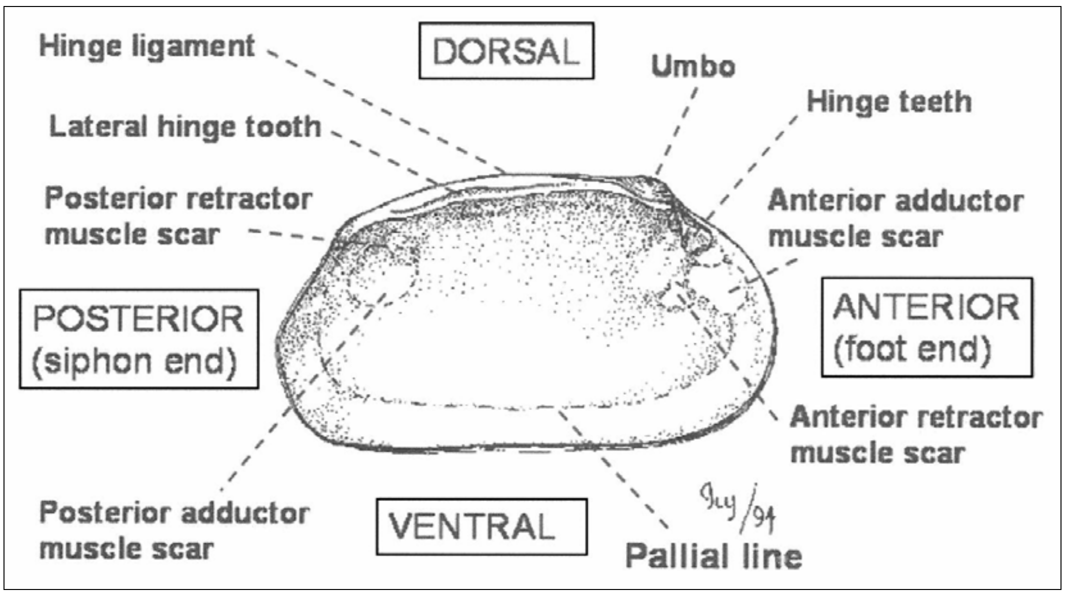


Figure 3.7-1 Identification Landmarks on Shellfish (modified from University of Michigan)

If the artifact was too incomplete to identify to species, it was identified only to the Family level (Unionidae). Only the quantity, the weight, and the condition, e.g., charred, ochre stained, etc., for these specimens was noted and updated in the database.

Initially, a reference collection from the recovered archaeological specimens was compiled. In order to ensure as accurate identification as possible, representative samples were taken to Dr. L. Graham for confirmation. Dr. Graham kindly confirmed or re-identified the specimens.

Due to age of the basic Canadian reference (Clarke 1981), The Integrated Taxonomic Information System (ITIS n.d.) on the Internet was checked to ensure that the most up-to-date taxonomies were being utilized. *Proptera alata* (Pink Heel-Splitter) has had a taxonomic revision to *Potamilus alatus* and *Lampsilis radiata siliquoidea* (Fat Mucket) has become *Lampsilis siliquoidea*.

When deciding on designating specimens as complete or incomplete, the specimen had to have at least 70% of the shell present with adequate landmarks. A large number of the specimens were complete. In some instances, some reconstruction of fragmented valves could be done in which case the quantity in the database was listed as “1” with several components. In order to be able to determine the Minimum Number Of Individuals (MNI) present, the specimens were sided—right or left. Several of the catalogue numbers had both halves of the shell present. In some cases, it was possible to match left to right sides, representing a complete individual.

Very few species can be identified to gender as sexual dimorphism is not characteristic of most of the recovered species. As gender would not be a harvesting criterion, this aspect was left for future analysis where a malacological researcher would be interested in recreating population dynamics. Similarly, the age of the individual specimens was not investigated, as this, to be completely accurate, requires thin sections through the beak (umbo) perpendicular to the hinge.

According to Dr. Graham, there are thirteen species of clams found in Manitoba, not all of which are found in the Red and Assiniboine Rivers at The Forks as some are head water species. The habitat along the Red River is primarily mud channels and along the Assiniboine River is mud with occasional stretches of sand or gravel where the river has cut through glacial moraines.

Not all thirteen species were represented in the archaeological recoveries. Only seven distinct species were identified (Table 3.7-1).

SCIENTIFIC NAME	COMMON NAME
Unionidae	Pearly Mussel Family
Ambleminae	Button Shell Sub-family
Amblema plicata	Three-Ridge
Fusconaia flava	Pig-Toe
Quadrula quadrula	Maple-Leaf
Anodontinae	Floater Mussels
Anodontoides ferussacianus	Cylindrical Floater
Lampsilinae	Lamp Mussels
Potamilus alatus	Pink Heel-splitter
Ligumia recta	Black Sand-shell
Lampsilis siliquoidea	Fat Mucket

Table 3.7-1: Recovered Clam Species

Following is a brief description of each of the recovered species as well as their ecological niche. The illustrations were obtained by an Internet search, the host site of each image is acknowledged.

Amblema plicata (Three-Ridge) is common in southern Manitoba occurring in the Red River-Lake Winnipeg drainage area as well as the Great Lakes, St. Lawrence, and the Ohio-Mississippi River system. According to Clarke (1981:256), Three-Ridge clams are the heaviest of the molluscs. These clams are usually easily identified by the heavy parallel ridges (three, sometimes four) on the posterior. They have a wide ecological range living on various substrates.

creekconnections.allegheny.edu

Plate 3.7-1: Three-Ridge

nas.er.usgs.gov

Plate 3.7-2: Pig-Toe

Fusconaia flava (Pig-Toe), a roughly triangular-shaped shell, is found in the Red River-Nelson River system in Manitoba as well as the Mississippi-Missouri water system and Lake Erie and Lake Huron in Ontario. This species is found principally in medium or large rivers and occasionally large lakes where it lives on mud or sand among sparse or moderate vegetation.

Quadrula quadrula (Maple-Leaf) is another easily identified clam as it has two bands of raised nodules radiating from the beak on the exterior surface. Clarke (1981:260) states that this clam is usually found in rivers where the currents are slow to moderate such as the Red River system and the Ohio-Mississippi drainage system. As well, *Quadrula quadrula* can be found in Lake Erie in Ontario. The habitat is usually mud or sand with vegetation, occasionally dense, present.

bama.ua.edu

Plate 3.7-3: Maple-Leaf

gf.state.wy.us

Plate 3.7-4: Cylindrical Floater

Anodontoides ferussacianus (Cylindrical Floater) is unique in that it does not have hinge teeth, either lateral or pseudocardinal. It's one of the three species that lacks one or more of these attributes; *Anodonta grandis* (Common Floater) lacks both types of hinge teeth while *Strophitus undulatus* (Squaw-Foot) lacks lateral hinge teeth. The Cylindrical Floater is usually found on mud bottoms and sometimes on sand in slow-moving streams and occasionally lakes. The distribution of this clam includes the James Bay and Hudson Bay drainage system from central Ontario to southeastern Saskatchewan. As well, it can be found in the Great Lake-St. Lawrence and the Ohio-Mississippi River systems.

Potamilus alatus (Pink Heel-Splitter) is found in the Red and Winnipeg Rivers, the St. Lawrence River, as well as the Ohio-Mississippi River system. This species is usually large in size and has an obvious triangular wing-like shape on the dorsal. It occurs in large rivers and lakes usually in mud.

www.museum.state.il.us

Plate 3.7-5: Pink Heel-Splitter

animaldiversity.ummz.umich.edu

Plate 3.7-6: Black Sand-Shell

Ligumia recta (Black Sand-Shell) is elliptical in shape with the beak (umbo) to the back. It occurs throughout the Hudson Bay drainage system in the Red and Winnipeg Rivers and Lake Winnipeg as well as the Great Lakes system and the Ohio-Mississippi River system. It is present principally in large rivers on sand or gravel substrates but is occasionally found in mud.

Lampsilis siliquoidea (Fat Mucket) is a very abundant species occurring in rivers and lakes across Canada from Quebec to the Northwest Territories as well as drainage systems from New York to Arkansas. It lives on all types of bottoms (clay, mud, sand, or gravel) and can occur in shallow water.

mkohl1.net

Plate 3.7-7: Fat Mucket

3.7.4 Naturally Deposited Specimens

Fingernail clams and freshwater snails can provide information on the palaeoenvironment including climate, water quality, riverine beds, and in some instances aquatic and shoreline vegetation. During this project, these species were collected. However, due to the field collection technique, the recoveries are not considered to be a statistically valid population as dry screening through a large mesh tends to eliminate smaller specimens (many Sphaeriidae and Gastropoda). Flotation of the collected soil samples could be the optimum method of recovering statistically valid populations for environmental determination. This type of research is beyond the mandate of a mitigative project.

As the level of identification during the project was very basic, all of the naturally deposited specimens were looked at and identified as either valves or snails. If there were more than one type in a bag, the artifacts were separated out and reassigned a new number. All of the specimens were recounted and weighed. All new information, including the object name, the genus name, the common name, quantity, weight, marks, and condition was entered into the computer system. Occasionally, a specimen which was disintegrating or consisted of myriads of tiny fragments was catalogued as a "shell sample" with the quantity designated as "1".

The valve species consist of Sphaeriidae specimens which are part of the mollusc order, Pelecypoda. According to Lee (2001) these miniature valves:

- occur on every continent except Antarctica;
- can be found in all kinds of freshwater habitats—rivers, lakes, streams, ponds, and ephemeral pools;
- play an important role in energy and nutrient cycling; and
- are important in the diets of some fish, some aquatic insects, and some waterfowl.

Sphaeriidae have two subfamilies, Sphaeriinae (fingernail clams) and Pisidiinae (pea clams). During the in-depth analysis, the identification of the specimens from the CMHR project was only done to the Family level. Based upon information gleaned from Clarke (1981), three genera of Sphaeriidae, with approximately forty different species, could be found at The Forks. Most of these miniature valves prefer muddy substrates with vegetation.

The Gastropoda snail specimens include the Lymnaeidae and Planorbidae families. Lymnaeidae, pond snails, are conical spirals in shape. They are found worldwide with fourteen different species possibly occurring at The Forks. Lymnaeidae prefer stagnant to slow streaming water with heavy vegetation. Planorbidae, ramshorn snails, are flat coiled specimens. These snails also occur worldwide (they are the largest family of aquatic pulmonates) with eleven species possibly being present in The Forks area. Planorbidae live mostly in fresh water but some can survive in brackish water.

Kroker (1993:202) has postulated a few hypotheses to explain the presence of Sphaeriidae and gastropods at this location. The specimens could have derived from riverine flooding and incorporation in the silt deposition related to spring floods or they could have been transported in during a flood and been trapped in depressions (swales) while the flood water was receding. Alternately, the occupants of the site could have harvested aquatic vegetation (to which Sphaeriidae and gastropods clung) for use as damp material on fires for flavouring in the smoking of fish.

3.7.5 Worked Shell

During the initial cataloguing of the artifacts in the summer of 2008, four shell specimens were designated as beads and entered into the computer system as such. During the in-depth analysis of the shell, one more artifact was designated as a bead, while another specimen was noted to have what appears to be flaking along one edge. This artifact was designated as a shell tool. Each of these artifacts are sufficiently different that in-depth discussion will occur in the relevant cultural levels.

Shell beads are not an uncommon discovery at The Forks (Goundry 1993:192, 1994:191; Kroker and Goundry 1993a:27; Quaternary 1993:25). An extensive literature review (Goundry 1993) showed that similar bead artifacts were found in Saskatchewan, North Dakota, South Dakota, northern Minnesota, and Nebraska. The chronological ages of these sites ranges from Oxbow (Wettlaufer *et al.* 1960) to Post-Contact (Lehmer 1954). Ethnographic documentation indicates that shell beads were used as decoration until supplanted by commercially manufactured beads and metallic ornaments during the Fur Trade Era.

As well as being used for personal adornment, shell was used to connote wealth and status in a society. Shell was used as a trade item both within a group and among groups. The manufacture of jewellery from shell appears to be a long-standing tradition which cross-cuts temporal, cultural, and geographic boundaries.

Measurements, including diameter, thickness, and weight, were conducted on all specimens. Shape of the specimens (circular, ovoid, elongate) was noted. The edges of the beads were studied for evidence of any grinding to produce a smooth surface or a certain shape. The curvature was looked at to attempt to determine from which portion of the shell the bead might have been carved. The perforations were studied to ascertain the method of manufacture, either punched or drilled, and the shape, round or ovoid, was described.

In this project, as has been the case with shell beads recovered during other projects at The Forks (Goundry 1993:192, 1994:191), it was not possible to determine the species of shell from which the beads were obtained. Most landmarks that are used for species identification occur in the hinge region of the shell. Beads were often carved from the ventral portion of the valve which is, in some cases, the thicker stronger part of the shell rather than using the thinner, more fragile sections.

3.8 Miscellaneous Artifacts and Recoveries

During an archaeological project, recoveries are made which do not fit into the previously described categories. There are several different types of specimens which have differing types of analyses. Rather than put forth long explanations for the potential method of analysing disparate catalogued materials, the types of artifacts will be noted and generalized analysis methods described. Detailed analytical procedures will be written up in the appropriate section if the analysis was undertaken.

3.8.1 Soil Samples

One of the more common catalogued specimens were soil samples. A one-litre sample was taken of each cultural matrix in each excavation unit. In addition, equivalent samples were taken from hearths and other features. Samples of unusual sediments, such as sand pockets in a silty clay layer or extra-local clays, were recovered as well. The terms of the mitigative analysis program precluded in-depth analysis of these samples. Types of analysis which can be undertaken on soil samples include:

- ♦ flotation for the recovery of microfossils such as seeds, minute bone fragments, insect elements, tiny lithic flakes, etc.;
- ♦ palynological analysis for the recovery and interpretation of pollen which can assist in the reconstruction of the palaeoenvironment;
- ♦ sedimentological analysis which help determine source areas for fluvial deposits and soil formation processes.

Flotation was not undertaken as part of the analysis program of this project. However, Sara Halwas, a volunteer and later employee of the project, will be floating a considerable number of soil samples to recover plant material, especially seed, for her doctoral research program at the University of Manitoba, Department of Botany.

Under the aegis of Parks Canada, for their forthcoming project, twenty soil samples from Levels 1 and 2 are to be analyzed by Kim Munson, Department of Geography, University of Winnipeg. She will be examining the sedimentological composition of the samples.

3.8.2 Metallic Artifacts

When the temporal focus of the excavation is post-European, metallic objects are present. However, during Pre-Contact periods, metallic artifacts consisted solely of cold-hammered copper. These recoveries are uncommon and will be written up in the level in which they occurred. Often the sole evidence remaining is the green stain of cuprous oxide on bone or soil.

3.8.3 Coprolites

One of more unusual types of recoveries, and much more common than expected, were coprolites. These preserved specimens of fecal matter are considered to be canid in origin, most likely from domesticated dogs which lived and travelled with the occupants of the site. It is possible that they could have had their source in scavenging coyotes or wolves which visited the site after the people had moved on. It had been hoped that a researcher investigating canid behaviour, especially into the past, would be interested in analysing this material. To date, no such person has been found.

3.9 Residue Analysis

One of the more recent advances in archaeological research has been the development of residue analysis. Protein molecules derived from animal blood and fat can be abstracted from the interstitial spaces on lithic tools. By testing these molecules against sera from known species, similar to an allergy test, the animals which were butchered by these stone knives can be determined. Similarly, the burnt residue within cooking pots can be tested using infrared to compare spectra with that of known plants and animal proteins, thereby determining what food was utilized.

There are several laboratories worldwide that specialize in this type of analysis. A biface and five ceramic sherds were submitted, by Quaternary Consultants Ltd., to Paleo Research Institute of Golden, Colorado under Heritage Permit A49-09 authorizing export of cultural material (Appendix A). The submitted lithic sample was DlLg-33:08A/16135, a Swan River Chert biface, from Level 2. The ceramic samples were sherds from Vessel 50 (Level 1), Vessel 116 (Level 2), Vessel 46 (Level 2B), Vessel 73 (Level 3), and Vessel 91 (Level 3A). The detailed report by Paleo Research Institute as well as their explanation of the applied methods is attached as Appendix B.

After the majority of this report had been written, Parks Canada, in conjunction with a web-based project they were initiating, submitted further samples to Paleo Research Institute in late 2009 and Quaternary Consultants Ltd. permission to publish the results in this report. They selected samples from only Level 1 and Level 2, both lithic and ceramic. The lithic samples were DlLg-33:08A/7836, a biface from Level 1, DlLg-33:08A/7851, a granite grinding stone from Level 1, DlLg-33:08A/8762, a Knife River Flint retouched flake from Level 2, DlLg-33:08A/6816, a granite chitho from Level 2, and DlLg-33:08A/12742, a limestone ochre bowl from Level 2. The ceramic samples consisted of sherds from Vessel 41 from Level 1, DlLg-33:08A/24685, an undesignated shoulder sherd from Level 1, and DlLg-33:08A/10633, another undesignated shoulder sherd from Level 2.The detailed report by Paleo Research Institute is attached as Appendix C.

4.0 LEVEL 1

4.1 Introduction

Level 1 was encountered in every unit that was opened (Figure 4.1-1). It occurred throughout the block area on the south, the isolated units in the north, the exploratory trench at the north edge, and the expanded elevator shaft area in the east. The layer ranged from very sparse to quite dense, reflecting activity areas.

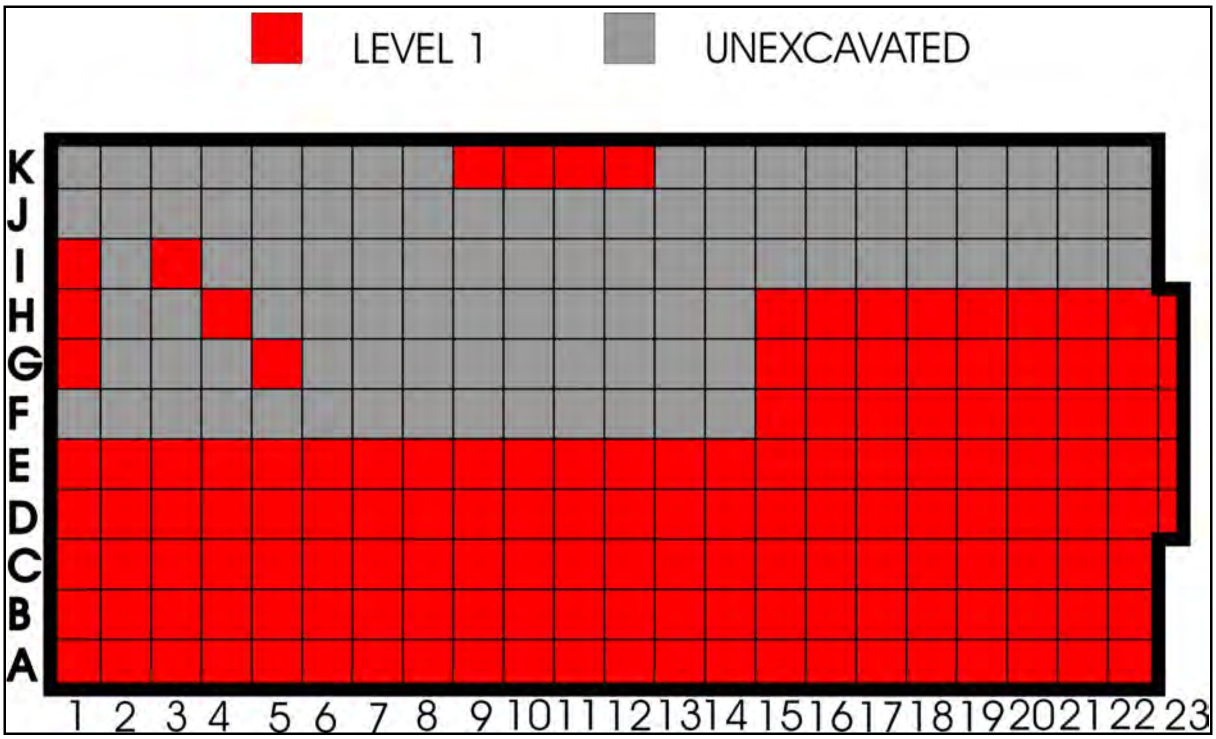


Figure 4.1-1: Map Showing Presence of Level 1

4.2 Features

4.2.1 Hearths

The primary feature that was recorded during the excavations was that of hearths (Figure 4.2-1). There are twelve hearths, most of which are relatively small. The size of four hearths could not be determined as they were on the periphery of an excavated unit—G23, H4, H16, and K9. The largest hearths are the two overlapping amorphous hearths centred in Units G19 and H19 and extending into adjacent units. They are relatively shallow and probably are the result of sequential campfires which were slightly offset (Plate 4.2-1).

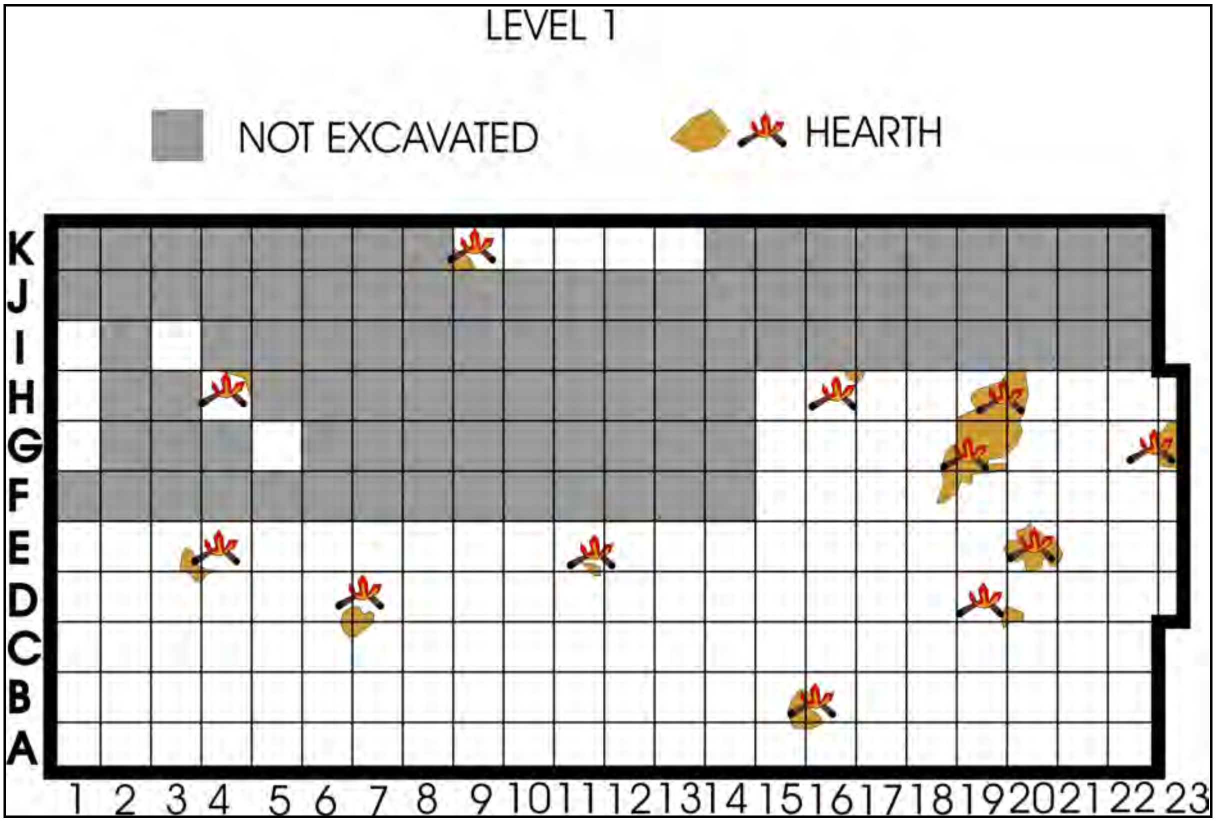


Figure 4.2-1: Distribution of Hearths in Level 1

Plate 4.2-1: Amorphous Hearth in Unit G19

4.2.2 Footprints

During the project, the archaeological team were able to document one of the rarest finds in North American archaeology, that of a footprint. Footprints are more commonly recorded in areas with volcanic activity. In instances where people walk through volcanic ash, the footprints are preserved when the ash hardens into tuff (a type of volcanic rock). Two of the more commonly known examples are at Pompeii (at the foot of Mount Vesuvius in Italy) and the East Rift Valley in Africa. A previous recovery during the 1991 Public Archaeology Project at The Forks recorded human and animal prints as well as buggy tracks (Kroker, Greco and Peach 1992:30-34).

For this fleeting glimpse of a long ago person's passage across the area to be recovered archaeologically, there must an unusual sequence of events:

- ♦ First, there must be sufficient rainfall to make the soil, a clayey silty clay, plastic enough to take an impression greater than two centimetres deep - any less and the impression would wash out during later rain falls.
- ♦ Second, the soil must either bake and become hard prior to freeze-up or, if the formation is late in the fall, freeze to remain intact throughout the winter and early spring melt. In addition, any precipitation between the formation of the footprint and freeze-up must be less than that which would make the soil saturated as the edges would then slump and the whole footprint would become amorphous.
- ♦ Third, in the spring, the ground must remain frozen, or preferably still under snow cover, when the flood waters bearing a sediment load rise over the location of the footprint. The sediment load, usually of a similar silty clay, is deposited on the snow or ground surface when the flood waters lose sufficient momentum to continue carrying the suspended solids. In the case of the footprints at the 1991 Public Archaeology Project site, the deposited sediment was sand (carried by the 1826 flood) which made the problem of the two layers melding moot.
- ♦ Fourth, no ice scour can occur, as this would gouge the surface of the soil and eradicate the footprints.
- ♦ Fifth, the water must recede before the underlying soil containing the footprint melts as this would result in the deposited layer of sediment melding into the previous soil without a discernable distinction (after all, they are both silty clay from the same source).
- ♦ Sixth, the archaeological recovery technique must permit the identification of minute changes in soil layer composition (texture, colour, etc.). Shovel shaving or mechanized excavation does not provide such an opportunity.
- ♦ And seventh, the excavating archaeologist must have the skills to identify such minute differences.

While excavating Level 1 in Unit A14 on July 20, 2008, Ernie Reichert encountered the initial indications of an area of depressed floor level (Plate 4.2-2). Careful excavation revealed that it was indeed a human footprint (Plate 4.2-3) as well as a second imprint of a large Artiodactyla (cloven-hoofed animal) (Plate 4.2-4). Photographs and measurements were taken and preparations were made (Plate 4.2-5) to make plaster-of-paris casts (Plate 4.2-6) of both prints (Plates 4.2-7 and 4.2-8).

Both individuals, the human and the large Artiodactyla (probably bison, but moose or elk are also a possibility), were crossing the area, the person heading southwest and the animal northeast. The sequencing of the two prints cannot be determined, although they both would have happened after the rainfall that turned the ground surface into mud. As to why there are no other prints recording the passage, there are two possibilities: this location was a patch of bare soil in an area covered with grass which would have prevented impressions from being formed or, the location was in a slight depression which retained water and hence mud longer than immediately adjacent areas which had already dried to the state where impressions would not be made. The human footprint would have been made while the camp was still occupied. There was a ceramic body sherd under the ball of the foot and a small rim sherd under the heel. Both sherds rested on a very thin layer of fish debris, scales and fragmented bone.

Plate 4.2-2: Floor of Unit A14 Showing Footprints

Plate 4.2-3: Human Footprint

Plate 4.2-4: Artiodactyla Footprint

The person making the footprint impression would have been wearing moccasins, as there are no impressions of toes. Based upon the size, the footprint appears to be equivalent to a Man's Size 8 or 9. Further analysis of the footprints may occur in conjunction with a Parks Canada project scheduled for 2010.

Plate 4.2-5: Building Casting Framework

Plate 4.2-6: Pouring Plaster-of-Paris Cast

Plate 4.2-7: Cast of Human Footprint

Plate 4.2-8: Cast of Animal Print

4.3 Ceramic Artifacts

Of the 149 excavated units, ceramic vessel sherds were recovered from 130. The level yielded 5049 sherds with a total weight of 12157.0 grams. This results in an average sherd weight of 2.41 grams for Level 1.

4.3.1 Artifact Distribution

General distribution by weight is illustrated in Figure 4.3-1. The discrimination is arbitrary, increments were chosen to best illustrate differentiation. Density varies greatly from zero recoveries in 19 units, to highs of 846.8 grams for 326 sherds in Unit A18, 691.9 grams for 186 sherds in Unit B19, and 684.7 grams for 332 sherds in Unit B17.

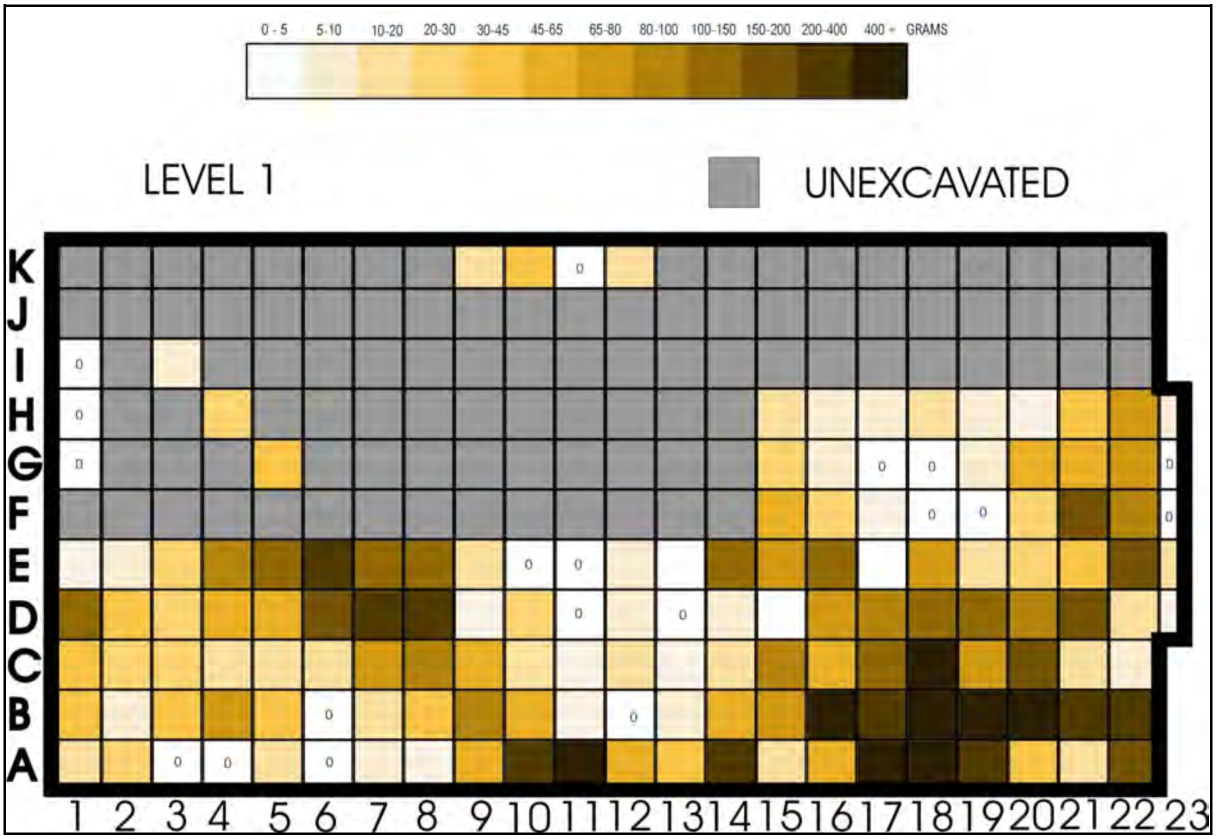


Figure 4.3-1: Distribution of Ceramic Recoveries by Weight

Three distinct densities are readily evident. Two are along the top of the incline (Figure 2.2-4), both probably only partially exposed by the excavation. The third was located below the slope. The first one, centred on the D and E-lines and the 6-8 east lines, appears to be deposited in peripheral association with two defined hearth features (Figure 4.2-1), the highest densities being located to the east and north of the hearths. The second, situated in Unit A10 and Unit A11, is probably only a portion of a larger deposit to the south of the A-line. The area of highest density is located at the bottom of the slope along the southern limits of the excavation area in the A and B-lines where they intersect with the 18 East line. This deposit likely continued to the south also. This area is bracketed by two hearths, but it is unclear why the density of ceramics is highest at this location.

It is likely, in a habitation area, that some hearths were interior and some were exterior. The ceramics alone do not enable one to tell if the hearths are internal or external to habitation structures. Some hearths appear to be located in areas of low ceramic density. This possibly suggests an internal function, where general surface litter would be less tolerable.

Upon reviewing the distribution of materials identified to vessel (Figure 4.3-2), it is apparent that the vessel fragment distribution mirrors that of the weight distribution. This suggests limited post-depositional influence, but it also shows that there are at least four separate ceramic densities. This fourth density, though more sparse than the others, is discrete and contains Vessels 93, 111, and 24.

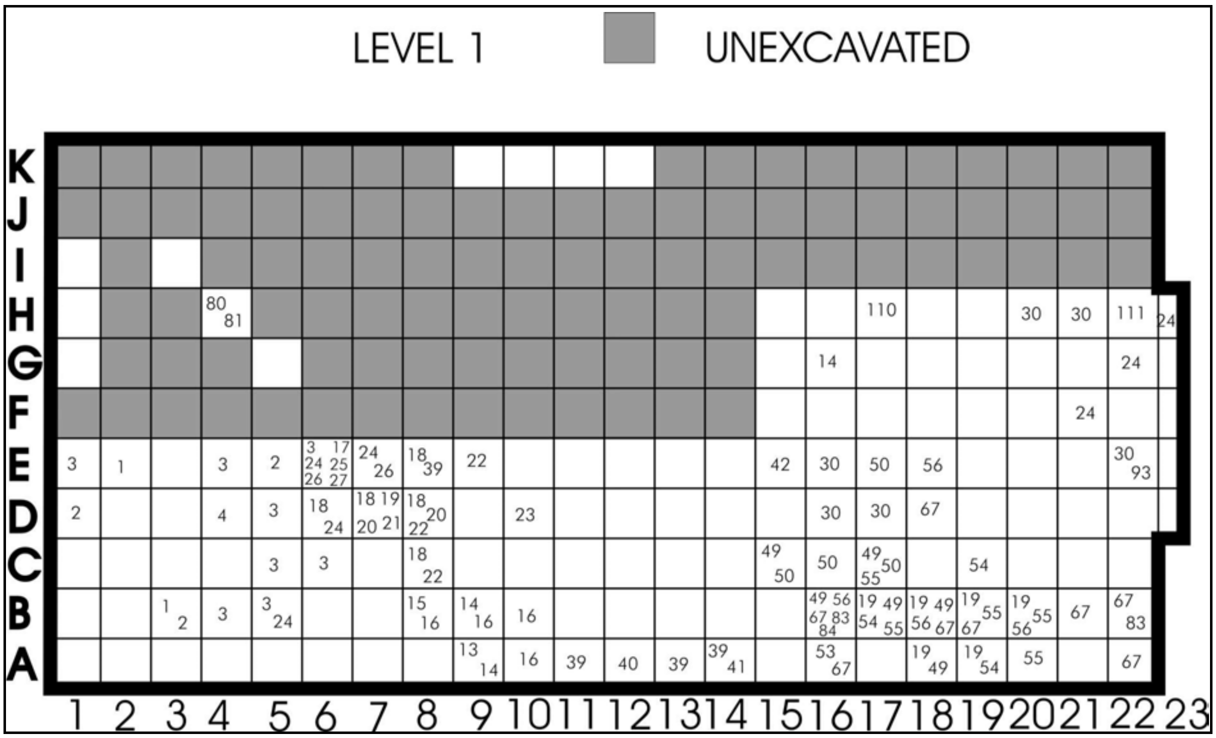


Figure 4.3-2: Distribution of Identified Ceramic Vessels

The general tendency shown in the vessel distribution is for the materials to be scattered on a SE to NW axis, echoing the topography. One exception is Vessel 24 which is spread across the excavation area on the opposite SW to NE axis in two distinct clusters, one above the slope on the west end of the excavation area and the other below the slope at the east end. In each of these separate locations, Vessel 24 appears to continue to follow that same scatter direction. This scatter seems likely to be caused by human factors and not post-depositional ecological influences.

The distribution of identified vessel fragments also indicates that the areas of highest weight density generally include the greatest density of vessels. The northernmost density above the slope contained portions of a total of 12 to13 vessels, depending on the specific parameters one chooses. The area of highest density for weight on the southern margin, below the slope, has nine identified vessels.

4.3.2 Artifact Recoveries

The recoveries consisted of 549 rim sherds/sherdlets, 4500 body sherds/sherdlets, and seven non-vessel ceramics.

4.3.2.1 Identified Vessels

A total of 38 vessels were identified from Level 1. These vessels are described in more detail to highlight the distinctive features of the individual vessels. The distribution is plotted on Figure 4.3-2.

Vessel 1

This vessel is a short- and flaring-necked vessel with disproportionately large decorative elements on the rim and neck. The paste consolidation is good. This vessel displays a repaired crack and wide disparity in thickness between the neck and rim. Rim sherds from this vessel were recovered from Units B3 and E2.

Vessel 2

The exterior of this vessel is covered with a thick deposit of charred residue. The decoration is densely applied and the rim is impressed with criss-crossing cord wrapped object impressions (CWOI). This vessel was identified in Units B3, D1, and E5. It is considered to be the same previously undefined type as Vessel 34 from Level 2, now referred to as Rainy River, Aspen type.

Vessel 3

Vessel 3 is part of a group of vessels from this level that are interpreted as being produced by a single maker. This group has been isolated as a new type for the Rainy River Composite—Holly Oblique. This pot shows CWOI decoration and stamping descending onto the shoulder, with a pronounced flare to the neck. Vessel 3 was recovered from nine different units (B4, B5, C5, C6, D5, E1, E4, and E6) including Unit C5 on Level 2 (rodent displacement).

Vessel 4

A small sherd representing this vessel was recovered from Unit D54. It is from the juncture of the neck and shoulder and has distinct large vertically oriented stamps. The stamps are more or less straight sided but the ends are rounded and, descriptively, it falls between linear and ovoid. These prominent stamps are unique and little more is interpretable, including the orientation of the sherd. A small impression appears as an oblique cord impression but not enough is present to determine if it is a cord mark from surface textile impression or a decorative element.

Vessel 13

Recovered from Unit A9, this is one of only a few vessels from this assemblage which appears not to be part of the Rainy River Composite. It is represented by only a single sherd. The paste of this vessel is very well consolidated. Vertically oriented linear stamps are impressed on the interior and exterior. The exterior surface is textile impressed up to the lip.

Vessel 14

This pot seems not to have CWOI or stamping on the neck. It shares the same rim decoration with Vessel 16, wide and flat CWOI nearly perpendicular to the rim. Vessel 14 also is distinctive for the red ochre or hematite staining on the interior and also on the exterior to some extent. The profile is straighter than the others identified as the same type. It was recovered from Units A9, B9, and G16.

Vessel 15

This is a large vessel with an aperture at the interior lip of approximately 30 cm. It has a flaring neck profile and limited decoration, constrained to oblique CWOI over vertically oriented stamps. It is of a type identified as Rainy River Plain. It was recovered in Unit B8.

Vessel 16

This is another Holly Oblique vessel, in this case the Stamped type. It was recovered from Units A10, B8, B9, and B10. Other than the rim decoration of CWOI, there appears to only be a singular row of asymmetrical stamps. It has a flaring neck profile with an interesting re-curve toward the interior near the rim, different than the typical incipient S. Finger impressions are visible on the interior of the neck.

Vessel 17

Similar to Vessel 3, this vessel is a Holly Oblique, CWOI type. The neck is shorter on this pot and it has one more row in the horizontal CWOI set. It was excavated from Unit E6.

Vessel 18

This Little Owl vessel illustrates the apparent tendency for this type to become larger through the occupations excavated here. The chevron at the upper neck is one of the diagnostic traits. This vessel, however, has traits not seen on earlier vessels of this type, in lower levels, in particular the wide and flat CWOI on the rim. Vessel 18 comes from Units C8, D6, D7, D8, and E8.

Vessel 19

The Rainy River Plain type is typified by the minimal combination of oblique CWOI over stamps on the exterior and oblique CWOI on the rim. This pot has this motif, but the stamps are quite large. The surface of this vessel is impressed with fine weave textile. This pot was widely dispersed, being recovered from Units A18, A19, B17, B18, B19, B20, and D7.

Vessel 20

Interpretation of this vessel is restricted by the limited view the small sherds afford. It appears to be an expression of the Rainy River Pseudo-chevron type. The overall dimensions are difficult to assess but it appears to be a smaller vessel than many of this type. The flaring rim is a consideration for comparison. Vessel 20 was excavated from Unit D7 and Unit D8.

Vessel 21

This vessel is identified from a single sherd from the lower portion of the neck, recovered from Unit D7. The decoration consists of vertically oriented linear stamps just above the neck juncture with three rows of CWOI visible above. Two other vessels are similar but the stamps on this vessel do not match either. Hence, it is designated as a discrete vessel.

Vessel 22

The designation of this vessel was based on an incomplete profile, in fact without a neck. This vessel has distinctly large stamping at the neck juncture. The stamps on this pot are longer and deeper than most in this assemblage. It was recovered from Units C8, D8, and E9.

Vessel 23

This vessel is identified as an example of the Rainy River Composite DDC type. It has a straight, outward angled neck and asymmetrical punctates, creating slight bosses. It is represented by a single rim sherd from Unit D10.

Vessel 24

One of the largest examples of the Holly Oblique type, it has only CWOI decoration, including oblique CWO stamps below the horizontal motif. It is from Units D6, E7, F21, G22, and H23.

Vessel 25

This pot is distinctive in this collection, and yet it appears to be a likely part of the Rainy River Composite range of expression. It is currently undefined and it is unclear how it might fit into the mix exemplified by this assemblage. Vessel 25 was recovered in Unit E6.

Vessel 26

This is one of two pinch pots, or finger moulded vessels, recovered from the site. The second pot (Vessel 59) was recovered from Unit A19 in Level 2A. This is the smaller of the two, roughly 2.5 cm high. It is difficult to imagine this as a functional pot and, in this case, it is assumed to be the product of play. The small scale of the finger indentations suggest that it is the effort of a child. Vessel 26 was recovered from Unit E6 and Unit E7.

Vessel 27

This small sherd, found in Unit E6, is of interest because of the rim form. This round rim, which appears to be rolled over, is not typical for Rainy River Composite ceramics. A Plains/Woodland designation is indicative of its typological leanings. This vessel will remain undefined at this time.

Vessel 30

This vessel, located in several units in the northeastern portion of the excavation (Units D16, D17, E16, E22, H20, and H21) shows the greatest similarity to Vessel 16, also a Holly Oblique, Stamp type. It also has the same profile and interior finger impressions, which are primary to grouping many of the Holly Oblique pots to a single maker. This pot has three rows of stamps, the lowest consisting of widely spaced singular asymmetrical stamps, larger than those above.

Vessel 39

The vessel has origins grounded in at least two types isolated from earlier occupations in the lower stratified levels. It also illustrates the continued usage of the punctate as a decorative element, well into the temporal range of Rainy River Composite ceramics. The surface treatment is a fine weave textile, not sprang weave. The sherds were in Units A11, A13, A14, and E8.

Vessel 40

Although this vessel's full profile has not been fully described, enough is present to suggest that it is likely another of the Holly Oblique type. Horizontal CWOI were present and part of the bottom row can be seen on the margin of the single sherd from which this vessel is identified. The artifact was recovered from Unit A12.

Vessel 41

This pot would likely be slotted in as a Winnipeg River Complex vessel if it was recovered without context. Our working date range for this assemblage is earlier than the currently understood temporal range for Winnipeg River ceramics. It is textile impressed up to the exterior lip and is undecorated, but for a several inconsistently applied small CWO stamps on the exterior lip. One sherd of this vessel was recovered from the bottom of a footprint in Unit A14 and other rim sherds were present in that same unit.

Portions of this vessel appear to be identified from Level 3 as well. The taphonomic factors that account for this would include ground squirrel activity. Another possibility is that excavation of a test pit in Unit D10 disturbed sherds from this vessel in the wall which were then displaced to the lower cultural level and curated with that designation.

Vessel 42

This is a short, vertical necked vessel. The overall dimensions are that of a small vessel, at least in the realm of day-to-day utilitarian pots. These smaller vessels may have had a specific purpose, possibly for small volume preparations, or maybe serving as an equivalent to a lunch box. This vessel shares general dimensions and neck profile with Vessel 50, but the similarities between the two stops there. It was located in Unit E15.

Vessel 49

Considered to be a Rainy River Pseudo-chevron vessel, it is interpreted as a late expression. The pseudo-chevron is uncharacteristically ill-formed and the vessel is proportionately dissimilar to the vessels of this type most commonly recovered from the Level 2 Complex. The short and thick incipient S neck profile is only seen in Level 1. This vessel was recovered from Units A18, B16, B17, B18, C15, and C17.

Vessel 50

This is a small vessel, similar in dimensions and proportions to Vessel 42. The decoration is unique in this assemblage and appears to be a hybrid of northern Plains and Woodland approaches. The sharp shoulder transition, the short neck, the smooth surface finish and the decoration are atypical for the Rainy River Composite. The decorative elements that make up the motifs on this pot are CWOI and stamps, a signature combination for Rainy River ceramics. Sherds representing this vessel were located in Units C15, C16, C17, and E17.

Vessel 53

This vessel, though identified from a single small sherd in Unit A16, carries a lot of implications. It is a fragment of the rim or 'lip' of what is described as a wedge rim vessel. This is not a Rainy River vessel, instead it is most likely from west or southwest of the Red River Basin. Wedge rims are typically associated with Plains traditions.

Vessel 54

The distinct appearance of the Rainy River DDC Composite pots are displayed on this vessel. It also has interior decoration—short CWOI below the interior lip. It shares this trait with Vessel 39 which also has the DDC decorative approach. Vessels like these are probably significant contributors to the confusion that surrounds efforts to distinguish between Blackduck and Rainy River ceramics. The vessel was recovered from Unit A19, B17, and C19.

Vessel 55

This pot, located in Units A20, B17, B19, B20, and C17, has been left with the typological identification of Bird Lake-like. It may represent a contemporary sub-type of Bird Lake, or be a progenitor, or represent a diffusion of Bird Lake traits during or after the zenith of the Bird Lake Complex. Unfortunately, the problems with the radiocarbon dates preclude the opportunity to resolve temporal subtleties like this.

Vessel 56

These vessel, recovered from Units B16, B18, B20, and E18, is interesting for the disconnect between the quality of manufacture and the lack of quality shown by the decoration. The incipient S profile of the neck and rim are very similar to that on Vessel 80 (an undecorated pot), and Vessel 45 (a Coalescent vessel of the Rainy River Pseudo-chevron type) from the Level 2 Complex.

Vessel 67

This is definitely not a typical Rainy River vessel. Vessel 67 does not fit the typology easily. The tall straight neck runs into a widely rounded, globular body form. The shoulders would have extended out beyond the constricted neck by a fair margin. The volume of this vessel was likely quite large. The sherds representing this vessel are widely dispersed, being found in Units A16, A22, B16, B18, B19, B21, B22, and D18.

Vessel 80

The form, quality and dimensions suggest a close affinity with Vessel 56. This vessel, however, is undecorated, despite the fact that the neck has been smoothed as if in preparation for decoration. The vessel is located in Unit H4.

Vessel 81

The Little Owl type, displayed by this vessel from Unit H4, runs through the entire assemblage, but how it relates to the rest of the materials is difficult to tell. It appears to exist parallel and somewhat separate from the other materials, as there seems to be little transfer of traits. The generally increasing size of the vessels may be interpreted as a subsumption into the milieu or this observation could be an artifact of the sample. Further research may provide clues.

Vessel 83

This is another vessel considered as part of the 'collapsed neck' tendency seen on Level 1. In this case, it appears as a collapsed version of the Rainy River Pseudo-chevron type, crossed with Kroker Mid-neck type. The sherds were located at the eastern part of the excavation area (Units B16, B22).

Vessel 84

Grouped with Vessel 13, and the following two vessels 93 and 110, Vessel 84 is textile impressed up to the exterior lip. Like the others, the decoration is restricted to a very limited part of the upper interior and exterior neck, and the rim. This pot, from Unit B16, has very small CWO stamps on the exterior lip, criss-crossing CWOI on the rim and short oblique CWOI on the interior.

Vessel 93

This slight proportioned vessel, located in Unit E22, has a distinct form which is not part of the typical Rainy River variation. It appears to have very little neck constriction, and the shoulders are so steeply sloped that the transition to the body of the vessel would have been extremely subtle. At this point it seems as though the other vessels of this group did not have the same form. This pot is decorated with small CWOI on the interior and exterior lips and the rim.

Vessel 110

The vertical stance, straight neck, textile impression up to the rim, and decoration only on the rim and possibly the exterior lip are all traits typical of the afore mentioned group. It also shares a well consolidated paste. This artifacts representing this vessel were recovered in Unit H17.

Vessel 111

Vessel 111, from Unit H22, has been determined to be a Holly Oblique vessel, of the CWOI and Stamp variety. Most of these vessels have a very similar character and affinity. A few have been linked by distinctive finger impressions on the interior neck, suggesting a single maker. This can not be said for all of Holly Oblique vessels, but it also can not be ruled out. This pot shares the vertically oriented asymmetrical-crescentic stamps with others of this type a particularly distinct stamp form.

4.3.2.2 Undesignated Vessels

Several shoulder sherds were recovered with horizontally oriented linear stamps aligned in vertical rows. DlLg-33:08A/2034 from Unit E5 and DlLg-33:08A/16007 from Unit A21 are illustrated in Plate 4.3-1. It is likely that they could be attributed to a particular vessel with a further, more in-depth review.

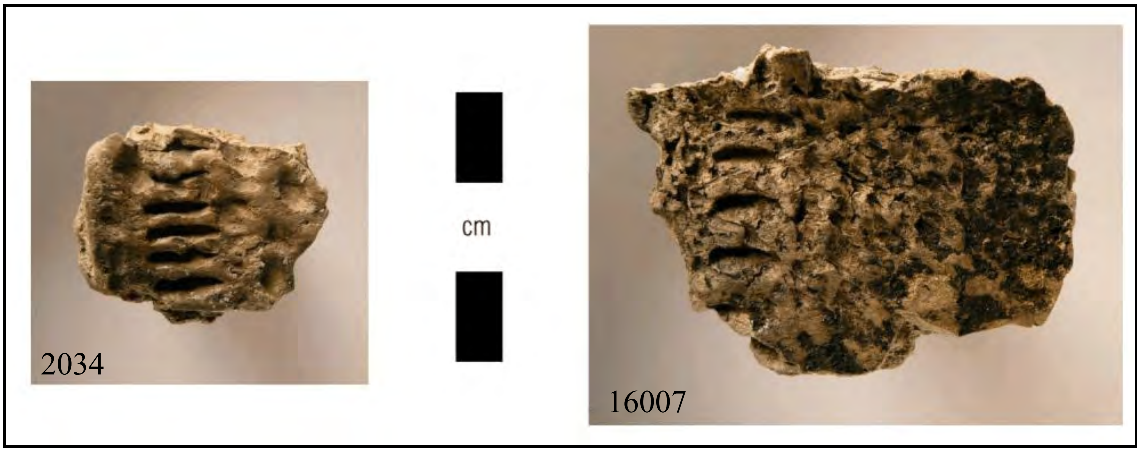


Plate 4.3-1: Decorated Shoulder Sherds

4.3.2.3 Body Sherds

A total of 4500 sherds from the lower portions of vessels were recovered. Refitting these sherds to the parent vessel is beyond the scope of a mitigative report. Some analysis of these body sherds was undertaken and will be discussed under manufacturing techniques.

4.3.3 Manufacturing Characteristics

Body sherds ranged in thickness, from thin to thick. Thickness is highly variable between vessels, in general there are thin walled vessels and thick walled vessels in each level. The thick walled vessels appear to be less frequent. Colour ranged from light terracotta, tan, buff (neutral between tan and grey), grey to near black. These variables are dependent on the portion of the vessel the sherd originates from, and the qualities of the vessels firing environment. The red end of the spectrum is due to an oxygen rich firing environment, the dark grey/black end is indicative of an oxygen deficient environment. Temperature variations also play a role in colouration. Without vessel reconstruction efforts, and even with, the body sherds may not be affiliated to particular vessels. There will be many partial reconstructions possible from this level, however. Paste quality ranged as well, poor (crumbly and not well worked, or too much temper, or insufficient heat), to very good (dense with clean breaks). Notes were compiled on the general colour and paste quality for the sherds found in each excavation unit but were not quantified or summarized for this report due to uncertain vessel affiliation for most body sherds.

4.3.3.1 Surface Treatment

The two surface treatments of consequence in this excavation are textile impressed and sprang impressed. In Level 1, textile impressed sherds comprise 81.6% of the total recoveries, sprang impressed are 8.0% and obliterated textile impressed are 4.8% (Table 4.3-1). Smoothed sherds are minimally present. A large number of sherds had exfoliated so that no determination of the type of surface treatment was possible. However, textile impressed surfaces overwhelm the other types.

LEVEL 1	149 units	WT / grams	QTY	%
SPRANG		969.7	366	8.0
TEXTILE IMPRESSED		9900.4	3959	81.4
OBLITERATED		592.1	357	4.9
VERTICAL CORD		-	-	-
SMOOTH		94.2	55	0.8
No Recorded Surface		600.6	312	4.9
TOTAL		12157.0	5049	100.0

Table 4.3-1: Types of Surface Treatment Recorded in Level 1

4.3.3.2 Modifications

One example of secondary modification was identified from Level 1 materials. A body sherd (DlLg-33:08A/7978 from Unit C11) was drilled from the exterior to create a perforation (Plate 4.3-2). Speculations are that holes were made to aid in suspension, or, in pairs, could be used to re-enforce a fracture in conjunction with some form of lashing. In this case, there is no evidence of a prior fracture where residues and debris would have accumulated during use. The most likely function appears to be suspension.

Plate 4.3-2: Drilled Sherd

One small sherdlet (DlLg-33:08A/1235 from Unit D1) shows gnaw marks from a small rodent (Plate 4.3-3). Identified in the field as possible tools marks, closer examination shows the grooves are in parallel pairs indicative of rodent incisors.

Plate 4.3-3: Rodent-gnawed Sherd

4.3.4 Residue Analysis

Residues were identified on the interior and exterior of many sherds. The density, distribution, thickness, quality, and character of the residue varied considerably. DlLg-33:08A/10192, a shoulder sherd from Vessel 50, was submitted, by Quaternary Consultants Ltd., to Paleo Research Institute in Golden, Colorado. Pollen of *Alnus* (alder), *Pinus* (pine), Asteraceae (sunflower family), *Chenopodium/Amaranthus* (pigweed), *Eriogonum* (wild buckwheat), and Poaceae (grass family) was present. A small quantity of *Zea mays* pollen indicated the preparation of corn in this vessel. Fabaceae starch was present indicating the cooking of beans.

The FTIR analysis resulted in identification of *Allium* (wild onion), *Helianthus* (sunflower) leaves and seeds, *Pinus* seeds, *Quercus* (oak) nuts, *Prunus virginiana* (chokecherry), and *Atriplex* (saltbush) in the residue. Consistent matches with *Phaseolus* (beans) suggest regular processing in the vessel. Other matches were made with *Bison* (bison) fat, *Antilocapra* (pronghorn), and fish. A deteriorated hair from a rodent was observed. Given the preponderance of beaver bone, it is possible that this represents cooking of beaver meat, although the FTIR did not indicate that presence.(Appendix B).

The Parks Canada submission of Vessel 41 resulted in identification of *Allium*, *Helianthus* seeds, *Pinus* seeds, *Quercus* nuts, *Xanthium* (cocklebur), *Nelumbo* (American lotus), *Rhus* (sumac), *Cleome* (beeweed), *Ribes* (currant), *Symphoricarpos* (snowberry), and *Zizania aquatica* (wild rice). Cultigens (beans and corn) were present as were bison and duck residue (Appendix C).

In addition, DlLg-33:08A/24685, an undesignated shoulder sherd, also submitted by Parks Canada, had *Allium*, *Helianthus* seeds, *Pinus* seeds, *Quercus* nuts, *Atriplex*, *Cleome*, *Ribes*, and *Zizania aquatica*. Corn, duck, and bison were also present on this sherd (Appendix C).

4.3.5 Non-Vessel Ceramics

Seven artifacts were identified as cast-offs, distinguishing them from the ubiquitous heat-modified clay. Five of these were identified with temper. There is only one specimen of note, DlLg-33:08A/11713 from Unit B13 does not seem to contain temper grit but was obviously manipulated by human hand. It has the unique characteristics of a blob of clay that was superficially molded and then thrown to strike a piece of split wood. It was likely inadvertently fired which allowed it to survive re-amalgamation into the soils. The wood grain impression has not been identified to species.

4.4 Lithic Artifacts

4.4.1 Lithic Tools

An excavation as extensive as the one being described in this report, in an area known to have been frequently inhabited, can be expected to yield numerous artifacts. Organic materials break down in relatively short periods of time when compared to stone, so it is no surprise that numerous lithic tools were recovered during this excavation. As multiple occupation horizons were encountered, the lithic assemblage will be analyzed by cultural occupation level.

The Level 1 recoveries for lithic tools totaled forty-seven artifacts (Table 4.4-1) comprising twelve different types of implements and weighing a total of 688.2 grams. The distribution of these tools is depicted on Figure 4.4-1. Several different lithic types are represented (Table 4.4-2) with Undifferentiated Chert being the most common.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	10	21.28
Projectile Point Preform	1	2.13
Scraper	6	12.77
Spokeshave	1	2.13
Biface	4	8.51
Uniface	1	2.13
Chopper	1	2.13
Retouched Flake	10	21.28
Utilized Flake	7	14.89
Adze	1	2.13
Hammerstone	1	2.13
Groundstone Tool	3	6.38
Palette	1	2.13
TOTALS	47	100.02

Table 4.4-1: Lithic Tool Types in Level 1

The tools will be described by type on an individual basis. The measurements (the metrics) of these artifacts will be illustrated in tables following each tool type or within the artifact description for smaller groupings.

LITHIC MATERIAL TYPE	QUANTITY	%
Chert (Undifferentiated)	16	34.04
Selkirk Chert	8	17.02
Knife River Flint	7	14.89
Swan River Chert	4	8.51
Granite	2	4.26
Schist	2	4.26
Quartzite	2	4.26
Limestone	1	2.13
Cathead Chert	1	2.13
Gronlid Siltstone	1	2.13
Gabbro	1	2.13
Denbeigh Point Chert	1	2.13
St. Ambrose Chert	1	2.13
TOTALS	47	100.02

Table 4.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 1

4.4.1.1 Projectile Points

Ten artifacts were designated as projectile points. The type and material are noted within each individual artifact description. The measurements of the various attributes are compiled in Table 4.4-3. The specimens are illustrated in conjunction with their description at twice actual size.

Plate 4.4-1: DlLg-33:08A/4725

DlLg-33:08A/4725 is a Prairie Side-Notched projectile point that was recovered in Unit A10. This small projectile point is roughly made from a low quality dark quartzite. Large granules of quartz are visible on all faces of the point. It appears to have been manufactured with as few flakes removed from the raw material as possible. The base on the dorsal face has a single flake scar visible, 5.4 mm wide and 4.1 mm long. The tip of the base on the right hand edge is broken off and the notch beyond it is composed of at least two flake scars, all originating from the same point such that they are detectable only from the two hinge fracture scars visible within the arc of the original flake scar. This originating flake scar is 8.0 mm in width and 5.2 mm deep. On the right edge, one flake scar is visible directly above the notch. It is 8.2 mm wide and 4.1 mm deep. From this point to the tip (6.8 mm), no flake scars are visible. On the left edge, from the tip to the notch scar, no flakes have been removed. The notch itself is again one large flake scar with at least two further reducing flakes removed, detectable only from the two hinge fractures visible within the notch. The notch scar is 7.0 mm deep and 7.4 mm wide. On the ventral face, the base has two flake scars visible, both in the middle of the base so that each tip is untouched by flake scars. These scars are 3.7 mm and 4.2 mm in width and 2.4 mm deep. From these scars to the right edge, there is an unknapped space 4.9 mm long. The notch is made of a single flake scar 6.0 mm in width and 4.8 mm deep. From the notch to the tip, one flake scar is visible immediately above the notch scar. It is 7.1 mm wide and 2.9 mm deep. There is an area 6.5 mm long from the flake scar to the tip that has been left untouched by the knapper. From the point along the left edge, two flakes have been removed. The first is 5.0 mm wide and 8.5 mm deep; it travels nearly to the notch scar and truncates in a hinge fracture. The second, much smaller flake scar is 2.5 mm wide and 6.4 mm deep. There are no other flake scars visible from here to the notch scar, leaving an area 4.6 mm long. The notch on this edge is made up of at least two flakes; but once again the only method of detecting the second flake is from the hinge fracture inside the larger initial flake removal scar. This flake scar is 5.9 mm wide and 4.8 mm deep.

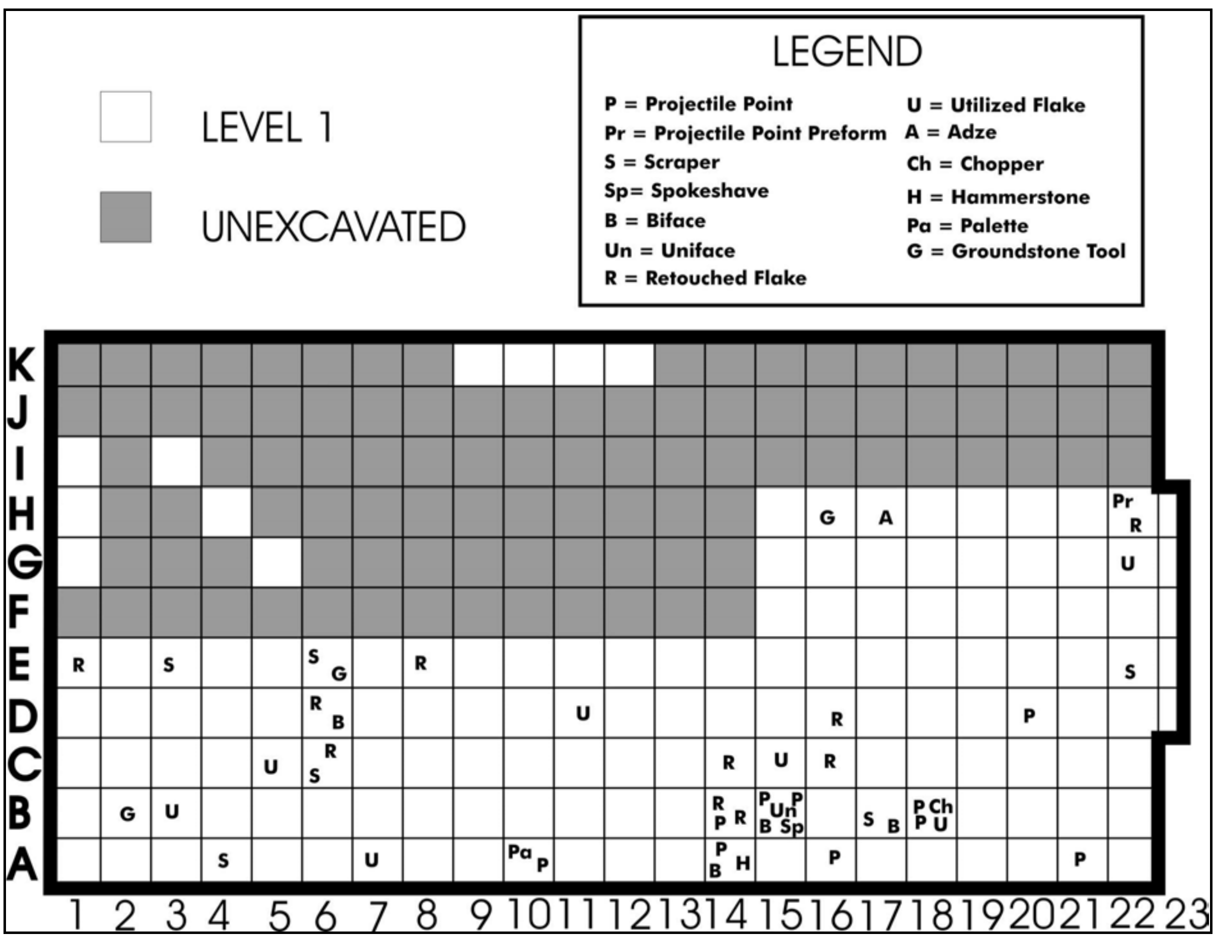


Figure 4.4-1: Distribution of Lithic Tools in Level 1

DlLg-33:08A/7837 is an incomplete Swan River Chert projectile point from Unit A14. This unifacially flaked specimen is similar to another projectile point recovered from Unit D20 (DlLg-33:08A/14401). It is worked on three sides, the fourth is broken obliquely across the length of the point. There are a few large flakes on this piece—3 mm to at least 9 mm; the 9 mm flake is obscured by the line of the break. The base is thinned by two flakes removed on the dorsal face. Some use wear is visible on the (dorsal up, distal away) right edge. This edge appears to be resharpened; there are a few stacked hinge fractures. This flake is very similar in shape to the base of a Prairie Triangular point.

Plate 4.4-2: Both Sides of #11909

DlLg-33:08A/11909 is a broken KRF projectile point which was recovered from Unit B14. Only a small section of this point survives. The point is broken at the hafting notches with the entire blade missing. The left edge of the base has been broken so that this notch is only partially present. The overall length of is 6.34 mm. One small section of the edge, 2.92 mm in length, has 5 flakes at 0.41 mm in width. This is remarkably small and even flintknapping. There are hematite stains on this point. A trace of cortex remains on the base.

DlLg-33:08A/13953 is the tip of a Selkirk Chert projectile point recovered from Unit B15. This point is broken high up, near the tip at an oblique angle. It displays very sophisticated knapping with broad shoulders and deep, even flakes averaging 4.3 mm.

Plate 4.4-3: DlLg-33:08A/13953

DlLg-33:08A/13954, from Unit B15, is a broken Denbeigh Point Chert projectile point. This point appears to have had some resharpening along the upper portion of the edge, running 13.19 mm on the left edge (ventral up, proximal facing researcher) and 12.03 mm along the right edge. The left edge angle is 65º to 70º while the rest of the point is approximately 40º. This point has definitely been resharpened and may have been used as a hafted point. The angle of the left edge suggests possible use as a drill, however the working edges are still sharp and have no evidence of drill usage (scars running at a 90º angle to the edge) so it is most likely that this tool broke in manufacture. Flaking has a range from 1.12 mm to 3.3 mm. The point is quite sharp at the tip. The base has been thinned with the ventral face having at least four flakes that terminate in step fractures, while the dorsal face has high-shouldered flakes ranging from 2.31 mm to 4.4 mm. The ventral face has mostly edge-flaking, while the dorsal face has flakes that - at least in one case - cover the surface entirely. Flaking patterns on this face are more even and parallel than on the ventral face. There is hematite staining on this artifact.

Plate 4.4-4: Both Faces of DlLg-33:08A/13954

Plate 4.4-5: Dorsal and Ventral Faces of DlLg-33:08A/14401

DlLg-33:08A/14401, from Unit D20, is a broken Eastern Triangular projectile point of St. Ambrose Chert. It is broken obliquely across the point. With the ventral side up and the proximal end facing the researcher, the right hand shoulder of the base extends 2.2 mm beyond the rest of the base. Flaking is even, with one flake on the dorsal face crossing over half of the point. These flake scars range from 1.2 mm to 3.9 mm.

DlLg-33:08A/16006 is an incomplete Prairie Side-Notched projectile point from Unit A21. This side-notched point, made from Gronlid Siltstone, has a broken tip, shoulder, and base. One shoulder survives. The tip angle listed is a projection and not a definite measurement. The edges are serrated in form with high-shouldered flakes; quite even along both edges, varying from 1.81 mm to 3.03 mm. The base thinning appears to be one flake taken off the ventral face and truncates sharply on a hinge fracture.

Plate 4.4-6: Obverse and Reverse Sides of DlLg-33:08A/16006

Plate 4.4-7: DlLg-33:08A/16042

DlLg-33:08A/16042 is identified as a Prairie Side-Notched projectile point. It was recovered from Unit B18. This chert point is complete and is a typical example of the prairie side-notched type. Flaking is even (ranging from 0.80 mm to 2.2 mm) and uniform on both edges as well as across the base. The shoulders have been carefully knapped. The notches are even and appear to have been carefully made. The base shoulders are squared. There is a hairline fracture running in a semi-circle across one edge; possibly a reason for discarding the point. Alternately, this fracture could have occurred post-depositionally.

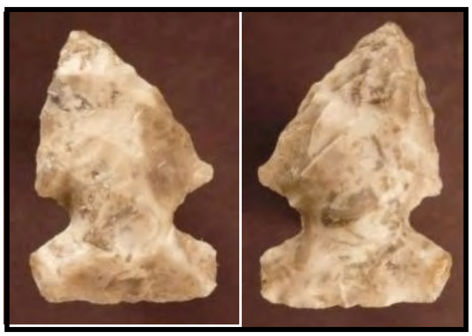


Plate 4.4-8: Obverse and Reverse of DlLg-33:08A/16043

DlLg-33:08A/16043 is a complete Prairie Side-Notched projectile point, made of chert, from Unit B18. This point has an uneven aspect in that the base edge to tip angle is well off 90º (the tip points to 80º) and would have had to be hafted on an angle. The dorsal face has severe stacking on the left edge (distal end facing away from researcher) and a very steep right edge. The ventral face has a smoother aspect, however the right edge (left with dorsal face up) is very steep as well with an edge angle of approximately 70º on both edges. The base is well formed and has a smooth edge, however it flares out quickly toward the notches. The notches are fairly deep and even.

Plate 4.4-9: Front and Back of DlLg-33:08A/23335

DlLg-33:08A/23335 is a broken projectile point made from Swan River Chert which was recovered from Unit A16. It is broken 18.2 mm from the tip, therefore type of point is not determinable as the base is missing. The ventral face has seven large flakes removed (this includes both edges) resulting in a serrated edge, but as the curvature of the ventral face is quite flat in comparison to the dorsal face, little reduction was required on this face. On the dorsal face, 12 large flakes have been removed, three of which terminate in step fractures. Numerous sharpening flakes have been removed from the dorsal face. There is no evidence of sharpening flakes removed from the ventral face. Flakes on both faces range from 1.9 to 4.7 mm.

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
4725	19.80	12.30	5.10	11.7	8.85	8.00	2.95	66	23	78
7837	17.40	13.10	3.20	13.10	n/a	n/a	n/a	n/a	n/a	n/a
11909	6.34	12.17	2.55	inc.	7.06	6.3	n/a	n/a	n/a	n/a
13953	20.80	18.80	4.50	n/a	n/a	n/a	n/a	n/a	n/a	50
13954	34.32	19.42	4.43	18.36	n/a	n/a	n/a	n/a	n/a	71
14401	18.73	16.50	3.40	16.50	n/a	n/a	n/a	n/a	n/a	n/a
16006	22.82	13.37	3.11	n/a	7.74	n/a	7.06	n/a	85	50
16042	21.25	13.50	3.00	12.61	7.75	3.75	3.80	51	90	85
16043	19.47	12.95	4.31	12.95	7.17	4.14	3.75	45	90	71
23335	18.20	20.90	5.50	n/a	n/a	n/a	n/a	n/a	n/a	72
23755	24.20	13.20	3.90	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 4.4-3: Measurements of Projectile Points from Level 1

4.4.1.2 Projectile Point Preform

DlLg-33:08A/23755, from Unit H22, is tentatively identified as a projectile point preform made from chert. It is broken in two pieces that refit. This preform fits within the standard measurements for an Eastern Triangular projectile point. However, there are difficulties with considering this specimen as a preform for a projectile point as it is barely within the minimum measurements for a point and would require more flaking to create a point, thus reducing it to a very, very small point. The ventral face is very flat but was further reduced on the right edge in a series of four hinge fractures that end at the break. It is probable that the knapper was working on this face/edge at the fourth hinge fracture when the tool broke as the hinges stop sharply right at the edge of the break. The dorsal face has five knapping scars running from the tip of the preform to just below the break. The last knapping scar is a hinge fracture that occurred beyond the edge of the break, so it is unlikely that this is the reason for the break.

4.4.1.3 Scrapers

Six scrapers were recovered in Level 1. The position of the working edge leads to designations as either end scraper or side scraper or a combination thereof. The metrics are in Table 4.4-4 and selected artifacts are illustrated in the descriptions at two time actual size.

DlLg-33:08A/161 is a broken end scraper from Unit A4. This SRC end scraper has been badly damaged; there is a break at the base of the tool and a break on the left side of the working edge which appears to have considerably thinned the tool. On the right side of the working edge, a series of deep step fractures (possibly caused by post-depositional actions, e.g., foot pressure) obscures the working edge. Directly above this set of step fractures is a remnant of cortex. It is possible that these step fractures were an attempt to remove this cortex. There are eight flake scars visible on the working edge, totaling 7.83 mm in width with a maximum of 9.01 mm in depth. The ventral face has some slight wear polish on it, near the working edge.

DlLg-33:08A/1703 is an end scraper made from Selkirk Chert. It was recovered from Unit E3. This end scraper is clearly a reworked projectile point; the tang of the scraper is fashioned out of a projectile point base, with the base shoulders knapped away so that a narrowed tang remains. The notches are still visible and unmodified. There is no way to tell if the width of the scraper is in accordance with the original shoulder width of the projectile point. Both faces have medium polish on the tang, crossing it horizontally in two bands on one face and one band on the other face. This strongly suggests hafting polish, but it is not possible to tell if this polish is from the tool's original incarnation as a projectile point or in its second life as an end scraper. On the face with two bands, the working edge is made up of four flakes, ranging from 1.94 mm to 4.74 mm, with a maximum depth of 5.48 mm. On the opposite face, the working edge is made up of five flakes, ranging from 1.32 mm to 3.56 mm, with a maximum depth of 3.53 mm. Hafting width is 5.49 mm.

Plate 4.4-10: #1703

DlLg-33:08A/5005 is a broken chert end scraper from Unit C6. As so little remains of this tool's working edge, the designation 'scraper' is somewhat doubtful. This could be a core that was knapped lightly at one edge resulting in what appears to be a working edge; there is some battering at the edge that could either indicate use or failed attempts to remove flakes. At the working edge on the dorsal face, seven flakes have been removed, four of which are step-fractures. These flakes range in size from 2.06 mm to 5.75 mm in width with a maximum depth of 3.6 mm. On the ventral face of the working edge, nine flakes have been removed. Neither these flakes nor the ones on the dorsal face are contiguous. These flakes range from 1.85 mm to 4.93 mm with a maximum depth of 9.41 mm.

Plate 4.4-11:
DlLg-33:08A/5456

DlLg-33:08A/5456, a complete chert side scraper, from Unit E6, has strong use wear polish on the ventral face, 2.0 mm behind the working edge. It is 0.5 mm shorter than DlLg-33:08A/5958, and the same general shape. There is conchoidal fracturing 12.5 mm from the base along the opposite edge, suggesting that both edges were involved in the tool's use. There are six high-shouldered flakes along the opposing edge resulting in a serpentine edge. The working edge is built partially out of the secondary shaping of this tool, and most of the flakes taken off this edge are sharpening flakes.

DlLg-33:08A/15127, a KRF end scraper from Unit E22, is quite roughly worked in comparison to others recovered at this site. The working edge has an angle of 40º, which is extremely shallow in comparison to the usual 80º-90º angles of a typical end scraper. Five large flakes (2.1, 4.1, 1.3, 1.3 and 3.4 mm from right to left) create a scalloped edge. It should be noted that although the edge is scalloped, the ventral face at the edge is still flat. The right edge has been utilized for 12.4 mm from working edge to the end of use on that edge. As well, the left edge has 12.2 mm of polish, so it is possible that this scraper could be more properly called a side/end scraper.

Plate 4.4-12: Dorsal and Ventral Sides of DlLg-33:08A/15127

Plate 4.4-13: #23656

DlLg-33:08A/23656, a KRF Thumbnail Scraper, from Unit B17, has knapping along one edge. The working edge is directly opposite where the impact platform would have been were it still a part of this tool. It has been removed or obscured by a hinge fracture at the proximal end. The ventral face has no knapping scars, as all knapping occurred on the dorsal face. Fifteen flakes were removed from the working edge (Plate 4.4-14), with sizes ranging from 0.7 mm to 2.3 mm. Polish on the dorsal face is limited to the working edge only. Polish on the ventral face is more extensive—two spots of polish 7.2 mm from the working edge and two areas of light abrasion running vertically from the edge into the body of the tool. The abraded area is very light.

Plate 4.4-14: Working Edge

4.4.1.4 Spokeshave

DlLg-33:08A/13960 is a spokeshave made from chert. It was recovered in Unit B15. This artifact has flake scars in the incurvate edge and very minor polishing along that edge. The specimen is very thin; enough so that this tool would not have survived too much use. It is probable that this spokeshave was used opportunistically and discarded. Because a spokeshave, by definition, is a scraper with a concave working edge, the measurements of this tool are tabulated in the scraper metric table (Table 4.4-4).

Plate 4.4-15: DlLg-33:08A/13960

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
161	end	17.37	16.39	7.64	16.28	2.11	65
1703	end	13.17	14.35	3.36	12.40	2.33	55
5005	end	23.09	29.68	7.32	17.75	6.52	30
5456	side	27.50	17.90	5.50	25.00	4.90	55
15127	end	32.30	13.20	5.30	12.57	3.50	40
23656	end	18.80	14.30	2.10	8.50	5.50	11
13960	spokeshave	30.56	19.45	3.08	9.25	3.57	55

Table 4.4-4: Measurements of Scrapers from Level 1

4.4.1.5 Bifaces

Four tools were identified as bifaces, meaning that sharpening flakes had been removed from both faces of the lithic specimen. The metrics are detailed in Table 4.4-5 and the artifacts are depicted at twice actual size.

Plate 4.4-16: Obverse and Reverse Faces of DlLg-33:08A/5140

DlLg-33:08A/5140, from Unit D6, is a Knife River Flint biface. This tool was broken in manufacture parallel to, but slightly offset from, the long axis of the tool. The striking platform is clearly visible at the base of the tool and the ventral face clearly shows a bulb of percussion. The surviving edge is on the right. Were this tool to be symmetrical prior to breaking, it would be a teardrop shaped biface, possibly to be further worked into a projectile point. The knapping on both faces is not very invasive, moving a maximum of 4.0 mm on the dorsal face and 5.5 mm on the ventral face. The base has a width of 9.5 mm, then a space 13.24 mm long that has no flake scars and then nine flake scars with a maximum width of

4.55 mm. On the ventral face, there is a total of seven flake scars, with a maximum width of 6.0 mm. No evidence of tool use can be discerned along the working edge.

DlLg-33:08A/7836 is a broken Selkirk Chert biface from Unit A14. This tool has a stepped structure to its edge, consistent with drill manufacture and it is probable that it was broken in manufacture or resharpening. The break runs obliquely across the tool, just at the point that a shoulder is beginning to appear. This is clearly reflected on the more complete opposite shoulder. There are only tantalizing hints of use wear on the edges, both of which are still sharp enough to cut easily. The one unbroken shoulder extends 6.7 mm beyond the working area. Most likely this is a hafting extension. With the dorsal face up and the proximal end facing the researcher, the right edge flares out 6.8 mm. Flake scars range from 1.5 mm to 9.7 mm. As there is no evidence of use wear, it is probable that this tool was broken in the process of manufacture or resharpening and discarded. Protein analysis showed no trace of any animal residue on this fragment and it is likely that it was broken during manufacture (Appendix C).

Plate 4.4-17: DlLg-33:08A/7836

DlLg-33:08A/13956 is a chert biface from Unit B15. This artifact is in the process of manufacture and could properly be called a preform. The flaking is extremely rough with many flakes terminating in hinge and step fractures. It is a teardrop-shaped specimen. It is highly probable that this piece was

Plate 4.4-18: Obverse and Reverse Sides of DlLg-33:08A/13956

discarded (if it wasn't simply lost) due to the difficulty of thinning across steep hinge/step fractures that run around the edges. Both edges have large vertical faces that would have made it difficult to further thin the artifact. As well, with the ventral face up, the left edge appears to be worked to 23.64 mm and the right edge 9.68 mm prior to abandonment. There is hematite staining on this tool which also has some patination beginning on both the ventral and the dorsal faces; some of which covers flaked areas.

DlLg-33:08A/14246, a broken Selkirk Chert biface, was recovered from Unit B17. This is the base of the original tool, most of which appears to be lost. The flake scars on the ventral face almost uniformly end in a hinge fracture, and those on the dorsal face are less forcefully flaked, with most flakes crossing to just under half the face. Flakes vary from 1.3 mm to 5.9 mm. Only traces of the lateral working edges are present. The base of this artifact is suggestive of a lanceolate-shaped tool.

Plate 4.4-19: Obverse and Reverse Sides of DlLg-33:08A/14246

4.4.1.6 Uniface

DlLg-33:08A/13959 is a chert uniface recovered in Unit B15. There is a small length on the ventral face that has some micro-flaking, otherwise this tool is unifacially flaked on the dorsal face. This section, 16.13 mm in length in the medial section of the working edge, is the result of use wear flaking. There is some polishing on the ventral face near both working edges. This tool has the bulb of percussion, bulbar scar, etc. still very visible—a good example of tool manufacture from a single flake. The dorsal edges are rough, consisting of multiple- hinged and step-terminated flake scars. This specimen appears to have been used mostly on the sides as the 'tip' of the tool is truncated in step fractures as well. The measurements for this artifact are listed in Table 4.4-5.

4.4.1.7 Chopper

DlLg-33:08A/16063 is a chert tool from Unit B18. The material of this chopper is made up of bands of light grey limestone and a medium brown chert, running vertically along the length of the tool. This tool appears to have never been used as the leading edge is still fairly sharp and there is no evidence of any use wear. The measurements for this chopper are detailed in Table 4.4-5.

4.4.1.8 Retouched Flakes

Ten retouched flakes were recorded in Level 1. Their distribution is illustrated on Figure 4.4-1 and the metrics are detailed in Table 4.4-5.

DlLg-33:08A/1623, from Unit E1, is a chert retouched flake. This tool is unusual in that the main working edge is curved to form a bowl-shaped edge, so that the working edge slopes 2.3 mm in an upward curve that rises sharply from the base of the bowl to the right hand edge. There is a large amount of polish on the inner edge as well as extending inward from the working edge for 2.1 mm. The right hand edge of the tool has four large, precise flakes taken off the edge from 12.1 mm to 16.1 mm from the base of the tool. The largest flake scar is 2.15 mm and the smallest scar is 0.4 mm, although this scar's size may be obscured by the flakes taken off each side of it. As with DlLg-33:08A/23675 (a retouched flake from Level 3, Unit B8), DlLg-33:08A/1623 is flaked on both faces, but not along the same edge; therefore this tool is unifacially flaked.

DlLg-33:08A/5004, from Unit C6, is a chert retouched flake that has been heat-treated. It is slightly unusual in that the working edge is knapped on both faces. The left half of the working edge is flaked on the ventral face, while the right half of the tool is flaked on the dorsal face. The manufacturer most likely knapped half, flipped the tool over and flaked the other half, possibly in order to create a flatter working edge. Ventral flaking is 13.5 mm long and dorsal flaking is 9.7 mm long. The dorsal face has cortex and it is likely that this flake was struck off a pebble or small core.

DlLg-33:08A/5189 is a broken retouched flake made of chert. It was excavated in Unit D6. It has two flakes removed from one face and some slight rounding at one end of the edge. This artifact has natural striation over all of the surfaces which makes detection of use wear very problematic. In addition, high-gloss inclusions cloud the possibility of detecting use wear polish. The two flakes removed measure 8.54 mm and 9.04 mm in width. Length of these flakes cannot be discerned as this specimen is broken on both faces and on each side of the working edge.

DlLg-33:08A/5614, a Selkirk Chert retouched flake, was recovered in Unit E8. This artifact has been flaked bifacially and appears to have been exposed to the elements for a substantial length of time as some patination has occurred on one face and part of the working edge. Dorsal/ventral and proximal/distal are not identifiable on this flake. The working edge is made up of seven flake scars on each face, with use wear making up the rest of the working edge. The tool is broken across the faces. The flaking measures approximately 16.60 mm on both faces.

DlLg-33:08A/10390 is a retouched flake, made of chert, from Unit C16. It is a multipurpose tool. This tetrahedral tool is flaked on the ventral face on three edges. The impact point has been obscured from slight flaking, however, a bulbar scar is clearly visible. The working edge at the proximal end is 15.7 mm in length. The longest edge is 37.7 mm long on the right hand edge. The left hand edge is 21.5 mm in length (a portion of the edge at the distal end shows no sign of use). The distal end of this tool narrows to a point that has knapping scars taken off both faces. This is indicative of graver use. However, no real polish or use wear can be detected on the tip, making it questionable if the tool was used as a graver. This artifact has hematite staining and the dorsal face is entirely cortex.

DlLg-33:08A/11460, a KRF retouched flake, came from Unit C14. This specimen is extremely small, 14.3 mm long. The working edge is on the left side and only 10.2 mm long. There are numerous flake scars on this working edge. Flake scars range from 0.7 mm to 1.3 mm. The bulbar scar is clearly visible and is at the proximal end immediately to the right of the working edge. Even though this is a very small flake, the edge to the right of the bulbar scar is broken laterally so it is possible that this tool was slightly larger. This flake is so small that it is difficult to understand how it could have been held during use. Another possibility is that this is a sharpening or edge reduction flake; this does not agree with observation, however as there are some slight polish marks on the ventral face.

DlLg-33:08A/11922 is a KRF retouched flake from Unit B14. It is a retouched primary decortication flake which terminated in a step fracture. The working edge has been unifacially flaked on the dorsal face from the tip of the tool to near the base of the edge. At this point, the stone flares out to a nearly 90° angle face. The tip of the tool has eleven flaking scars generally 0.41mm in size, in an area 2.39 mm in length. The tip angle is 40°. A very light gloss or wear polish can be seen on the tip and in two areas of the working edge. The majority of the ventral face is unknapped aside from two places; one being the ventral face of the tip and another 6.72 mm from the tip. This second area contains only two flake scars (2.79 mm and 1.21 mm) that could have been removed due to dragging pressure encountered when the tool was utilized. The area on the ventral face of the tip contains four flake scars (1.89 mm, 1.03 mm, 0.89 mm, and 0.80 mm). Three of the four are on the working edge and appear to be thinning flakes; the fourth is on the opposite edge of the tip. The tip has polish on it and the working angle is 80°. It is possible that this tool was multipurpose; the tip could have been a graver and the rest of the edge used as a scraper.

DlLg-33:08A/11923 is a Selkirk Chert retouched from Unit B14. This roughly worked specimen has deep, high-shouldered flake scars at its working edge, the largest of which is 6.16 mm in width. The entirety of the working edge flake scars terminate in step fractures. This tool was made entirely through percussive flaking. No polish or use wear could be noted.

DlLg-33:08A/12628 was recovered in Unit D16. This Selkirk Chert retouched flake, like DlLg-33:08A/5004 (a retouched flake), has flaking on both dorsal and ventral faces on the same edge that slightly overlap in the middle of the flaking patterns. The working edge is on the left side. From the proximal end (bulbar scar is visible), flaking is on the ventral face, which runs 18.4 mm from the base. The dorsally flaked portion of the edge runs 12.7 mm from the distal end. Overlapping knapping is 5.9 mm in length.

DlLg-33:08A/19315 is a retouched flake from Unit H22. This SRC reworked flake is a tool of opportunity: very roughly rectangular in shape, two of the edges are cortex covered, and the strongly visible striking platform (on the ventral face) is mirrored by a strong flake scar on the dorsal face. The flaking on the dorsal face is percussive in appearance. All six flakes removed from this face terminate in step fractures. The working edge is battered enough that this tool could have been used as a one-ended pièce esquillée. However, the opposite edge from the working edge does not appear to be battered, although it is difficult to say for certain as cortex is often very battered in appearance. No polish is visible on the working edge.

4.4.1.9 Utilized Flakes

Seven tools were identified as utilized flakes. The metrics are listed in Table 4.4-5.

CAT. #	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
5140	biface	38.59	15.84	5.86	28.80	5.51	44
7836	biface	28.25	25.80	6.10	L 22.55	L 5.20	L 90
					R 29.88	R 4.36	R 35
13956	biface	49.09	28.51	11.89	23.64	9.68	62
14246	biface	21.20	23.20	5.50	indeterm	indeterm	L 28
					indeterm	indeterm	R 31
13959	uniface	32.88	21.70	6.23	L 15.96	L 4.41	L 55
					R 23.60	R 2.70	R 38
16063	chopper	74.00	63.50	30.00	47.20	24.70	50
1623	retouch fl.	22.10	17.70	4.30	E 15.10	E -1.10	E 30
					R 15.30	R 1.10	R 35
5004	retouch fl.	23.20	13.80	3.50	21.10	4.00	77
5189	retouch fl.	29.68	22.54	6.03	22.25	6.80	53
5614	retouch fl.	25.09	13.23	4.92	26.05	0.10	35
10390	retouch fl.	40.00	17.50	7.00	15.70	3.70	46
11460	retouch fl.	14.30	8.20	1.40	10.20	1.20	indeterm
11922	retouch fl.	36.06	17.08	5.97	33.05	-2.86	55
11923	retouch fl.	34.24	20.07	15.19	28.04	11.56	65
12628	retouch fl.	25.50	14.00	3.80	25.20	6.00	30
19315	retouch fl.	24.62	19.84	7.26	23.33	3.91	41
535	utilized fl.	31.30	21.98	14.20	28.60	4.97	45
1064	utilized fl.	16.06	13.26	1.91	14.20	0.80	31
4598	utilized fl.	15.70	12.60	4.10	12.00	0.00	41
9242	utilized fl.	29.90	25.20	5.80	20.50	2.25	27
11993	utilized fl.	29.10	18.90	4.40	17.20	-3.15	35
16067	utilized fl.	19.00	10.70	9.00	6.90	0.20	indeterm
23798	utilized fl.	12.10	15.80	2.50	12.00	-0.6	32

Table 4.4-5: Measurements of Flaked Lithic Tools (Excluding Scrapers) from Level 1

DlLg-33:08A/535, from Unit B3, is a quartzite utilized flake. This utilized flake saw brief use before being lost or abandoned. There is a light polish directly on the slightly worn working edge but no polish spots can be discerned on the rest of the tool. It appears to be a shatter flake as the ventral face shows no bulb of percussion or bulbar scar and is quite flat overall. However, the generally low quality of the material itself could easily obscure any defining indicators.

DlLg-33:08A/1064 is a broken utilized flake from Unit C5. This chert specimen has some light work-polish along the left edge. It is broken across the faces and was likely abandoned or discarded.

DlLg-33:08A/4598, from Unit A7, is a utilized flake made of Cathead Chert. This flake is a small portion of a larger tool. One face is cortex and the opposite face is heavily patinated, such that no flaking patterns nor use wear could be determined. The working edge of this flake does have faint grooving that could be consistent with tool use.

DlLg-33:08A/9242, a chert utilized flake, from Unit C15, has very light evidence of use. The working edge is slightly worn and fractured. No flaking can be seen. If this flake was used at all, it was for a very brief duration.

DlLg-33:08A/11993 is a KRF utilized flake from Unit D11. It is possible that it was used as a spokeshave, due to the fact that the only utilized edge is on a concave edge. There is clear use wear and polish on this incurvate edge. No actual edge-reduction flaking is visible, so this tool was most likely a tool of opportunity.

DlLg-33:08A/16067, a chert utilized flake, from Unit B18, has been heat-treated. This pyramidal flake has a very small section of a worked edge, 6.9 mm long. The use wear along this edge is distinct but very small; wear extends less than 0.5 mm into the edge. This tool is broken on both sides of the working edge and the 'base' of the pyramid is cortex.

DlLg-33:08A/23798 is a broken Selkirk Chert utilized flake from Unit G22. It has some use wear on the working edge. All three other edges are broken. The edge is slightly incurvate but it is most likely that this is the result of edge damage from use than from any intentional construction as the conchoidal fracturing on the edge is all along the working edge. There is only slight polish on the working edge and nowhere else on the tool.

Plate 4.4-20: Schist Adze

4.4.1.10 Adze

DlLg-33:08A/19221 is an adze made of schist. It was recovered in Unit H17. This artifact is rectangular in shape, 109.0 mm in length, 64.5 mm in width, and 184.0 mm in thickness. It is heavily damaged along the working edge, with only a small portion of one corner remaining mostly intact. The edge angle measurement is therefore not dependable, but projection along the tool's dorsal and ventral surfaces to a projected point agree with measurements of approx. 29-32°. The remainder of the working edge that has not spalled off is approximately 0.64 mm and heavily battered. There is an area 53.5 mm below the working edge on the lateral side that is probably where hafting would have taken place. This area slopes at a 60° angle towards the distal end of the tool.

4.4.1.11 Hammerstone

DlLg-33:08A/7851, from Unit A14, is a granite grinder or hammerstone. This artifact is very small and barely fits in the hand. It is generally rounded with both used ends battered into a flatter shape. There is very clear battering on both faces. As the faces are not polished, it is more likely that this tool was used as a hammerstone rather than a grinding stone. The overall dimensions are: length 32.33 mm, width 31.43 mm, and thickness 33.70 mm. Residue analysis showed the presence of *Allium* (wild onion), *Helianthus* (sunflower) seeds, *Pinus* (pine) nuts, *Quercus* (oak) acorns, *Cleom*e (beeweed), and *Phaseolus* (beans) as well as duck and sturgeon (Appendix C).

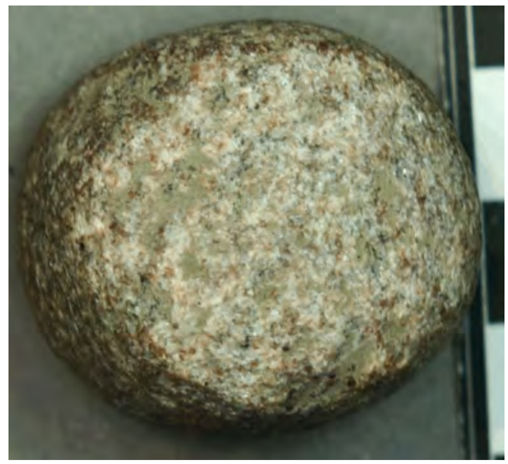


Plate 4.4-21: Granite Hammerstone

4.4.1.12 Groundstone Tools

DlLg-33:08A/433 is a broken groundstone tool made from gabbro. It was recovered from Unit B2.This object is a piece of a larger tool, only a small section of which survives. Only one face has a smoothed surface with some possible use wear scars running obliquely across that smoothed surface. One section of this smoothed surface is broken so only a small section of this tool has use wear on it. There are a few spots on the working face that have a high gloss. However, this material has crystals with high gloss as part of the matrix, so these areas may not be use wear. DlLg-33:08A/433 measures 26.60 mm in length, 26.50 mm in width, and 7.8 mm in thickness.

DlLg-33:08A/5463, from Unit E6, is a broken schist groundstone tool. This object is possibly the base of a tool; however it is not possible to determine what it could have been due to the fragmentary nature of the object. There is wear polish on the ventral face and a groove on the dorsal face that has some use wear scratches in it. It is possible that the dorsal groove is the remnant of a larger sharpening/honing groove but the fragmentary nature of the tool's form does not lend itself to further assessment. The measurements are: length 13.70 mm, width 21.40 mm, and thickness 3.40 mm.

DlLg-33:08A/21632 is a broken groundstone tool from H16. This granite stone is just a fragment of a much larger tool. Little can be determined about the overall shape and form. Two faces of this fragment are polished and angled against each other in such a way that it is clear that this is a piece of a tool. No further information that can be gleaned from this artifact. It measures 12.20 mm in length, 13.40 mm in width, and 3.70 mm in thickness.

4.4.1.13 Palette

DlLg-33:08A/4756 is a palette, made of limestone, from Unit A10. This artifact consists of two fragments which refit. It would have originally been a much larger artifact. One edge is fairly straight and rounded while all the others are very irregular due to breakage. Therefore, original dimensions will be difficult to extrapolate. There are hematite stains on one face which is smooth but still has a very rough surface. It is likely that this is from post-depositional degradation wherein groundwater percolation differentially dissolved the limestone matrix. DlLg-33:08A/4756 has measurements of 81.51 mm in length, 59.46 mm in width, and 11.85 mm in thickness.

Plate 4.4-22: Limestone Palette (2x actual size)

4.4.2 Detritus

Detritus is a term used by archaeologists to define the waste material that results from the creation of a stone tool. The large piece of stone that the detritus comes from is called a core and the pieces that are removed from the core are generally called flakes. This portion of the report concentrates on this waste material.

4.4.2.1 Cores

A core is a large piece of stone of an appropriate material for the manufacture of tools. Cores are generally used until they are exhausted, that is no more useful flakes can be removed from the core.

They may be abandoned at this point or they may be lost or the quality of the material may be low enough that the knapper does not continue to use the core. Fifteen cores, of varying material, were recovered from Level 1 (Table 4.4-6). These cores are plotted on Figure 4.4-2.

CAT #	UNIT	MATERIAL	WEIGHT
943	C3	Limestone	14.90
4748	A10	Swan River Chert	10.16
4855	B8	Quartz	27.85
5201	D6	Swan River Chert	18.91
5537	E6	Chert	68.86
7700	A12	Selkirk Chert	10.95
7843	A14	Selkirk Chert	14.63
9779	A16	Selkirk Chert	8.53
11921	B14	Swan River Chert	51.76
11929	B14	Quartz	3.87
14250	B17	Swan River Chert	26.10
15616	D21	Quartzite	45.55
16066	B18	Chert	31.23
18819	G22	Swan River Chert	66.89
20260	F20	Swan River Chert	17.16
TOTAL			417.35

Table 4.4-6: Cores Recovered From Level 1

DlLg-33:08A/943 is a chert core recovered from Unit C3. This core, although small at 36.0 mm in length, is covered on four sides with flake scars. Overall, it is very roughly reminiscent of a tool, with a base and some worked edges. The base is a small incurvate platform 13.0 mm by 12.0 mm, semi-lunate in shape. There are three prominent faces, all covered with flake scars. Although there is an angled tip opposite the base, this is the result of removing flakes for further refinement of those flakes. This core has a pinkish cast to it, suggesting it has been heat treated. It appears to have been discarded or abandoned as it was at the end of its usefulness.

DlLg-33:08A/4748 is a Swan River Chert (SRC) core that has been heat treated. This specimen has cortex on the dorsal face with one extremely invasive vug as well as some lower-quality material along one half of the dorsal face. Three flaking attempts have been made on this face: one is a conchoidal step fracture; the other was an attempt to remove some of the lower-quality material; and the third runs along the left edge, which is broken across the width of the core. On the ventral face, two large flakes have been removed prior to the step-and hinge-fracturing below them. It appears that some attempts were made to remove thin, long flakes from this face, but due to the vug, the small size of the core, and the low quality of part of this core, these attempts were less than successful. It appears that almost all of the tool-quality material has been removed. Most likely this core was abandoned after it broke as no flaking attempts have been made at the edge of the break.

DlLg-33:08A/4855 is a quartz core with a heavily fractured structure. This is the probable reason for abandonment. Flakes or preforms removed from this core would be very short-term use.

DlLg-33:08A/5201 is a core of Swan River Chert. This roughly square core has cortex on three faces. It was a pebble that was likely knapped until all useful surfaces were exhausted and then abandoned. Two faces of this core had large (27.7 mm) flakes taken off of it prior to abandonment.

DlLg-33:08A/5537 is a chert core that barely fits the definition in that only two flake scars are in evidence on the ventral side. Both the proximal and distal ends are truncated by single, large flake scars. The proximal end has a recognizable bulb of percussion. However, the distal end flake scar has no clear bulb.

DlLg-33:08A/7700 is a roughly triangular Selkirk Chert core that has several large, heavily step-fractured flaking attempts on one face and three large flake scars on the opposite face. It is probable that the core was abandoned due to the step-fracturing. Some cortex remains at one point of the triangle. It is possible that this may have been an attempt at a biface that was abandoned due to the difficulty of continuing to manufacture the tool.

DlLg-33:08A/7843 is another roughly triangular Selkirk Chert core. It may also have been an attempt at creating a biface. However, it is a known technique to bifacially flake a core to produce long, flat blanks from the core. Some cortex remains on several edges, so this was possibly a pebble or cobble that was worked to exhaustion and then abandoned.

DlLg-33:08A/9779 is a Selkirk Chert core which is roughly triangular in form. No step-fracturing is visible. Four flake scars are visible on each face. There is some hematite staining at random points on this core.

DlLg-33:08A/11921 is a Swan River Chert core with numerous flakes having been taken off all sides. It was most likely abandoned due to the large amount of vugs or inclusions. It appears to be broken in half and has hematite staining.

DlLg-33:08A/11929 is a high-quality quartz core. The high quality is due to the clarity of transparency and lack of internal fracturing. It was worked until it was too small to afford further flaking. There is some evidence of bipolar flaking in that the two points furthest from each other have some crushing marks, however, these marks are not uniform enough to be certain.

DlLg-33:08A/14250 is a SRC core which has a very roughly polyhedral shape. Approximately one-quarter of this specimen is low-grade chert at one end while the remaining three-quarters is high grade chert. Several plunging flakes have affected the low-grade end. Most of the faces of this core consist of large flake scars indicating that larger blanks were removed prior to its loss or abandonment. Two large hinge fractures and one plunging fracture that terminates in an outward hinge are possible reasons for this core's abandonment.

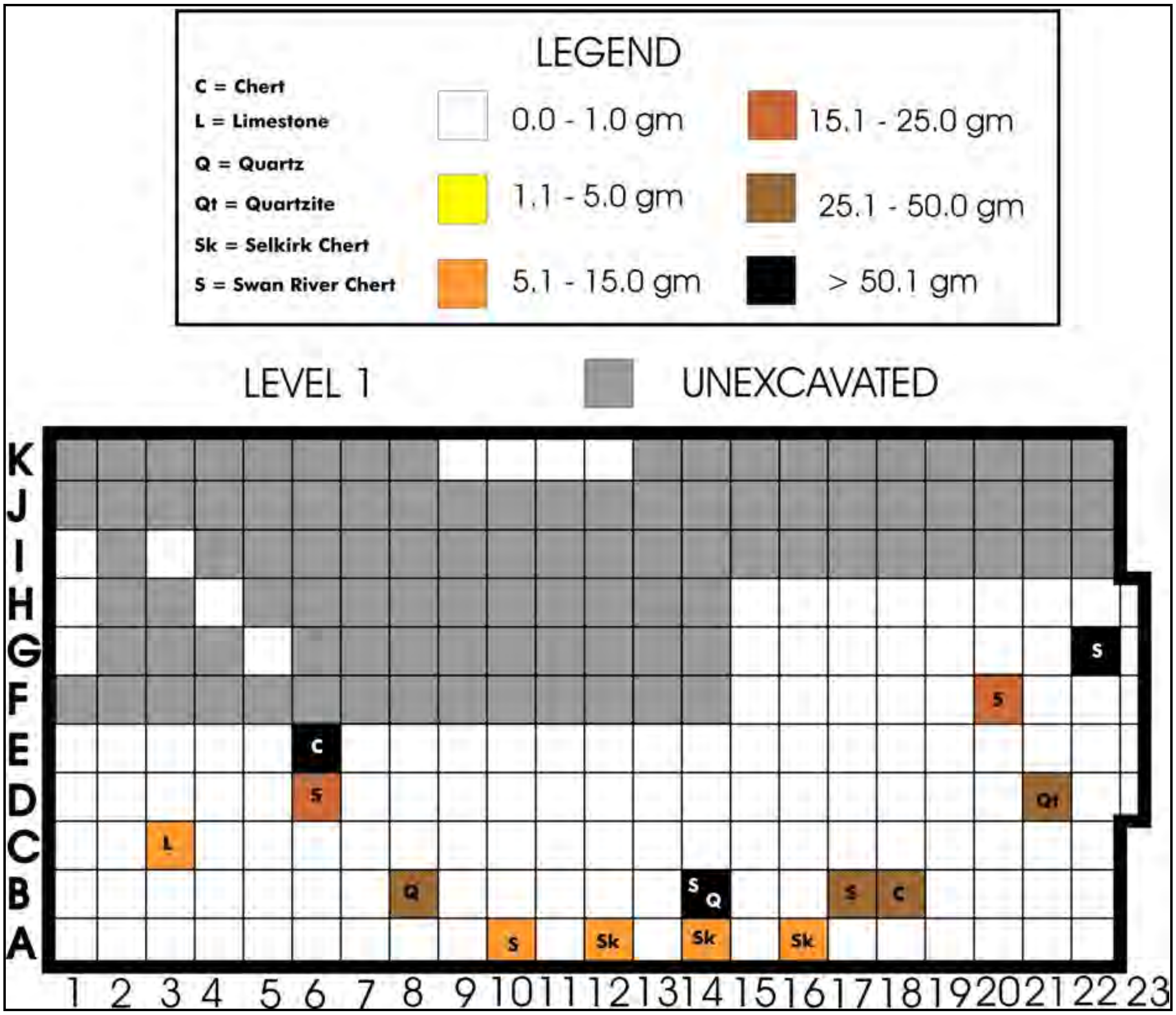


Figure 4.4-2: Distribution of Cores in Level 1

DlLg-33:08A/15616 is a quartzite core. Although there are numerous attempts at flaking all around the edges, only six flakes have been removed from it. One face has several long scratches running its length horizontally with several more scratches crossing them vertically but the existence of these is not necessarily the result of purposeful action; they could well have been the result of post-depositional action.

DlLg-33:08A/16066 is a very roughly cube-shaped chert core which has one flake removed off of each of its six faces. There are a series of hinge fractures near one edge and this would have increased the difficulty of removing further flakes off of that face.

DlLg-33:08A/18819 is a Swan River Chert core with bipolar knapping scars. This marginally fits the definition as only one flake can be determined to have been removed. That flake could have been twice the size of the residual core. Most likely, a pebble was struck once to break the object in half. The specimen was found wanting and discarded.

DlLg-33:08A/20260 is a SRC core with cortex on three sides. Only one area has been knapped bifacially with percussion flaking (steep hinge and step fractures). This area is one short section of one edge (18.63 mm). The artifact was probably briefly tested and thrown away.

The distribution of the cores is similar to that of the flakes in Level 1, with the pattern that of a large arc stretching across the southern portion of the excavation area.

4.4.2.2 Flakes

Flakes are the byproducts of the tool manufacturing process and represent different stages of the process. As described in Chapter 3, flakes can be categorized as to the phase of lithic tool manufacturing which they represent. The assemblage from Level 1 has representations of all five categories (Table 4.4-7, Figure 4.4-3).

DlLg-33:08A/14016 is an unsorted flake assemblage that was collected from Unit B15. This assemblage was collected in the field, dirt and all, as an unsorted sample with lithic material and fish bone as well as some of the soil matrix. While undergoing an initial waterscreening in the lab, it was discovered that numerous micro-flakes had been collected as well as the larger tertiary flakes of which this assemblage is largely composed. The decision was made at that time to save this collection as a whole for future research. It serves as a representative sample of the kind of detritus often not perceived by an excavator due to the diminutive size of these flakes. The matrix at DlLg:33-08A has a very high clay content, which when even slightly moist will adhere to all objects and render items as small as these flakes invisible. The lithic material of these flakes is primarily undifferentiated chert, Swan River Chert, and Selkirk Chert, as well as Knife River Flint, quartz, and quartzite. The assemblage has not been cleaned beyond the primary waterscreening. When the micro-flakes were recognized, the assemblage was removed from the waterscreen and left to dry, then rebagged. While some flakes were most likely lost in the waterscreening, this assemblage is still a good example of the variety of materials and flaking techniques utilized by the knappers of the time.

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	95	327.9
Secondary decortication	163	463.8
Secondary shaping	156	239.1
Tertiary shaping	185	77.0
Thinning/sharpening	1191	118.8
TOTAL	1790	1226.6

Table 4.4-7: Frequency of Types of Recovered Flakes

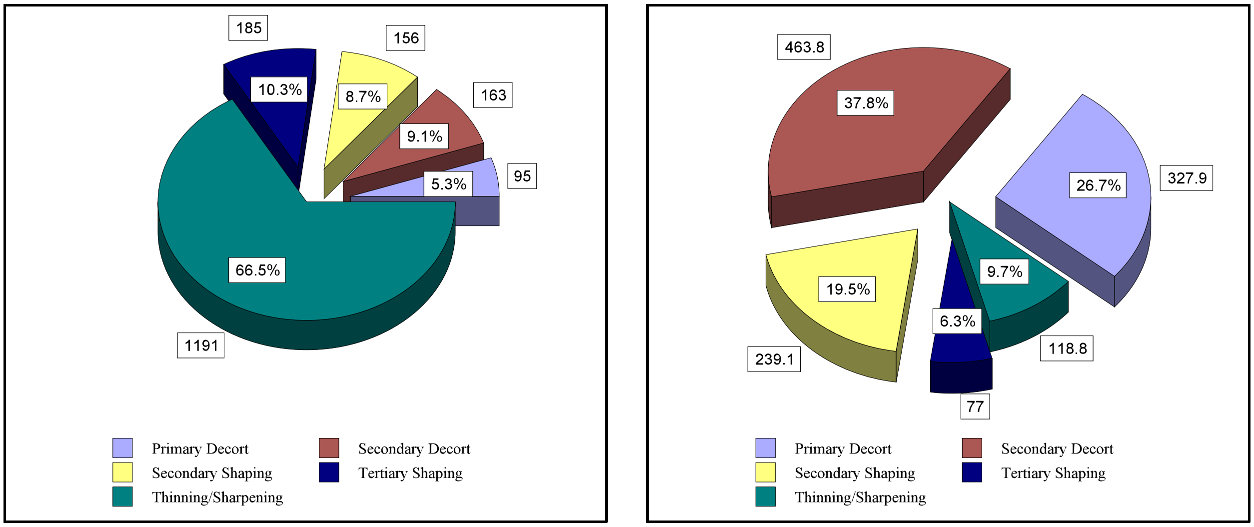


Figure 4.4-3: Frequency of Types of Flakes by Quantity (left) and Weight (right)

The flake distribution pattern in Level 1 (Figure 4.4-4) generally concentrates around the hearths. The hearth shared by Units A15, A16, B15, and B16 (Figure 4.2-1) is in the middle of the highest concentration of flakes. Another flake concentration centers around the hearth shared by Units D3, D4, E3, and E4 and has the second largest concentration. The northeast excavation area has a more general spread of flakes around the hearths in this area. As well, both flakes and tools were excavated directly from the hearths. It would appear that the lithic concentration around the hearth in the A/B 15/16 area was at least a portion of a knapping station as the highest amount of flakes and the greatest weight concentrations occur directly in this area.

There are 17 different types of stone among the flake assemblage for this level. They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes (Table 4.4-8). The frequencies are visually portrayed in Figure 4.4-5. The largest amount by number of flakes is Undifferentiated Chert at 989 flakes and 55.19% of the total. Chert is also the greatest amount by weight at 550.5 grams and is 44.38% of the total. Swan River Chert is the next largest by numerical amount (336 flakes, 18.75%) yet it is fourth in weight, behind chert, limestone, and Selkirk Chert. The distribution of material types across the excavation area (Figure 4.4-6) generally replicates the frequency distribution pattern.

The large amount of Swan River Chert (SRC) flakes and their comparatively light weight suggests several possibilities: previously prepared tools made of SRC were brought to the site and these required retouching: SRC tools were prepared on site but the material was considered valuable and the material was reused: trading routes from the Swan River area were interrupted; or the material itself was not considered valuable.

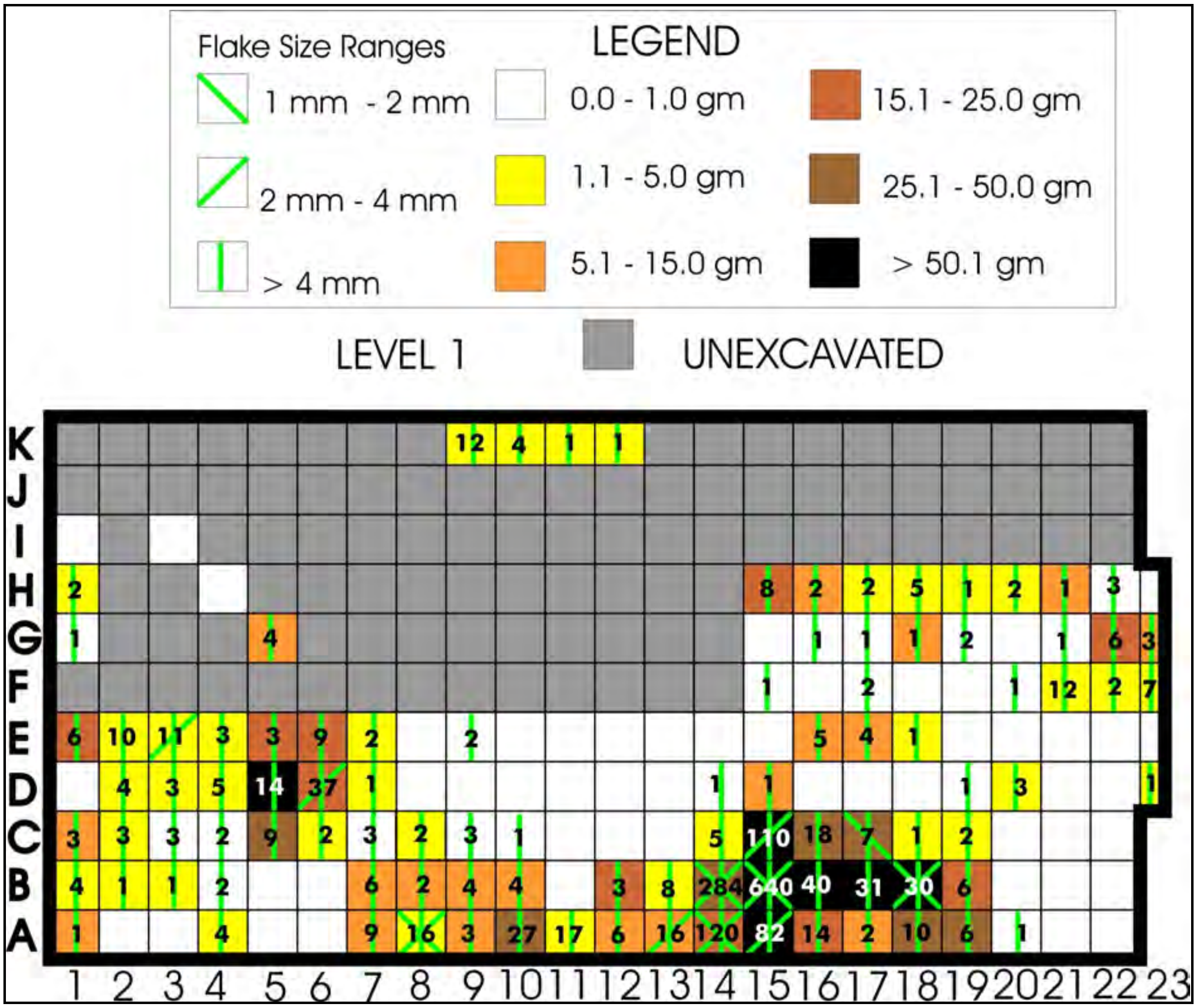


Figure 4.4-4: Distribution of Flakes in Level 1

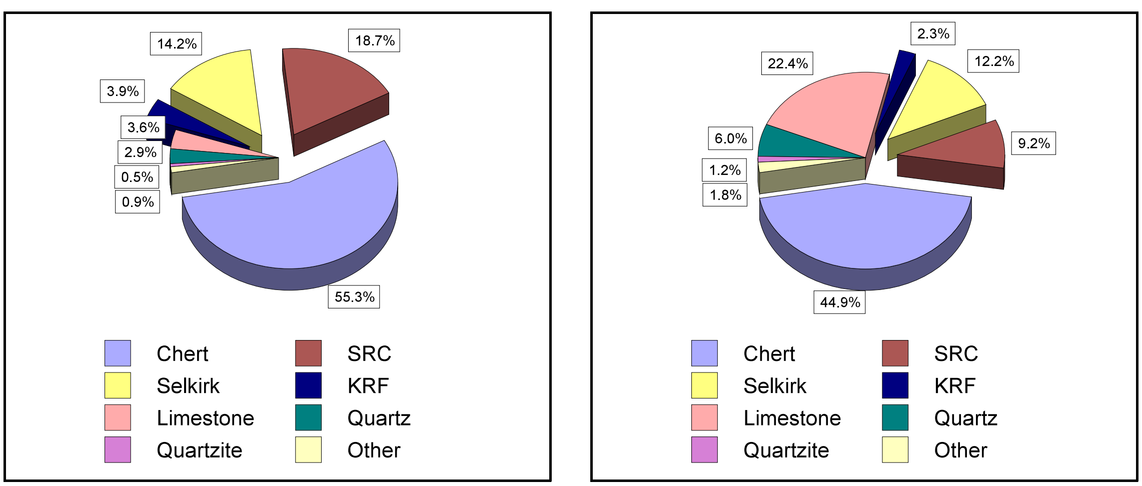


Figure 4.4-5: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

MATERIAL	QTY	%	WT	%
Agate	1	0.06	1.1	0.08
Feldspar	1	0.06	0.2	0.02
Jasper	1	0.06	1.1	0.08
Hudson Bay Lowland Chert	1	0.06	5.1	0.42
Lake of the Woods Black Chert	1	0.06	4.5	0.37
Winnipeg River Quartzite	1	0.06	3.8	0.31
Chalcedony	2	0.11	0.9	0.07
Ironstone	2	0.11	3.4	0.28
Basalt	3	0.17	0.9	0.07
Granite	3	0.17	1.0	0.08
Quartzite	9	0.50	14.4	1.17
Quartz	52	2.90	74.1	6.04
Limestone	64	3.58	274.2	22.35
Knife River Flint	69	3.85	28.3	2.31
Selkirk Chert	255	14.25	149.2	12.16
Swan River Chert	335	18.72	113.4	9.25
Chert (Undifferentiated)	990	55.30	551.0	44.92
	1790	100.02	1226.6	99.98

Table 4.4-8: Frequency of Level 1 Flakes by Material Type

4.4.3 Natural Object Modified

Three types of modified natural objects were recovered from Level 1: fire-cracked rock (FCR), hearthstones, and ochre.

4.4.3.1 Fire-cracked Rock and Hearthstones

The hearthstones (Table 4.4-9) are all limestone while the FCR (Table 4.4-10) is all granite. The distribution of these artifacts is shown in Figure 4.4-7.

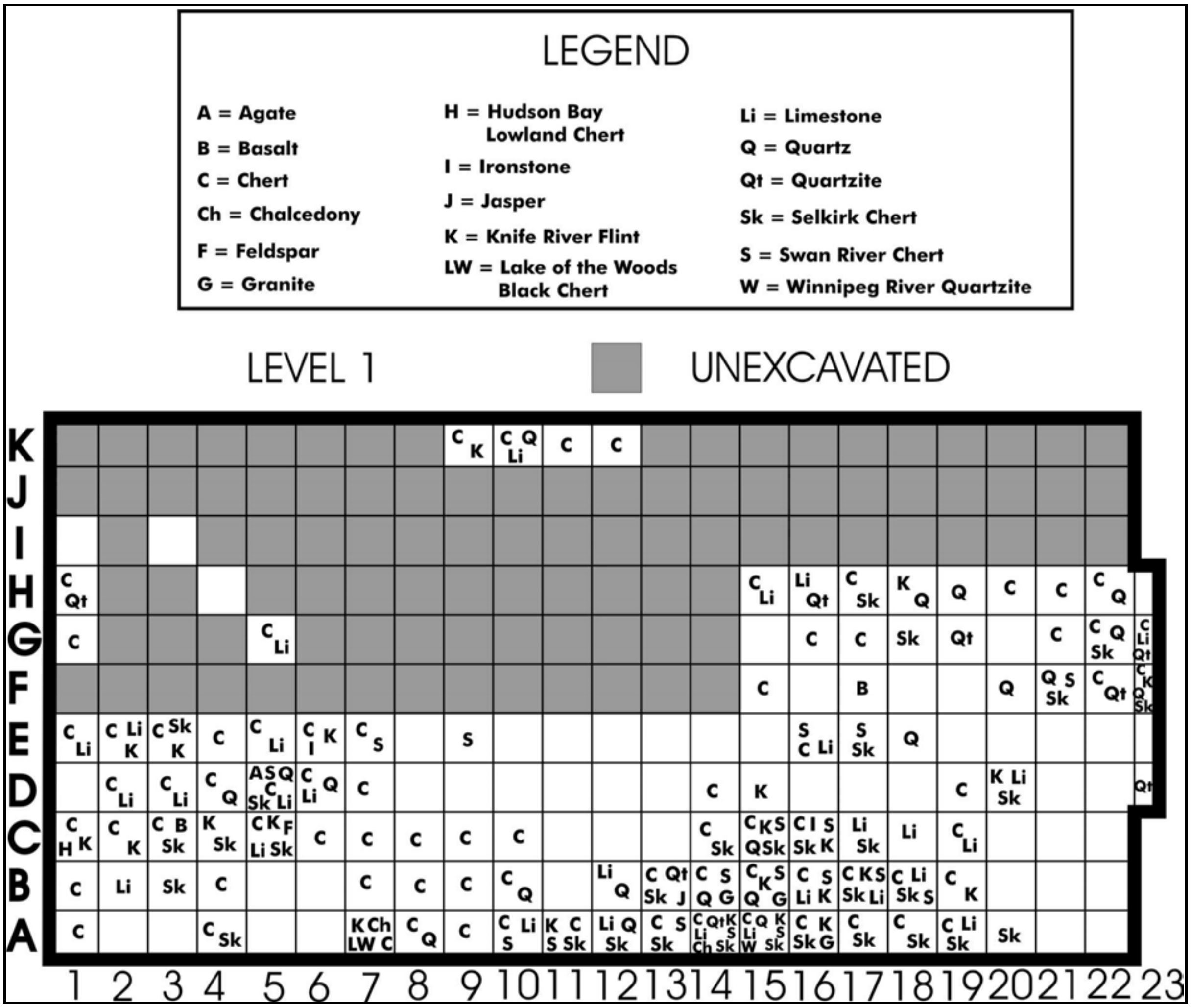


Figure 4.4-6: Distribution of Flakes by Material Type

CAT #	UNIT	QTY	WT
863	C1	1	279.0
1716	E3	1	40.0
1721	E3	1	11.1
4591	A7	1	4.5
4592	A7	1	82.3
8066	C14	1	276.9
TOTAL		6	693.8

Table 4.4-9: Hearthstones Recovered from Level 1

CAT. #	UNIT	QTY	WT	CAT. #	UNIT	QTY	WT
10	A1	3	13.08	940	C3	1	0.01
11	A1	1	9.08	993	C4	2	0.32
62	A2	3	60.0	994	C4	5	0.47
7705	A12	1	80.0	1072	C5	1	34.15
7976	A15	1	1820.0	8065	C14	1	0.73
324	B1	1	1.6	1238	D1	1	8.91
332	B1	1	60.0	1291	D2	1	0.53
570	B3	1	0.47	1366	D3	1	2.99
571	B3	1	240.0	1430	D4	4	2.69
653	B4	1	0.92	1515	D5	2	6.84
708	B4	1	18.79	1516	D5	2	200.0
710	B4	69	40.0	1517	D5	1	25.1
711	B4	1	400.0	1619	E1	1	2.14
712	B4	6	500.0	1640	E2	1	0.44
4858	B8	1	37.87	1714	E3	3	1.66
4859	B8	1	17.71	1746	E3	6	3.72
793	C1	1	80.0	1798	E3	2	0.8
794	C1	1	40.0	1869	E3	8	3.8
800	C1	1	40.0	1870	E3	3	2.05
902	C2	1	29.18	8163	E14	1	240.0
903	C2	1	80.0	13058	K10	1	10.0
TOTAL						146	4116.05

Table 4.4-10: Fire-cracked Rock in Level 1

4.4.3.2 Ochre

The third modified natural object is ochre. The ochre from Level 1 (Table 4.4-11) was all bright red hematite. Ochre is generally viewed as a ceremonial material and the distribution (Figure 4.4-8) may indicate certain activities such as decorating clothing or other hide products. Lithic scrapers (Figure 4.4-1) and bone hide processing tools (Figure 4.6-10) appear to be concentrated at this location, lending support to the hypothesis.

4.4.4 Natural Object Unmodified

Unmodified natural objects are simply cobbles, spalls (a section of rock that has naturally come off another piece), and pebbles. Ten artifacts were identified as unmodified natural objects (Table 4.4-12). Most rock or stone would have to have been manuported (carried purposefully) to the site. Small rocks can, however, be carried by ice scour or fast-moving floods so it is possible that these objects were carried to the site naturally.

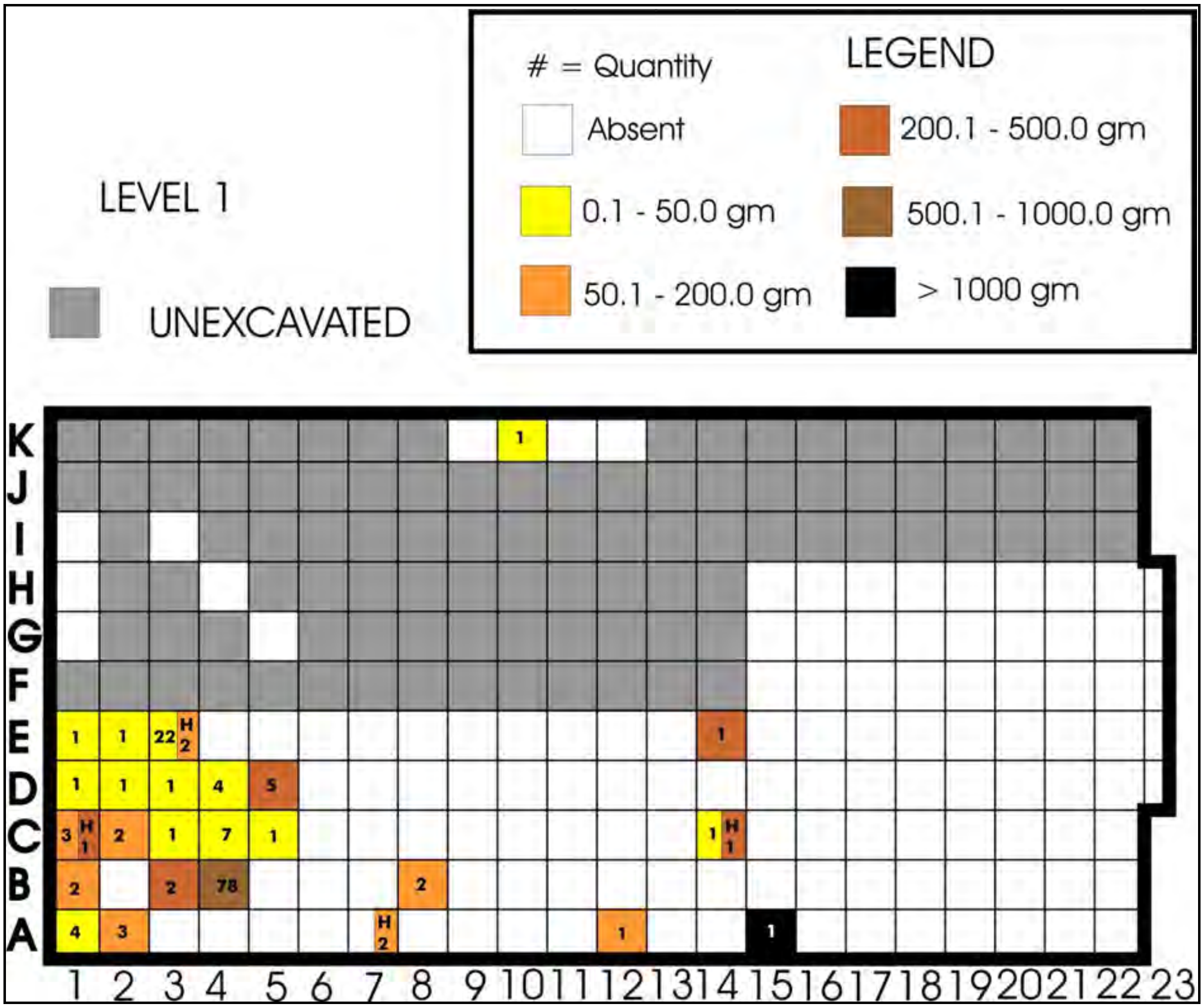


Figure 4.4-7: Distribution of Fire-cracked Rock and Hearthstones (H) in Level 1

CAT. #	UNIT	QTY	WT	CAT. #	UNIT	QTY	WT
28	A1	1	0.2	1486	D4	1	5.5
253	A4	1	0.1	1527	D5	2	3.5
437	B2	1	0.1	1550	D5	1	0.1
627	B3	1	0.1	1650	E2	1	0.1
628	B3	1	0.1	1704	E3	1	0.1
779	B5	1	3.3	1884	E3	2	0.1
901	C2	1	0.2	5452	E6	1	0.1
1290	D2	1	2.1	9247	C15	1	0.1
1371	D3	2	0.7	9426	C15	1	0.6
1372	D3	1	0.2	13967	B15	1	5.8
TOTAL						23	23.6

Table 4.4-11: Ochre Recovered from Level 1

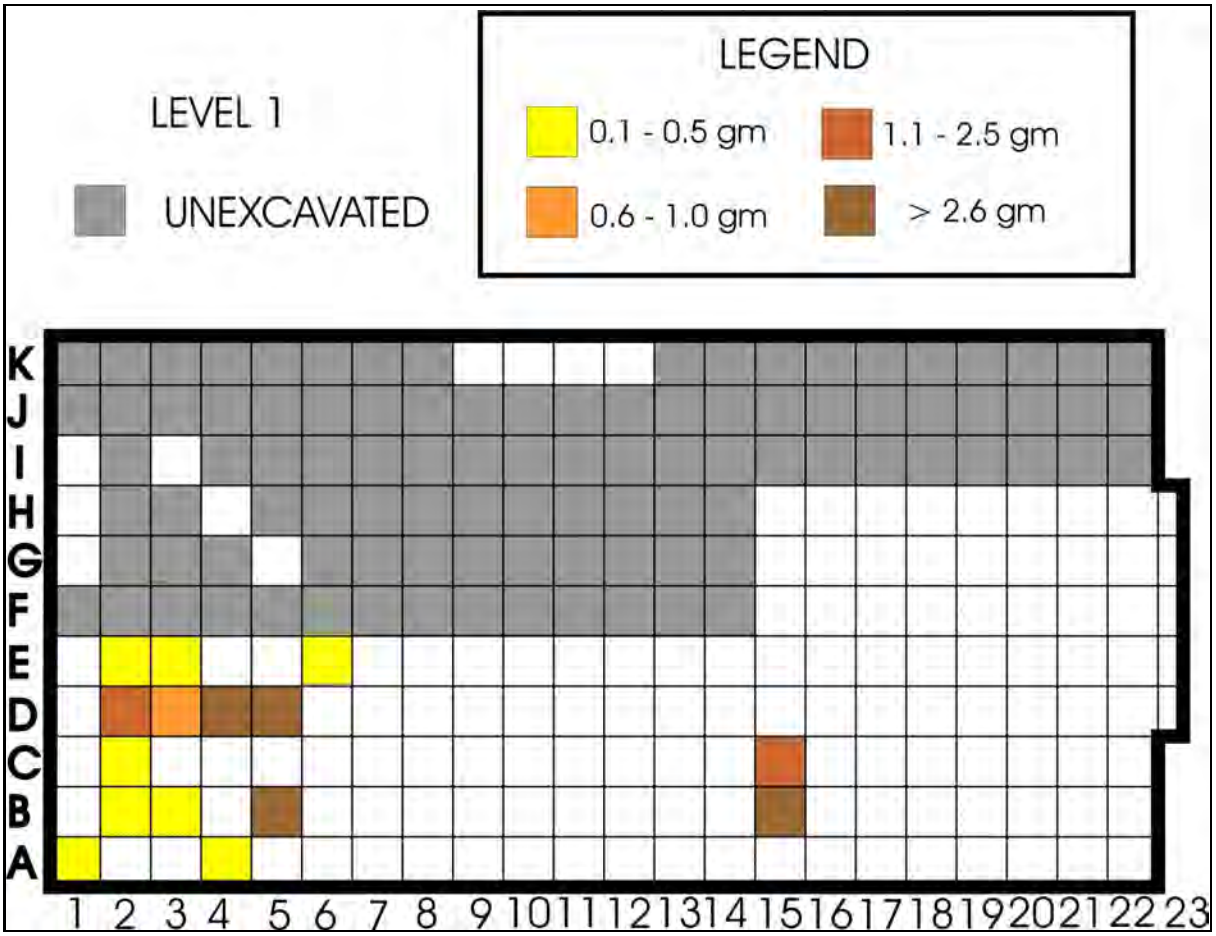


Figure 4.4-8: Distribution of Ochre in Level 1

One cobble and one pebble are made of chert, a stone type that is useful for knapping, and it may be that these objects were carried to the site and then abandoned. Only specimens that could have had some functional use, even without modification, are described.

DlLg-33:08A/331 is a large chert cobble which is very blocky in form. Several areas have had flakes removed from the surface, but these are more haphazard than purposeful. It is probable that this cobble was found wanting due to the low quality of the material, or it was already at the site when Level 1 was occupied.

DlLg-33:08A/10038 is a flat piece of limestone that was originally thought to be a possible palette. There is no regular abrasions to either surface, both faces are rough and show no signs of utilization. Limestone is a soft rock and any kind of scratching, rubbing, or scraping will leave some recognizable patterns of wear on it.

DlLg-33:08A/21798 has had five flakes taken off it. At minimum, one half of this quartzite cobble has been removed, however it is not clear if this was done by a human hand or if this was the result of one of many possible natural occurrences.

DlLg-33:08A/21634, the ironstone pebble, is semi-spherical in shape. There is no evidence of this pebble having been used in any way. However, ironstone, which is a form of iron oxide, could be ground down to create ochre.

CAT #	OBJECT	UNIT	MATERIAL	QTY	WEIGHT
331	cobble	B1	chert	1	407.08
10038	cobble	C17	limestone	1	199.74
21798	cobble	A22	quartzite	1	105.61
TOTAL				3	712.43
1909	pebble	E3	chert	1	1.67
5151	pebble	E6	mudstone	1	60.00
21634	pebble	H16	ironstone	1	65.10
TOTAL				3	126.77
8018	spall	C12	limestone	1	122.90
10019	spall	A20	quartzite	1	73.90
21822	spall	B22	schist	1	3.60
24374	spall	A9	limestone	1	20.00
TOTAL				4	220.40

Table 4.4-12: Unmodified Natural Objects in Level 1

4.4.5 Summary

Overall, the tools, flakes, and cores are associated with the hearths unearthed in Level 1. The majority of flakes and tools are concentrated roughly around the hearth in Units A15 and A16 and it is very likely that further excavation beyond the A line would reveal a knapping station, or at least more evidence of one. There are some tools associated with the hearth in Unit E3 as well. The large hearth in Units F19 and G19 has only a few of the tools and flakes in this level's lithic assemblage.

The lithic materials suggest a pattern of trading, collection, or more likely a combination of these that runs from the northwestern shores of Lake Winnipeg to the Knife River Flint quarries in North Dakota. The projectile points are types typical for Late Woodland cultures of this and surrounding areas and are made from materials available within the catchment area described above. The lithic assemblage of this level consists of the tool kit of the people who used this site and these tools reflect their lifeways; tools for hunting (projectile points) and butchering meat (bifaces, utilized and retouched flakes) as well as tools for preparing vegetative matter (hammerstone) and working bone and wood (spokeshaves and adzes), as well as tools for preparing for and engaging in ritual acts (palettes). Needless to say any tool can be used in a variety of ways depending on the job at hand.

The fire-cracked rock is concentrated generally between the hearth in Units C6, C7, D6, and D7 to the western limit of the excavation. All stone is manuported onto the site, so the FCR would logically have to have been carried in as well. Carrying a lot of granite simply to line firepits would be a waste of time and would not be supported by the amount of FCR recovered from Level 1. It is more likely that the FCR resulted from smaller granite cobbles being used as boiling stones (stones are placed in a fire, heated, and then thrown into a pot of water, increasing its temperature until boiling is achieved) and either abandoned or retained somehow for use in pottery manufacture as temper. Alternatively, the two hearths closest to the western edge of the excavation could have been the food preparation areas and the hearth in Units A15 and A16 was the tool preparation area. As well, the ochre recovered in Level 1 concentrates around these two activity areas, the food preparation area around the hearth in Units C6 and C7 and the tool preparation area around the hearth in Unit A15.

4.5 Botanical Remains

A total of 225 samples, each with a discrete catalogue number, representing 790 charcoal specimens had been collected from 49 excavation units. Seven types of wood were identified from the samples in Level 1. The highest occurring type was ash followed by maple, oak, elm and then poplar, and willow (Table 4.5-1). A single piece of plum/cherry wood was also present.

TAXON	SAMPLES	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	45	113	34.88
Elm (*Ulmus*)	19	37	11.42
Maple (*Acer*)	44	92	28.40
Oak (*Quercus*)	26	50	15.43
Plum Family (*Prunus*)	1	2	0.62
Poplar (*Populus*)	3	3	0.93
Poplar/Willow	14	21	6.48
Willow (*Salix*)	5	6	1.85
Diffuse Ring Pattern	39	83	
Semi-ring Porous	1	2	
Hardwood	1	1	
Unidentified	27	380	
	225	790	100.01

Table 4.5-1: Frequency of Charcoal Recoveries

Graphically, the frequency of the identified taxa is depicted in Figure 4.5-1. Maple and ash are the dominant species.

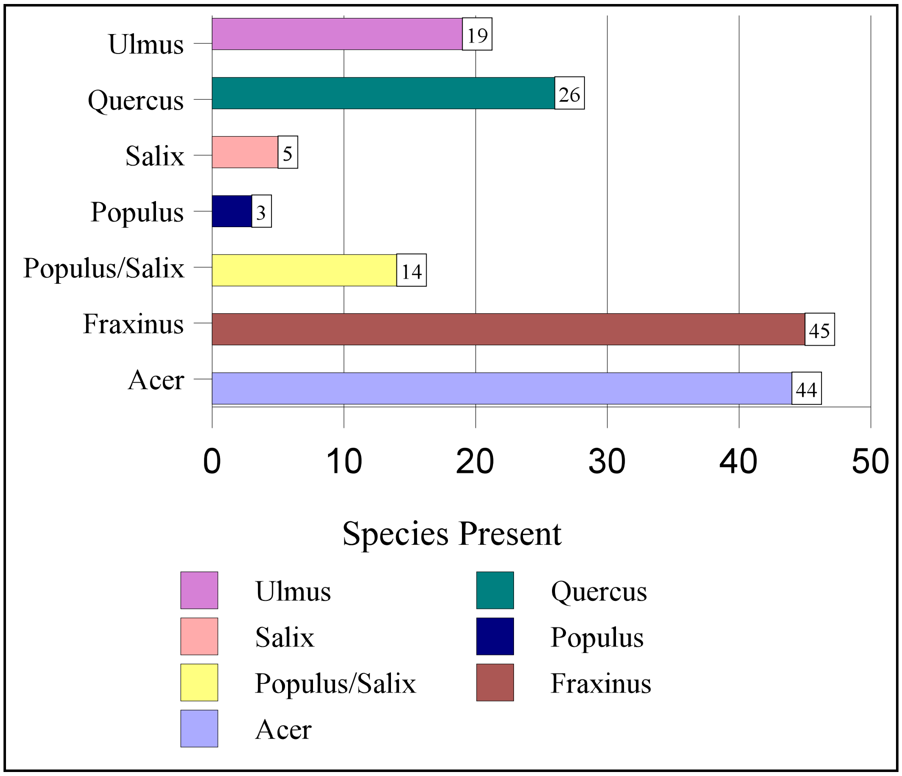


Figure 4.5-1: Frequency of Identified Taxa

Level 1 contained 12 hearths (Figure 4.2-1). Charcoal was collected from ten of the excavation units that corresponded to four of these hearths (Table 4.5-2). These units were Units A15, A16, B15, B16; Units D3, D4, E3, E4; Unit D6; and Unit K9.

Two of the hearths (Unit D6 and Unit K9) only had one sample collected from each and one wood type: oak (Unit D6) and a semi-ring porous wood (Unit K9). The other two hearths had multiple samples and contained greater species diversity. Both hearths contained specimens of ash, maple, poplar/willow, oak, and elm.

An incomplete charred American hazelnut (*Corylus* sp.) shell was recovered from Unit B15 in Level 1 (DlLg-33:08A/13964). This was associated with the hearth. One of the uncharred puccoon (*Lithospermum* sp.) seeds, DlLg-33:08A/534, occurred in Unit B3 in this level.

HEARTH	A15-B16	D6	D3-E4	K9
NUMBER OF SAMPLES	4	1	19	1
Ash (*Fraxinus*)	2	-	13	-
Elm (*Ulmus*)	1	-	3	-
Maple (*Acer*)	1	-	9	-
Oak (*Quercus*)	1	1	10	-
Poplar (*Populus*)	1	-	-	-
Poplar/Willow	1	-	2	-
Diffuse Ring Pattern	1	-	7	-
Semi-ring Porous	-	-	-	1
Unidentified	1	-	1	-
TOTAL	9	1	45	1

Table 4.5-2: Frequency of Charcoal Recoveries at Hearth Locations

4.6 Mammal, Avian, and Reptilian Remains

4.6.1 Mammal Butchering Remains

In total, 4558 elements, weighing 16088.1 grams, were recovered. The numbers by quantity (Figure 4.6-1) of undetermined bones appears to be very high (67%), but this can be better understood when seen in relation to the total weight (Figure 4.6-2) in grams (3562.2). The vast majority of these materials are very small fragments where identification is not possible. The term "identified" refers to all elements within the level that have been identified to a particular species. Specimens which could not be identified to element were not identified to a specific species and are listed as "undetermined". The remainder of the categories represent those cases where it was possible to determine the element and the size range of the animal, but not the specific species.

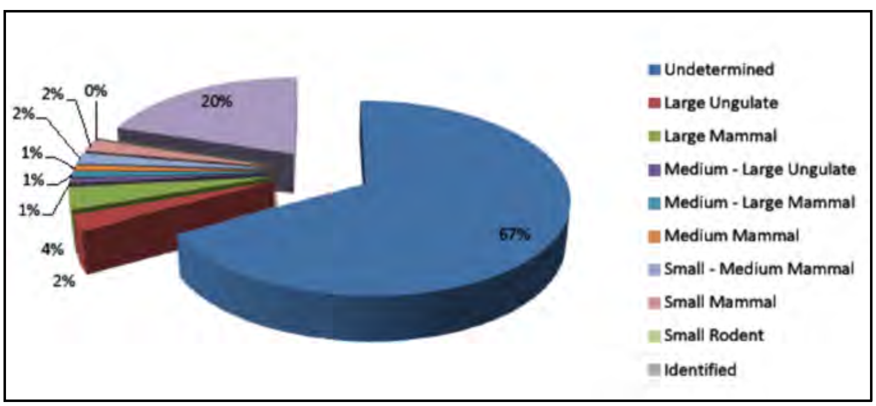


Figure 4.6-1: Frequency of Mammal Taxa by Quantity

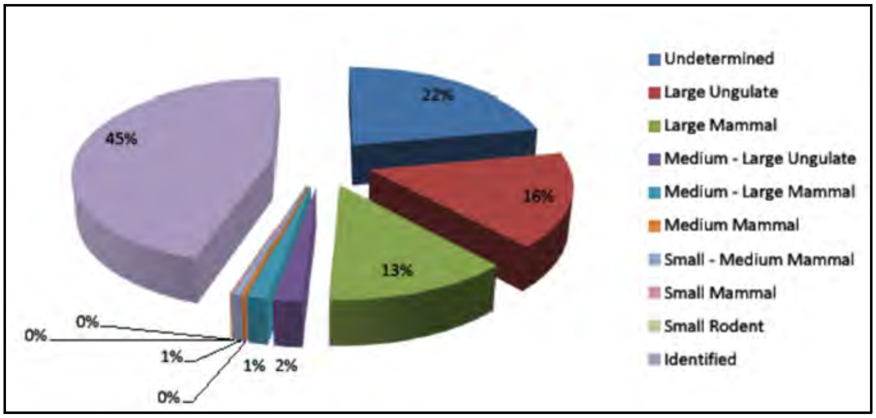


Figure 4.6-2: Frequency of Mammal Taxa by Weight

As can be seen in Figure 4.6-3, most of Level 1 has fairly high amounts of mammal bone by weight.

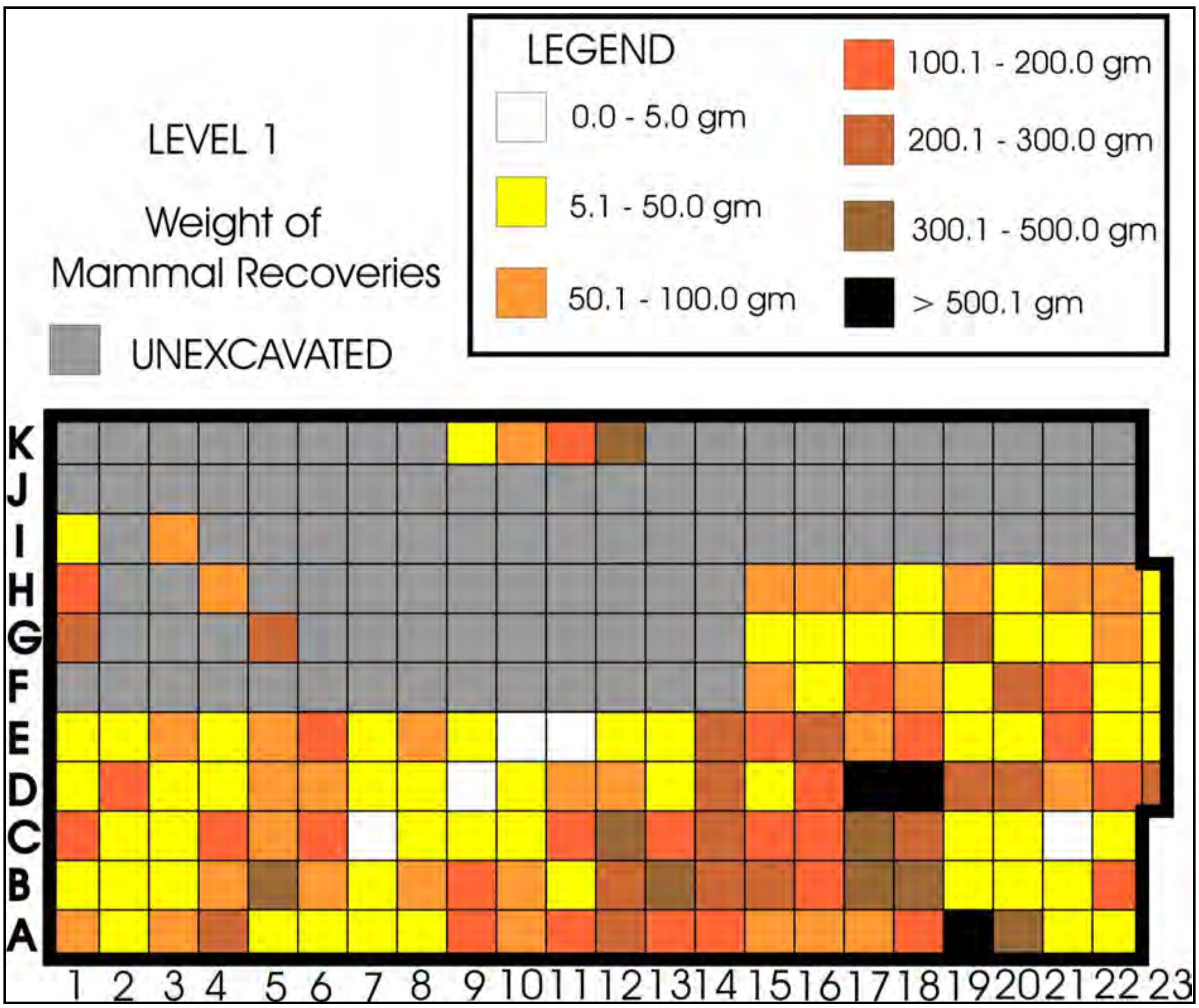


Figure 4.6-3: Level 1 Mammal Distribution by Weight

The units on the K line and the six units in the northwest quadrant (G1, G5, H1, H4, I1, and I3) are too isolated to provide any insight into distribution. However, in the main excavation area there are several locations with concentrations of bone. The first concentration, found around Unit B5, is of interest because this area is on the level terrain prior to the terrace sloping to the east (Plate 2.2-1). This concentration seems to fade in columns 7 and 8 where there is very little material present, but this is likely due to the slope that could have resulted in much of the bone being displaced to the east.

The second concentration is much larger than the first. Much of the southern portion of the excavation, from columns 9-20, is encompassed. The amount of variation within this assemblage is huge with representational elements from every species identified. All of the black units are the result of very large pieces of bison bone, while most of the light brown and dark brown units are simply the result of large quantities of bone from a number of different species as can be seen in Figure 4.6-4 and Figure 4.6-5.

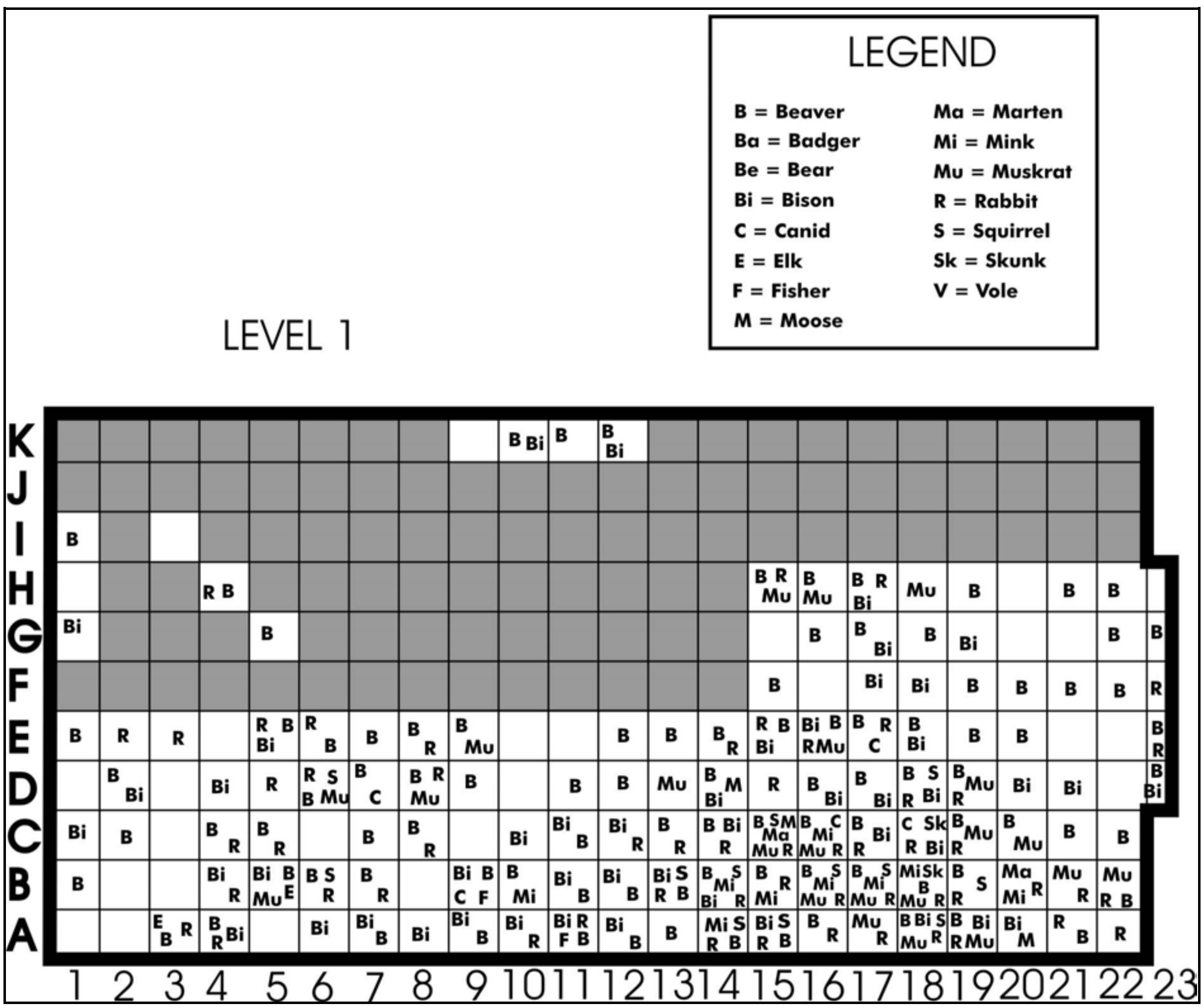


Figure 4.6-4: Distribution of Identified Mammal Species in Level 1

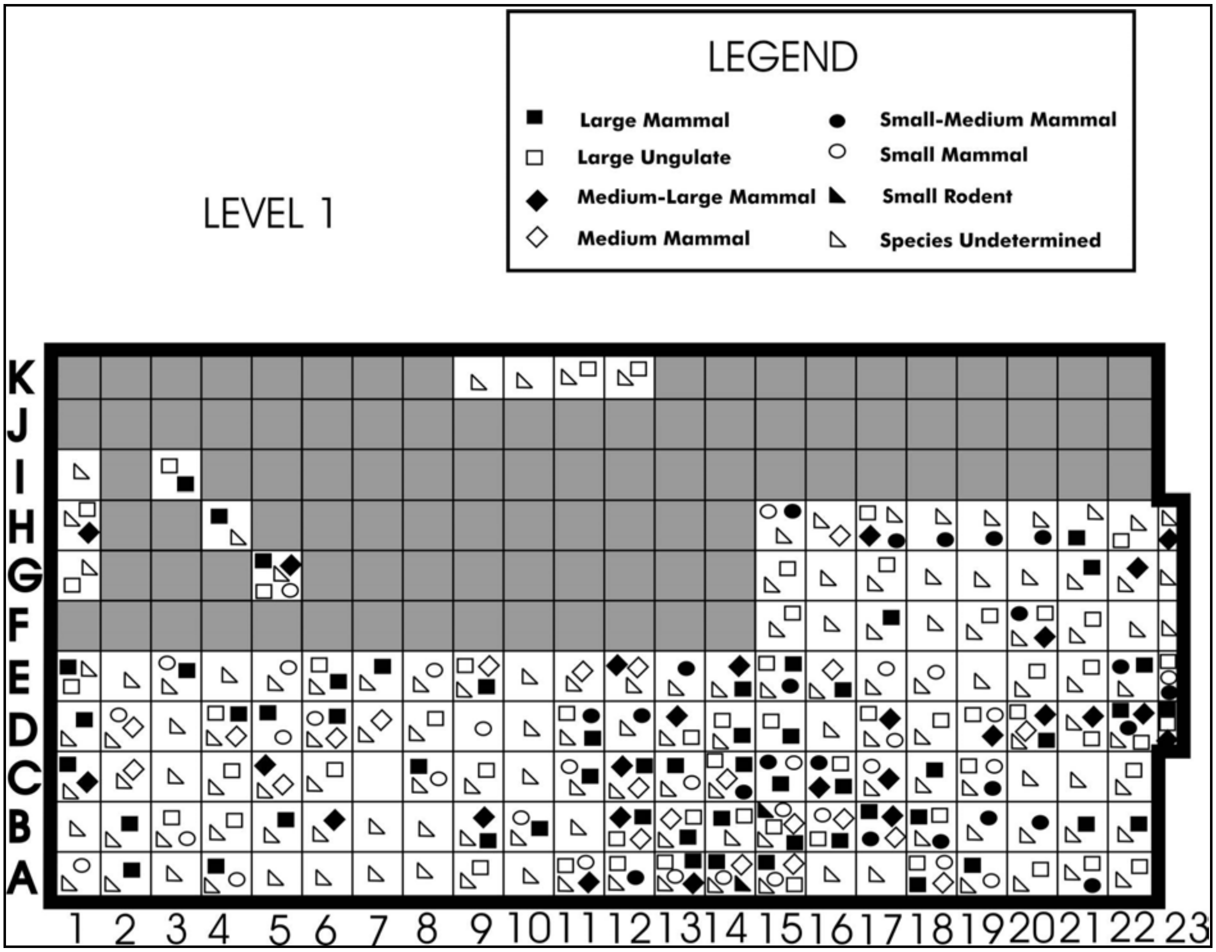


Figure 4.6-5: Distribution of Mammal Remains Which Could Not be Identified to Species

Within the elements identified to species, bison obviously overwhelms the other taxa by weight (Figure 4.6-6). Given the massive bone structure of the species, this is not surprising especially when compared with smaller mammals like beaver. When the quantity of identified elements is considered, the smaller mammals, particularly rabbit and beaver, dominate (Figure 4.6-7).

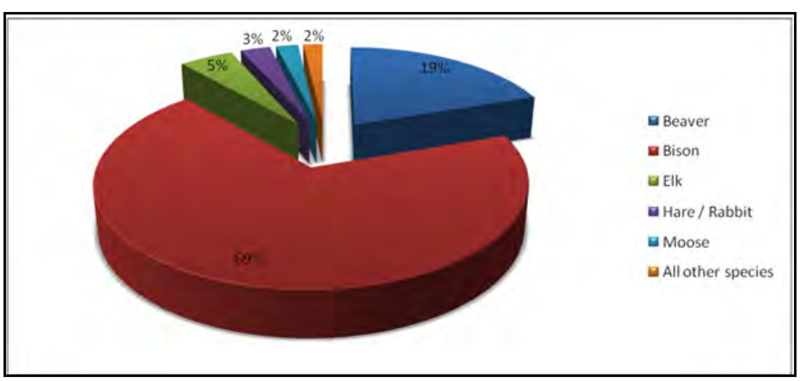


Figure 4.6-6: Level 1 Identified Faunal Remains Distribution by Weight

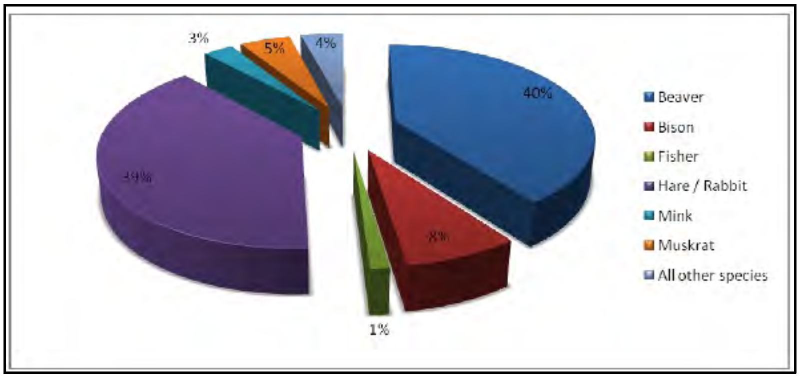


Figure 4.6-7: Level 1 Identified Faunal Remains Distribution by Quantity

The MNI table or minimum number of individuals provides us with a count of the fewest possible animals that had to be present in the site based upon the faunal remains (Table 4.6-1).

SPECIES	MNI
Beaver (*Castor canadensis*)	6
Bison (*Bison bison*)	1
Dog/Coyote/Wolf (Canidae)	1
Elk (*Cervus elaphus*)	1
Fisher (*Martes pennanti*)	1
Hare/Rabbit (Lagomorpha)	15
Marten (*Martes americana*)	1
Moose (*Alces alces*)	1
Muskrat (*Ondatra zibethica*)	4
Red Squirrel (*Tamiasciurus hudsonicus*)	1
Skunk (*Mephitis mephitis*)	2
Squirrel (*Sciurus* sp.)	1
TOTAL	38

Table 4.6-1: Minimum Number of Individuals of Identified Taxa

Of the large mammals, bison is the only one to represent any large amount of meat. There were 63 identified bison elements within Level 1. These elements only accounted for a single animal. However, based on the number of elements it seems likely that the animal was hunted in close proximity to the camp. In cases where animals such as bison are killed long distances from the camp, it is not always possible to transport the whole animal and people usually would butcher the animal in the field, taking the pieces with the greatest meat to weight ratio. This appears not to be the case here with many of the vertebra as well as the skull cap present.

The moose and the elk are not represented by nearly as many elements. In the case of the moose, there were only three elements present. Two of these were scapula sections which, although not modified, could either represent some future tool, as the thin sections of the scapula were often turned into tools, or simply that the forelegs were transported to the site. The final moose artifact is an awl made from the 5th metatarsal of a moose. This object could easily have been transported from camp to camp for quite some time and might not represent a recent kill at all.

Of the mid-sized animals, the canid is the only one present in this assemblage. However, in many cases it is not possible to differentiate between coyote, dog, or wolf. It is unclear if the elements represent a single animal or three different species.

The beaver represent the next largest amount of meat. As noted in Chapter 3, beaver can weigh between 15 and 35 kg, averaging 20 kg (Banfield 1974:158). The six identified individuals would represent a very valuable food source in addition to the fur being used for clothing. Beaver teeth have been employed as gravers and decoration in the literature (Peach 1998, 1999). It is unclear if these beaver represent a number of different hunting excursions or if they were all members of the same lodge that were taken at the same time. The area around The Forks would have been ideal beaver habitat and it is likely that there would have been multiple lodges within a reasonably short distance from the camp.

Rabbits or hares also obviously represented another source of food, with the remains of a least 15 different individuals. It is clear that there had been an effort to harvest these animals. Rabbits are not very large, averaging about 1 kg., but in large numbers these animals would have been a nice addition to any diet. Again, as with the beavers, rabbit furs would have been put to good use. The hunting of these animals might also have been undertaken by the women and children around the camp. Snares could be regularly checked and this task would not have interfered with other daily tasks.

With many of the other identified species, it is a question of whether these species were being taken for their meat or for their fur. Marten, mink, muskrat, and even skunk are seen more as fur bearers today. While it is not clear if these animals were selected primarily for fur or meat, both parts would have been used and in some cases these animals might simply have been convenient rather than specifically being hunted out.

When the areas of highest concentration are seen with the hearths superimposed (Figure 4.6-8.), it creates another view of the different areas of activity. The first concentration is bordered by two hearths located in Unit E3 and Unit C7. The second main concentration has only a few hearths within the area of highest activity—Unit B15, Unit D19, and Unit E20— but it is also surrounded by a number of small hearths. This seems to suggest that this larger concentration was a processing area where the vast majority of secondary food preparation was centred. There are faunal materials scattered across the excavation area, but it is possible that most of the meat was processed here and then distributed throughout the site.

This interpretation is also supported by the distribution of charred and calcined bone, as well as those elements which have marks indicating butchering (Figure 4.6-9). These materials are focused in the same areas of activity and they show a very similar pattern with that of the bone density, i.e., a relationship with the hearths that had been discussed as cooking/food preparation locations.

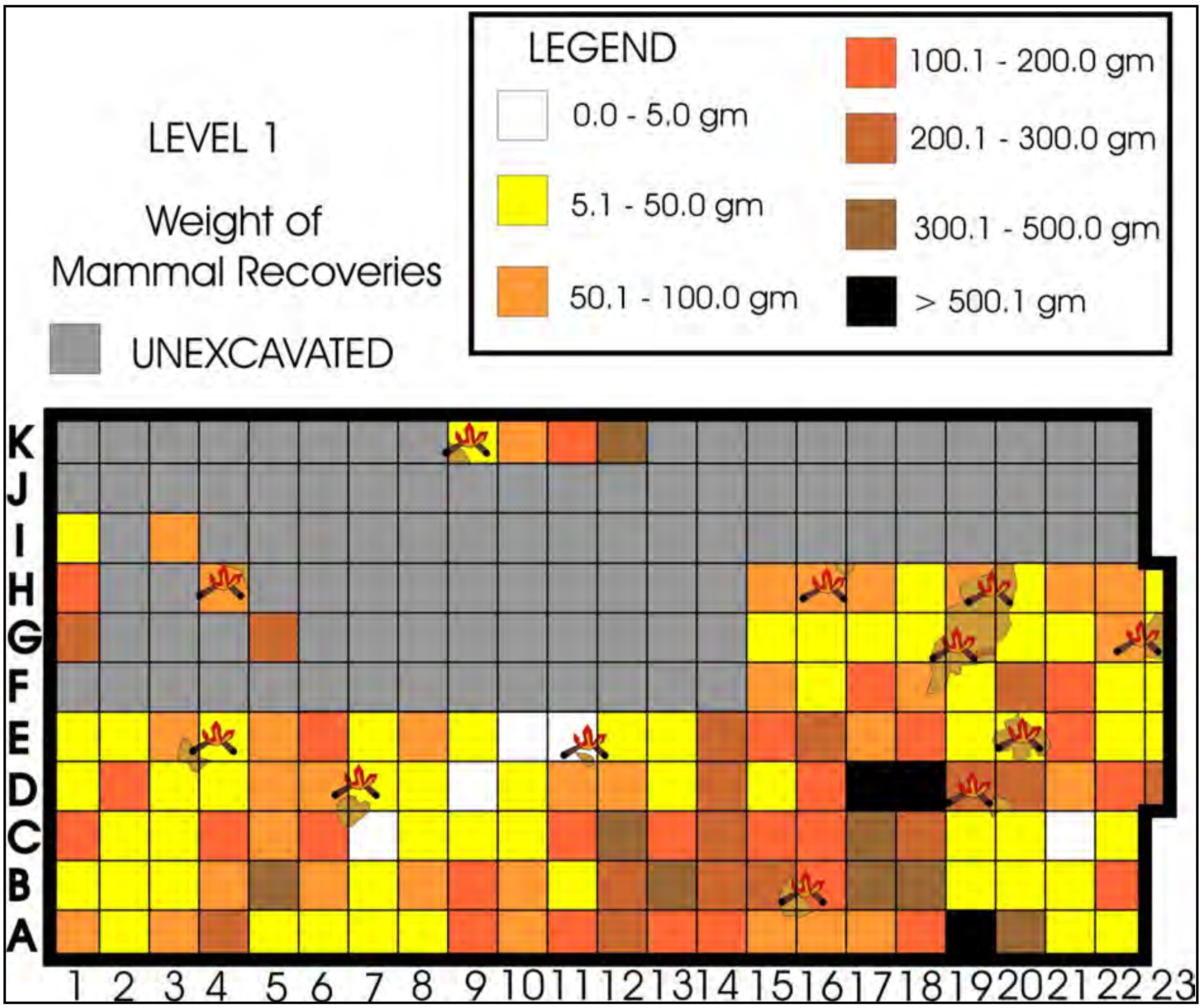


Figure 4.6-8: Distribution of Butchering Remains in Relation to Hearths

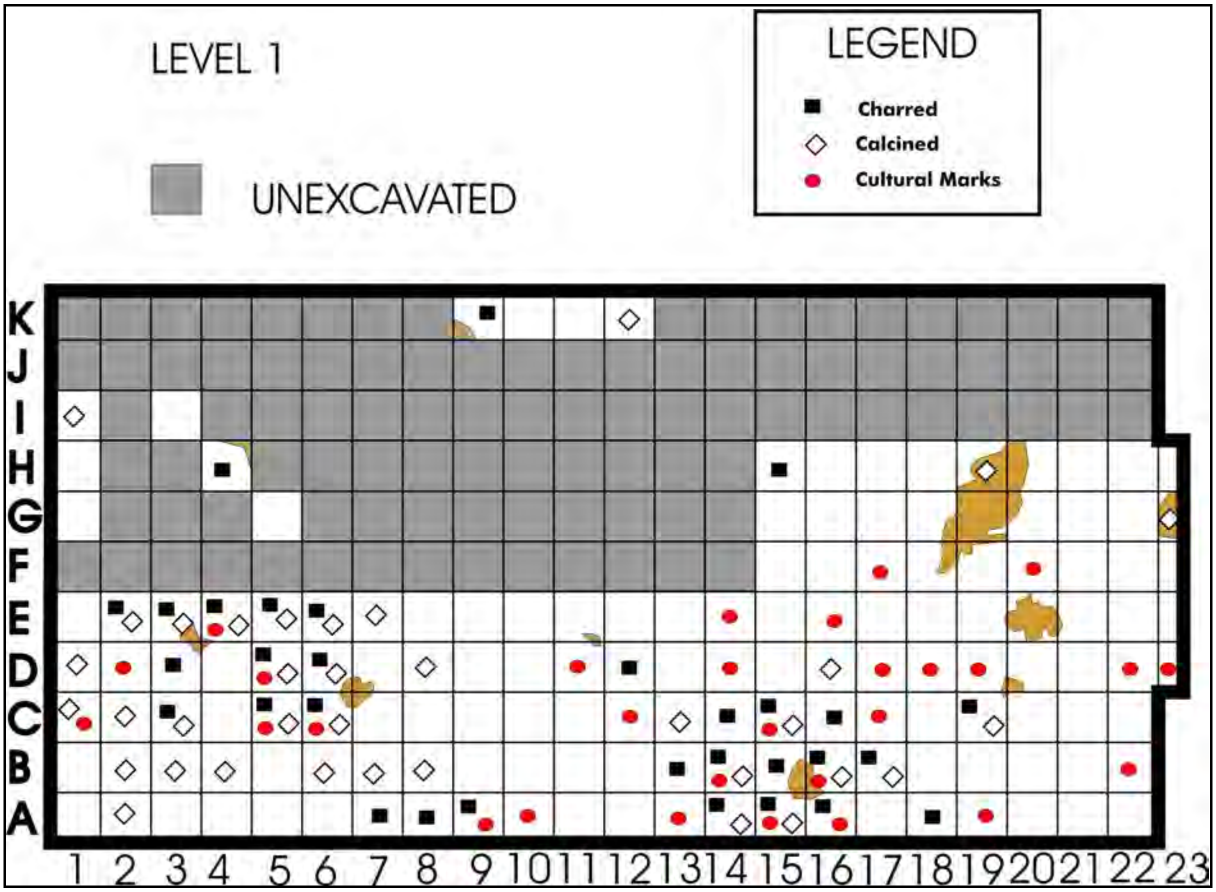


Figure 4.6-9: Distribution of Culturally Modified Mammalian Remains in Relation to Hearths

4.6.2 Bone Tools

There were a number of different bone tools recovered from Level 1 (Figure 4.6-10). These include awls, spatulas, and other implements (Table 4.6-2).

Included within the descriptions are two artifacts which were recovered during initial site preparation. DlLg-33:08A/1(hoe fragment) and DlLg-33:08A/3 (spatula) were found to the west of the excavation grid in the area that was prepared for the viewing platform. Stratigraphically, these artifacts would derive from the equivalent of Level 1 but are not included in the tool quantities for this level as they were external to the excavation area. They are described in the relevant subsections of this section.

CAT. #	UNIT	OBJECT	LENGTH	WIDTH	THICK	WEIGHT
1236	D1	Awl	15.0	1.2	0.5	6.1
1433	D4	Awl	5.7	0.9	0.5	2.1
1700	E3	Awl	8.8	1.9	0.4	6.4
4817	B7	Awl	9.3	1.3	0.4	2.7
7739	A13	Awl	3.8	0.7	0.3	0.4
9220	C15	Awl	9.3	1.7	1.1	5.9
9221	C15	Awl	9.2	1.2	0.3	2.6
13952	B15	Awl	9.2	1.2	0.7	4.8
20707	H15	Awl	5.7	0.7	0.3	1.1
20708	H15	Awl	12.1	1.6	0.4	6.6
4782	B6	Spatula	17.8	2.2	0.7	18.8
9216	C13	Spatula	13.4	2.0	0.6	13.1
9971	A19	Spatula	11.0	2.3	0.6	13.6
10143	A16	Spatula	15.5	2.6	0.6	22.3
11910	B14	Spatula	15.3	1.9	0.6	16.2
13319	K12	Spatula	18.0	0.9	0.4	6.1
23612	A9	Spatula	6.4	2.1	0.3	3.9
24930	G21	Harpoon	6.5	1.5	0.5	2.7
1699	E3	Scraper	9.8	2.2	1.3	20.7
4697	A9	Hoe	16.4	1.4	1.0	21.2
9922	A18	Squash Knife	16.8	8.3	1.0	38.4
900	C2	Graver	5.4	0.8	0.2	1.2
1299	D2	Bone Tool	14.2	3.3	0.5	19.4
7661	A11	Bone Tool	4.2	1.9	1.1	4.0
8114	E12	Bone Tool	3.4	2.3	0.3	1.8
11911	B14	Bone Tool	11.3	3.3	0.2	4.5

Table 4.6-2: Recovered Tools Manufactured From Mammalian Material

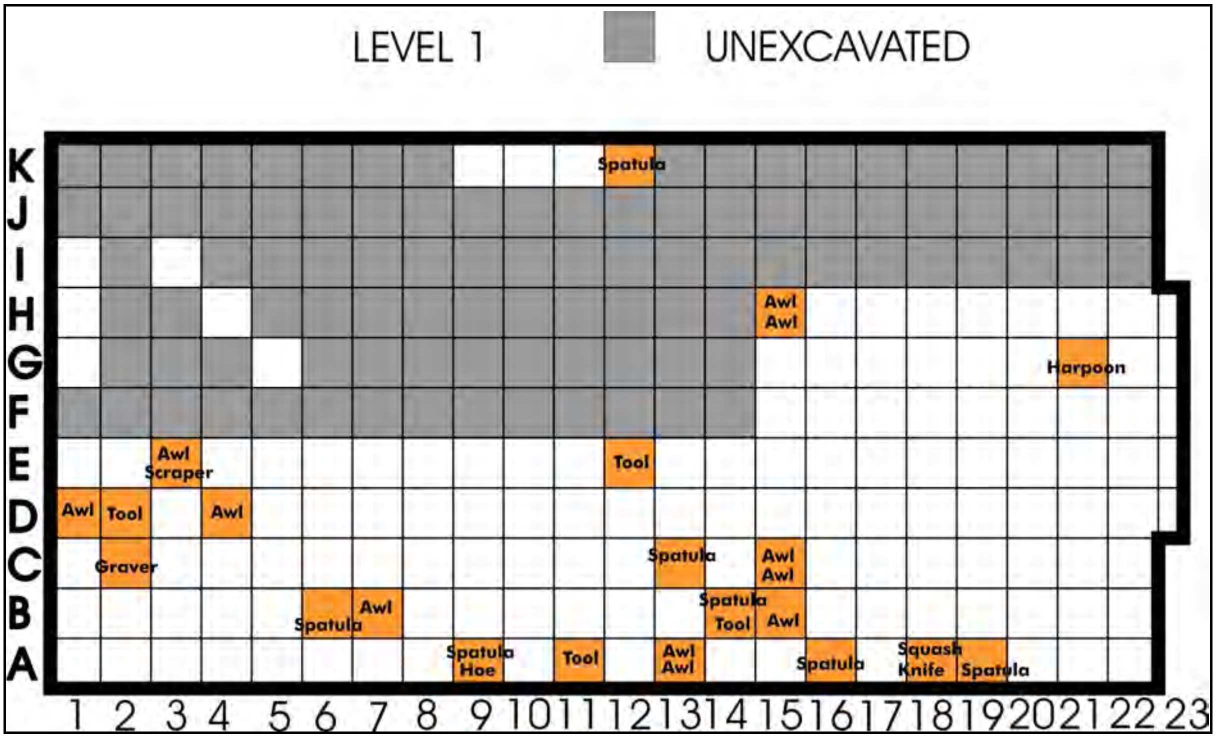


Figure 4.6-10: Distribution of Bone Tools (Mammal and Avian) in Level 1

4.6.2.1 Awls

The awls were the most plentiful type of tool recovered from Level 1. All of the awls (Plate 4.6-1) were constructed out of mammal bone, except DlLg-33:08A/7740 which was made from bird bone. In two cases, the awls were made out of moose metatarsals (DlLg-33:08A/9220 and DlLg-33:08A/13952).

The rest of the awls have been carved out of pieces of long bone. Most of the awls are of a long slender design. However, with both DlLg-33:08A/1700 and DlLg-33:08A/20708, the point is much broader and the body of the awl is much thicker unlike the typical “needle” shape. This possibly represents some different type of task that these two objects were used for or might simply represent some degree of personal preference on the part of the person that made it. Most of the thinner awls have been broken at some point and this may have been the reason why they were discarded. One awl of particular note within this set is actually one of the smallest. DlLg-33:08A/20707 is a small needle-shaped awl which would have been awkward to use in comparison to a larger tool. This tool might in fact not be an awl at all. It is possible that this artifact is the barb of a fishing hook and that it had been bound to a shaft—a J shape carved out of wood (Miles 1963:39).

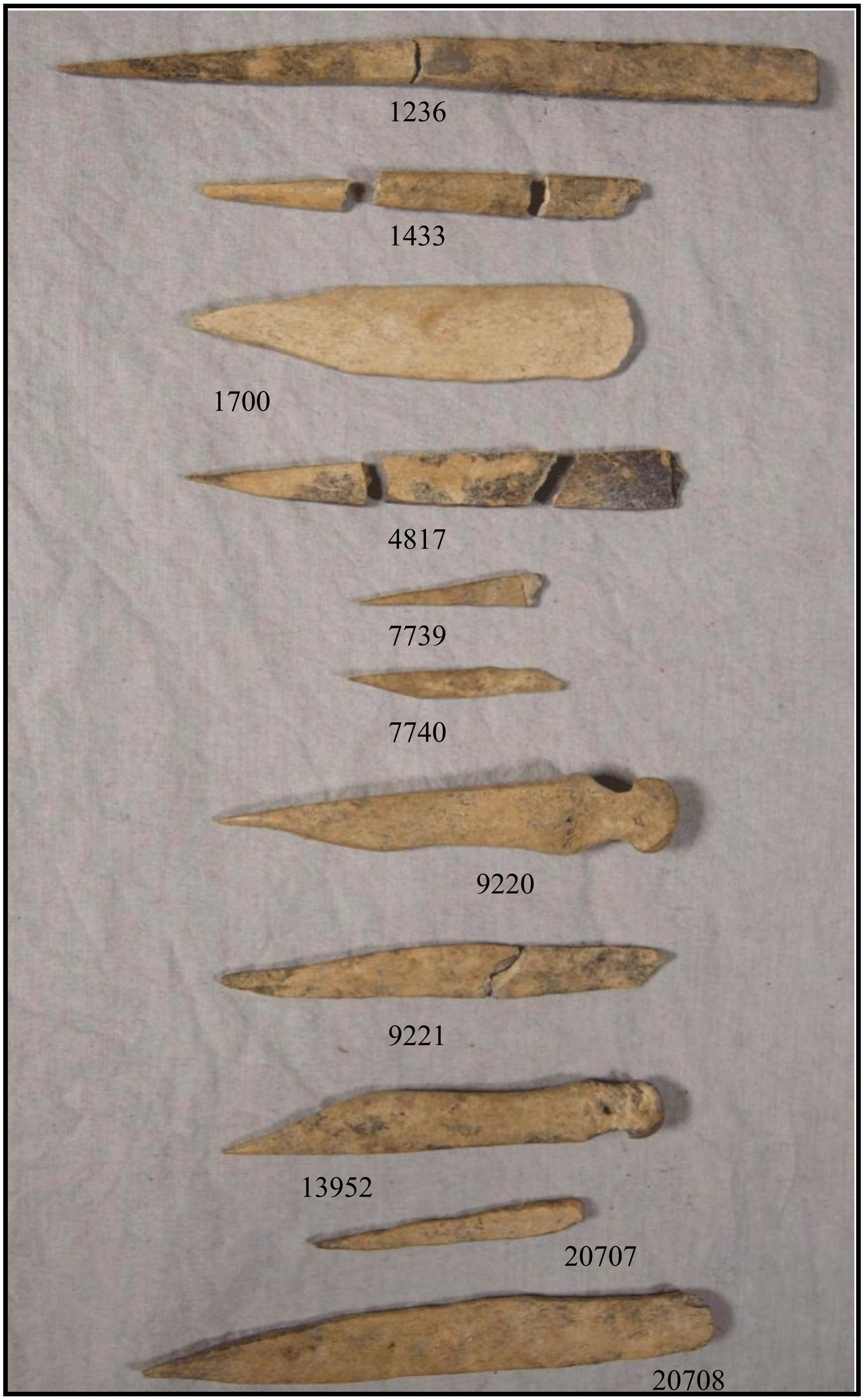


Plate 4.6-1: Bone Awls (75% actual size)

4.6.2.2 Spatulas

Compared to the awls, there are fewer spatulas (Plate 4.6-2). There are eight examples of the spatula-shaped tool present within Level 1.

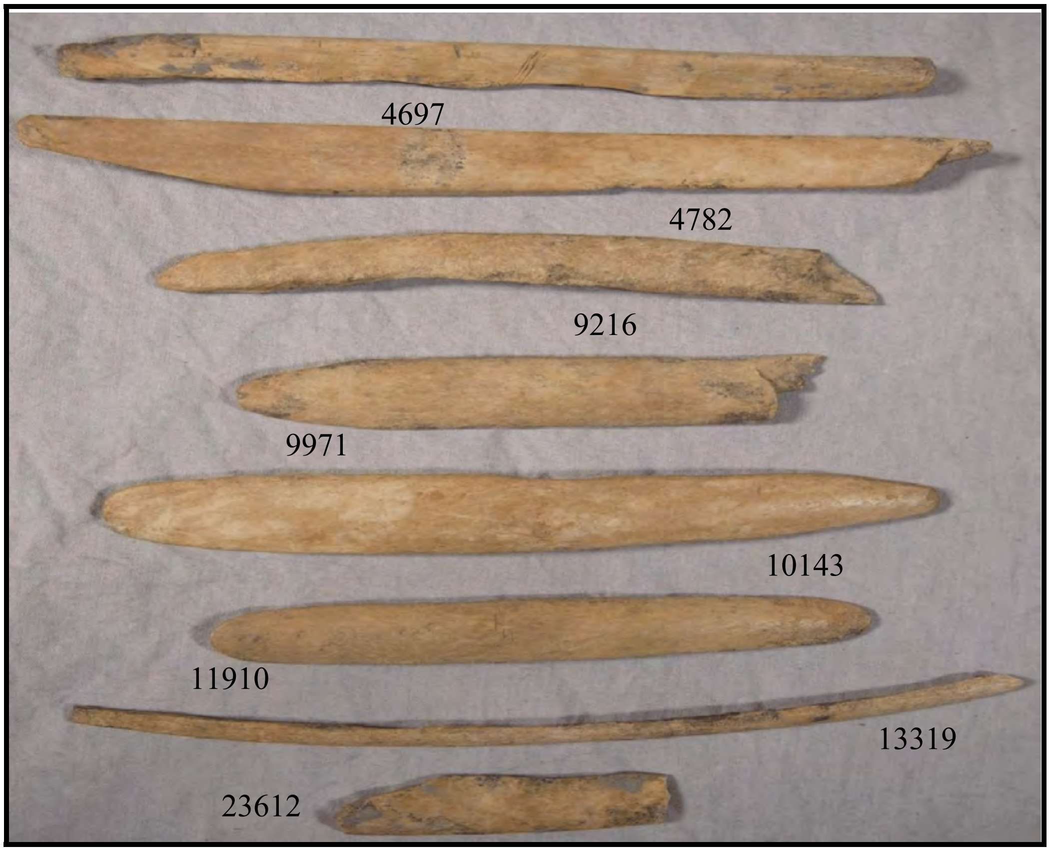


Plate 4.6-2: Bone Spatulas (75% actual size)

All of the spatulas were constructed out of mammal bone, predominantly rib bones. All of the artifacts displayed the general long and flat form which is typical of this class of tool. It is unclear, as discussed in the previous section (Chapter 3), the exact nature of these tools, but proximity of the spatulas with the areas of mammal bone concentration is at least suggestive that they played some role in food preparation or processing. The fact that most the spatulas are made from rib bones is not surprising as the shape of the bone is easily made into the spatula shape and ribs can be easily split lengthwise. It is likely that these tools were kept until they truly could no longer do the job they were made for and, as such, might not reflect the fauna in the area immediately around The Forks. It is also possible that rib bones could be prepared and kept to be later turned into spatulas or other tools.

The spatula (DlLg-33:08A/3), recovered off the grid, is an excellent example of this type of tool (Plate 4.6-3). The artifact is broken into two pieces, but luckily both halves were recovered. This spatula measures 21.4 cm in length, 1.9 cm in width, and 0.5 cm in thickness. This spatula is also constructed from a rib bone of a large ungulate.

Plate 4.6-3: Both Sides of Spatula (DlLg-33:08A/3) Found Off Grid (50% actual size)

4.6.2.3 Miscellaneous Bone Tools

There were also several single objects of particular note within this assemblage. A piece of modified bone displaying a clear tine or barb was recovered (Plate 4.6-4). DlLg-33:08A/24930 could either be the hafted end of a fishing spear or a harpoon head. The main distinction between these two tools is that a harpoon head is designed to come off once a fish or marine animal has been speared and is attached by a length of line where as the spear point is simply a single solid tool. The bottom end of this tool has been lost over time and so it is not possible to determine exactly which type it is. It is likely that this object, regardless of its exact nature, was used in the procurement of fish resources.

Plate 4.6-4: Bone Harpoon (DlLg-33:08A/24930) (2x actual size)

Not surprisingly there was a bone hide scraper (Plate 4.6-5) found in association with several of the awls. It is likely that this tool (DlLg-33:08A/1699) was being used at the same location to prepare skins for the manufacture of clothing.

Two more interesting finds that point to the possibility of some horticultural activity at the site are the presence of what might be a section of a scapula hoe and a probable squash knife. Unfortunately, there are only a few small fragments of what may be a scapula hoe (DlLg-33:08A/1299). However, there is a punched hole visible on the object that coincides with the placement of a hole for hafting the scapula to a wooden handle (Plate 4.6-6).The hoe fragment (DlLg-33:08A/1), found west of the excavation area, is only a small fragment of the whole scapula, but the presence of what appears to be a punched hole in the center of the bone suggests that it might be the result of a specific hafting technique (Plate 4.6-6).

Plate 4.6-5: Bone Scraper (DlLg-33:08A/1699) (1.5x actual size)

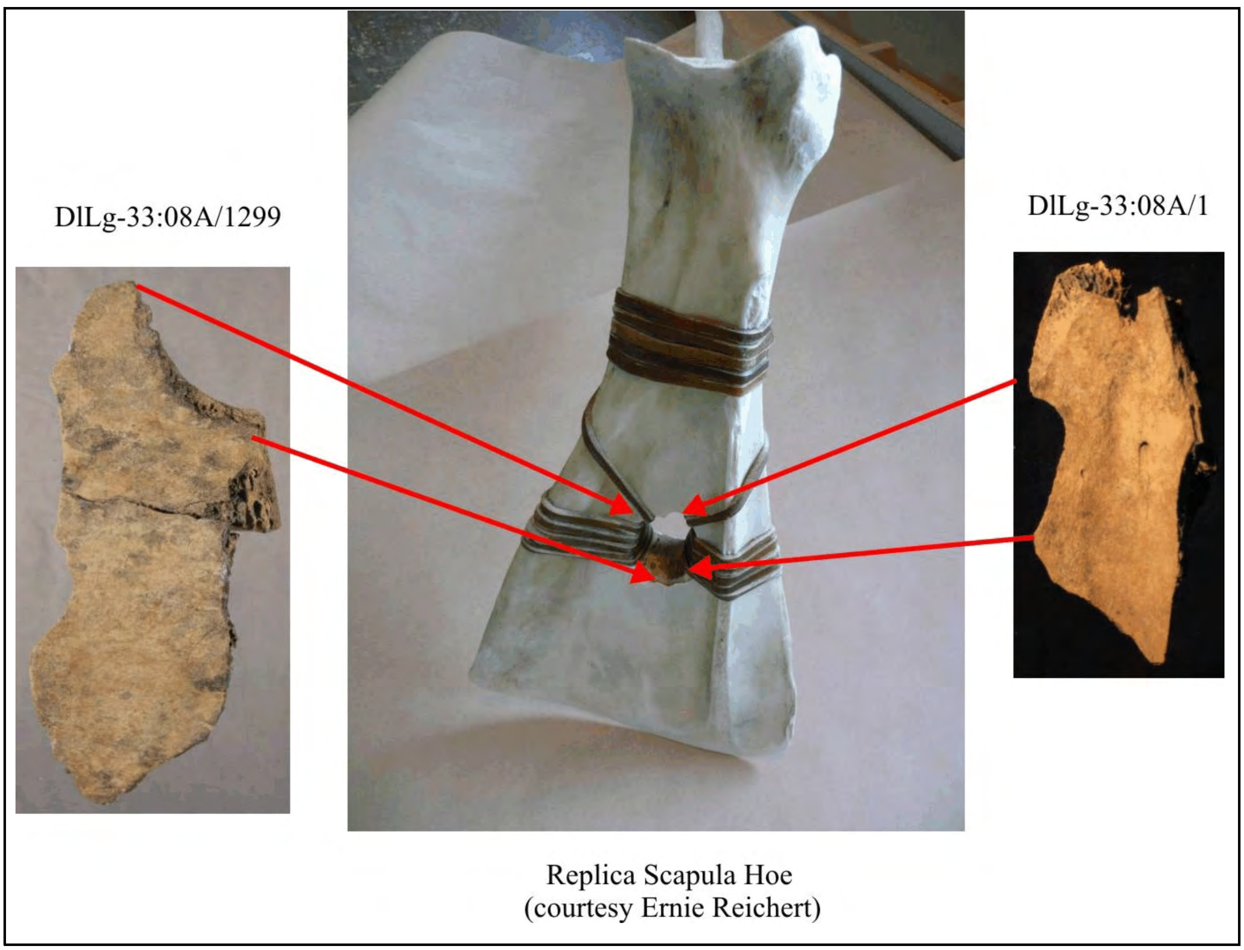


Plate 4.6-6: Composite Image Showing Positions of
Recovered Hoe Fragments on a Replica Scapula Hoe

The squash knife, DlLg-33:08A/9922, is a thinned piece of scapula formed into a “blade”(Plate 4.6-7). Although not as thin or sharp as a stone blade, these knives would have been easy to manufacture and would have reduced the need for a stone tool allowing the precious stone resource to be used for other objects. This squash knife is mostly intact and is consistent with those in the literature. Wilson, discussing horticulture among the Hidatsa, notes that, during the harvesting of squash:

> ...old women ascended the drying stage, and sat, five on either side of the pile of squashes. Each of the old women had a squash knife in her hand, made of the thin part of the shoulder bone of a buffalo, if it was an old-fashioned one; butcher knives of steel are now used. (Wilson 1917:71)

Plate 4.6-7: Dorsal and Ventral Faces of Squash Knife (DlLg-33:08A/9922) (75% actual size)

DlLg-33:08A/900 is a graver that has been formed out of the incisor of a beaver, a popular material for this type of tool. The tooth has been modified (Plate 4.6-8) by being split down the middle and the angle at the end of the tooth sharpened dramatically creating a narrow square edge. The hard and durable nature of beaver teeth make them an ideal woodworking or carving/engraving tool.

Plate 4.6-8: Graver Made from Beaver Incisor (DlLg-33:08A/900) (2x actual size)

DlLg-33:08A/7661 is a modified piece of mammal bone. The artifact has been altered to have three distinct sides creating a triangular cross section (Plate 4.6-9). It weathered and is damaged at one end. It is not possible to determine the exact form or function of this artifact from the small portion remaining . It could possibly have had somewhat of a spatula form, but this is merely speculation.

Plate 4.6-9: Top and Bottom of DlLg-33:08A/7661 (1.5x actual size)

DlLg-33:08A/8114 consists of a small disk of bone about the size of a two dollar coin (Plate 4.6-10). The artifact is constructed from cortical bone and is thin but fairly solid. The purpose of this tool is not readily available from its shape. It might have been some type of gaming or marking piece.

DlLg-33:08A/11911 is one of the most unusual objects from within the site (Plate 4.6-11). This piece of scapula has obviously been used due to its thin profile. However, despite all the use wear, which has produced rounded edges from some type of rubbing, the function of the tool is unknown. Most of the outside edge of the object is worn smooth and there are some striation on the flat surface, but no obvious function are evident.

Plate 4.6-10: Dorsal and Ventral Faces of DlLg-33:08A/8114 (2x actual size)

Plate 4.6-11: Dorsal and Ventral Faces of DlLg-33:08A/11911 (actual size)

4.6.3 Avian Butchering Remains

The bird remains within Level 1 posed a bit of a problem due to the incomplete nature of the specimens and, as such, even where the element could be identified, it was often difficult to determine any particular bird species. Mallard duck (*Anas platyrhynchos*) was the only clearly defined species present. In all likelihood, some of the other remains are also mallard, but it cannot be ascertained with certainty. Due to the major disparity in weight between mammals and birds, it seems more appropriate to map the bird remains distribution by quantity (Figure 4.6-11).

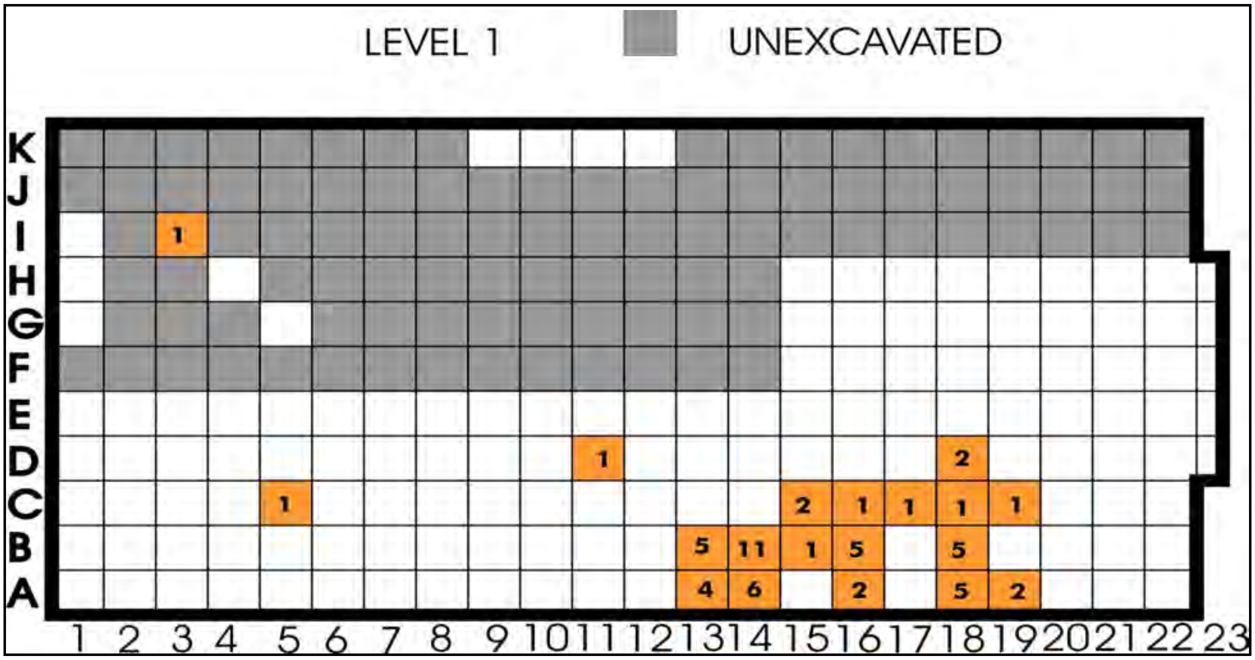


Figure 4.6-11: Distribution of Avian Remains

It is clear that the location of the highest amount of bird bone coincides with the main mammal deposition area. This lends further weight to the theory that this was the primary food processing area within that portion of the campsite which was excavated. The small amount of bird remains, compared to mammal, indicates that there was only a cursory use of bird as a food resource with the only species identified being water fowl which would likely have been plentiful in the areas around The Forks. Possibly, due to the large amount of fish being gathered, hunting birds was simply unnecessary.

There was a single piece of modified bird bone that fits with the typical awl form constructed out of a section of long bone. DlLg-33:08A/7740 measures 4.5 cm in length, 0.5 cm in width, 0.3 cm in thickness and weighs 0.5 grams. It was recovered from Unit A13, where a mammalian awl was also located. This tool is illustrated in Plate 4.6-1 with the mammal awls.

4.6.4 Reptilian Remains

There were several reptile bones located within Level 1. A total of 228 elements, either vertebrae or ribs, were located in Units E3, E4, E18, and C22. The combined weight is 2.3 grams. These materials were identified as being from a garter snake. It is likely that these bones represent three different creatures who found their way into rodent burrows for winter hibernation and died during that season. These burrows extended down into the cultural horizon. The snake remains are probably intrusive rather than the reptiles having actually died during the inhabiting of this level.

4.6.5 Amphibian Remains

Two specimens of amphibian remains were recovered: DlLg-33:08A/678 and 19267. These remains represent only a single individual and are more than likely the result of a frog digging down into the cultural horizon rather than being chronologically linked to it. There is nothing to suggest that this animal was linked to subsistence. With the large number of rodent burrows seen throughout the site, it is likely that a number of smaller animals found their way down to the depth of the site and perished. We have seen this both with the snakes and in all likelihood with many of the small rodents.

4.6.6 Summary

Based upon the materials excavated from Level 1, it is clear that the various mammals within the region were an important food source for the people of this camp. However, it is also clear that these limited remains would not have been sufficient to sustain a large population for a lengthy period of time.

There does appear to be one major activity area for processing both mammal and avian remains in the southeast corner of the site. It seems likely that this area is where much of the processing and possibly preparation of the food occurred. The meat was then distributed out from this location to the various hearths surrounding it.

The tools also seem to indicate another area of activity that lines up with the western concentration of mammal remains. The presence of several awls and a scraper suggest that the processing of skins and the manufacture of clothing was concentrated in this area. It is difficult when most of the other materials, such as the clothing or skins, associated with this task degrade and are not available for interpretation. However, the presence of tools specific to these tasks supports this interpretation.

4.7 Fish Remains

4.7.1 Artifact Recoveries

There are 19405 artifacts (4245 catalogued assemblages) in Level 1 which have been identified as fish remains. Each of those 4245 catalogued assemblage of artifacts represents a record in the database, from which to determine a quantitative analysis. Of the 19405 artifacts, 7165 were catalogued as “Unidentifiable Bone” (N=4626) or “Undetermined Bone” (N=2539), leaving 12240 artifacts (63.08%) being identified as to their element.

However, 8178 of those 12240 specimens (i.e., 42.14% of all artifacts, and 66.81% of the selected artifacts from this level) were either scales (N=4782), rib (N=101), rib/ray/spine (N=2134), or vertebra (N=1161) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

4.7.2 Species Determination

The remaining 4062 specimens (i.e., 20.93% of all artifacts from this level, and 33.19% of the selected artifacts from this level) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 4.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

4.7.3 Analysis

There are nine different taxa present in the sample, demonstrating a great diversity in the number of species being harvested. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 4.7-2. The results are further illustrated in Figure 4.7-1.

The most significant species with respect to MNI frequencies is Ictaluridae spp.(catfishes). It accounts for half of the individuals represented in the catch. *Aplodinotus grunniens* (freshwater drum) is also prominent. There is a large number of sauger/walleye (*Sander*) identified, as well. Catostomidae spp. (suckers) are present and burbot (*Lota lota*) appears in small quantities. *Hiodon* sp. (goldeye/mooneye), *Acipenser fulvescens* (sturgeon) and *Esox lucius* (pike) are each represented by a single individual. Percidae (perches) have a large count relative to other species, but they could also be from the sauger/walleye individuals present in this level, and not necessarily from other members of that family. It cannot be discounted, however, that species such as yellow perch may be represented in the Percidae remains.

The NISP counts do suggest that some species may have a greater significance, specifically the catfishes. This is to be expected given a number of factors: the familiarity by excavators of the catfish skeleton which may favour its recovery, causing bias in their collection in the field; the ease of identifying these elements during laboratory examination; the durability of the bone itself offering better preservation than that of other species; as well as the fact that they do occur in greater numbers when calculating the MNI for the species found in this level. It is interesting to note that sauger/walleye have less specimens identified than the suckers, but they calculate out to a higher number of individuals than the suckers.

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Lota lota	Fish	Total
Angular	5									2	7
Angular; Articular; Dentary; Retroarticular	8										8
Angular; Articular; Retroarticular	6										6
Angular; Dentary; Retroarticular	4										4
Angular; Retroarticular	141			23				1	9	20	194
Articular	19									9	28
Articular; Dentary; Retroangular	3									1	4
Basioccipital	37									4	41
Basioccipital; Parasphenoid	1										1
Basipterygium	2										2
Bone Sample										6	6
Ceratobranchial										1	1
Ceratohyal	47	4	1			31				21	104
Cleithrum	452	22	10	11						95	590
Coracoid	256									52	308
Cranium	20										20
Dentary	191	1		17	4	2		6		53	274
Dentary; Articular; Angular	1									2	3
Dentary; Tooth				4						1	5
Ectopterygoid	5									1	6
Epibranchial	6									3	9
Epihyal	27									4	31
Exoccipital	10										10
Frontal	71									9	80
Hyomandibular	152	31	1	4						26	214
Hyomandibular; Preoperculum	2										2
Hyomandibular; Preoperculum; Quadrate	3										3
Hypohyal	16									1	17
Interoperculum	41									4	45
Lacrimal	4										4
Lateral Ethmoid	23									5	28
Maxilla	15	21	13			6				9	64
Metapterygoid	39									9	48
Neurocranium	1									1	2
Operculum	120	22			2					26	170
Otolith	4		4			51				15	74
Palatine	56									3	59
Parasphenoid	58		20							7	85
Parasphenoid; Prootic	1										1
Pharyngeal Arch		13								1	14
Pharyngeal Plate						2				2	4
Pharyngeal Plate, Upper						1					1
Pharyngeal Tooth		1				1					2
Posttemporal										8	8
Premaxilla	32			8		7				8	55
Preoperculum	104		1							14	119
Preoperculum; Hyomandibular										1	1
Preoperculum; Quadrate	51									6	57
Prootic	10									1	11
Pterotic	14									1	15
Quadrate	59	3		15						11	88
Ray	1									1	2
Ray, Branchiostegal	63									12	75
Rib										101	101

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Lota lota	Fish	Total
Rib / Ray / Spine	11									2123	2134
Scale										4782	4782
Scapula	1									1	2
Scute							1				1
Sphenotic	31									1	32
Spine	6					4				49	59
Spine, Dorsal	73					32				24	129
Spine, Modified First	11									4	15
Spine, Pectoral	426					16				63	505
Spine, Pterygiophore	7					30				10	47
Spine, Pterygiophore; Dorsal						1					1
Spine, Second Dorsal	70					9				11	90
Spine, Second Pterygiophore	1										1
Suboperculum										1	1
Supracleithrum	48									10	58
Supraethmoid	58									9	67
Supraoccipital	19									3	22
Supraoperculum										1	1
Tooth										1	1
Undetermined Bone	11									2528	2539
Unidentifiable Bone										4626	4626
Urohyal	17									2	19
Vertebra	57	1								1103	1161
Vomer										1	1
TOTAL	3028	119	50	82	6	193	1	7	9	15910	19405

Table 4.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	3028	86.64	56	49.56
Catostomidae (2)	119	3.40	7	6.19
Percidae (3)	50	1.43	6	5.31
Sander (4)	82	2.35	12	10.62
Hiodon (5)	6	0.17	2	1.77
Aplodinotus (6)	193	5.52	24	21.24
Acipenser (7)	1	0.03	1	0.88
Esox lucius (8)	7	0.20	1	0.88
Lota lota (9)	9	0.26	4	3.54
TOTAL	3495	100.00	113	99.99

Elements Used for MNI Determination

1. Dentary (Left)
2. Maxilla (Left)
3. Parasphenoid (Complete)
4. Angular; Retroarticular (Right)
5. Operculum (Right)
6. Otolith (Right)
7. Scute
8. Dentary (Left)
9. Angular; Retroarticular (Left)

Table 4.7-2: Species Determinations

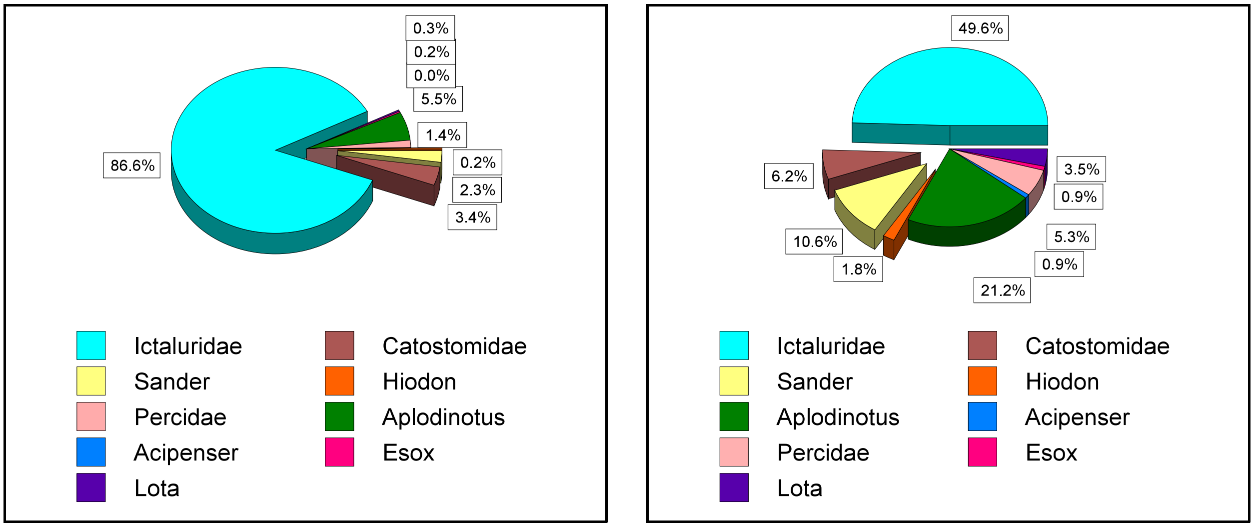


Figure 4.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The distribution of the fish remains by species is shown in Figure 4.7-2.

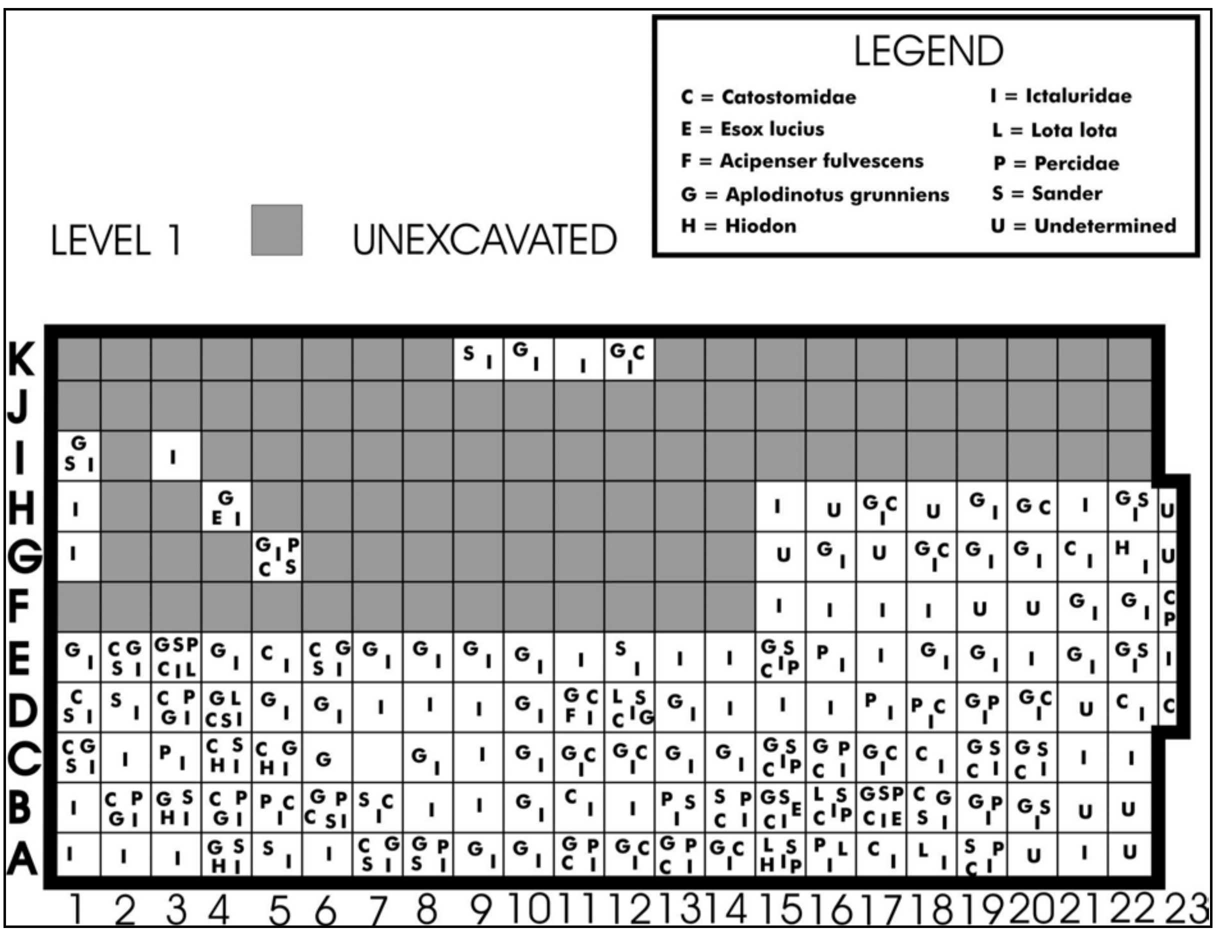


Figure 4.7-2: Distribution of Fish Remains by Species in Level 1

Fish remains were found in every unit excavated but one, Unit C7. Certainly catfish are located in almost every unit across the site, with freshwater drum being widely scattered as well. Suckers seem to be found in dense concentrations of fish remains, but dispersed across the site. The sauger/walleye remains are clustered into a dozen or so different areas, some relating possibly to nearby hearths, but with two large areas, one extending northwestwards from Units A4 - A8 diagonally to Units C1/E3; and the other showing up in the west to east line of Units B13 to B20/C20. The pattern of distribution of the sauger/walleye remains is similar to that of the densities in general of the fish remains as they relate to weight. The burbot do not seem to be located together, suggesting that the few individuals caught may have been processed at different places and not necessarily treated separately from other species in one place. *Hiodon*, for which there were only two individuals counted, are found in two or three concentrations but widely separated across the site. The pike remains also have a wide spatial separation which may suggest more individuals were processed than accounted for in the MNI. They are found isolated in Unit H4, with a greater concentration spanning Units B15 and B17. The lone sturgeon remain was recovered in Unit D11, which contained a hearth.

4.7.4 Interpretation

Figure 4.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 1. A more accurate comparison across the entire site can be made if the weights in those units where scale samples were collected are adjusted. However, of the twenty-four (24) catalogued scale samples, all but one had a gross weight less than 1 gram, so there would not be much change. DlLg-33:08A/10212, from Unit E17, has a quantity of 4550 scales weighing 36.4 grams. This would reduce the density in that unit by nearly half to about 41 grams, yet the resulting figure does not look out of place given the densities reported for that locus.

The distribution by weight shows areas of dense concentrations, particularly in Units D11, E15, C18, C19, E19, and H15. These units also have a great deal of catfish identified in them, which makes up for most of the weight. However, it does seem that the surrounding units have a gradual decrease in weight as one moves away from these central areas. There is a small overlap in the density distribution with that of the distribution of the fish species (Figure 4.7-2), coinciding with clusters of fishes found in certain areas of the excavation.

No cut marks, which may have indicated any butchering techniques or other processing practices, were recorded on any specimens. No post-depositional marks such as carnivore chewing were recognized on any specimen.

Thirty-five (35) artifacts were found to be burnt, charred, or calcined by fire, representing only 0.18% of the total number of fish remains. By weight, this translates to just 6.9 grams out of a total weight of 5399.2 grams (0.13%) that were altered by fire treatment. This is an extremely low percentage, suggesting that the bones were by and large not subjected to direct heat. Most occurrences were associated with hearths in the same or nearby units, or found in the dense cluster areas associated with the weight distribution. The only specific species identified with charred remains was freshwater drum collected in Unit E22, where a single upper pharyngeal plate was found.

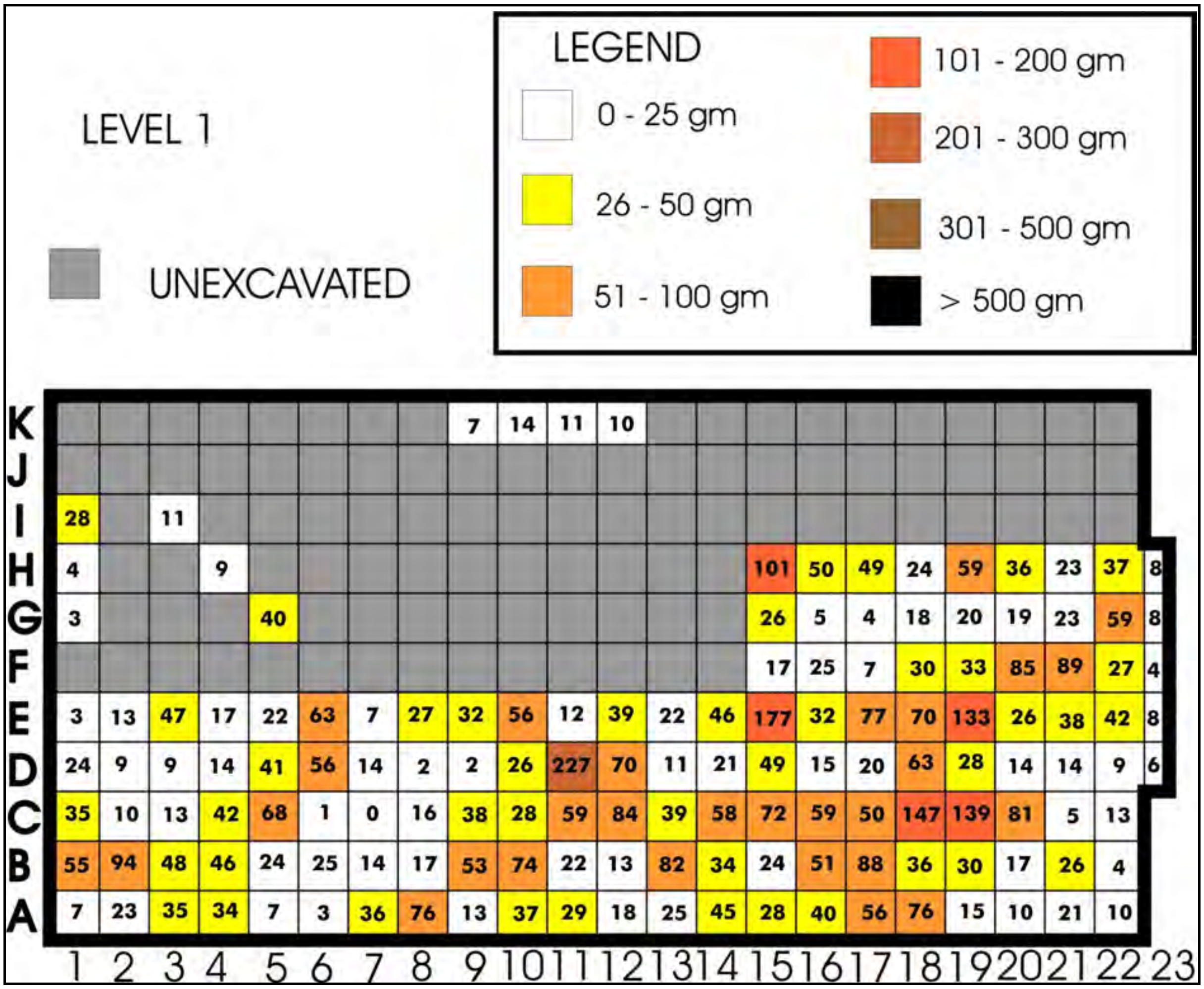


Figure 4.7-3: Distribution of Fish Remains by Weight

4.8 Shellfish

In Level 1, 478 artifacts representing butchering remains, naturally deposited specimens, and worked shell were recovered.

4.8.1 Butchering Remains

Of the 364 butchering remains in Level 1, 109 valves were identifiable to species (Table 4.8-1). The remainder could only be identified to the Family level—Unionidae. Obviously, the weight of the discarded shell is greater than the weight of the edible meat. It is impossible to ascertain the amount of food that is represented by the shellfish recoveries. The distribution map of butchering remain recoveries (Figure 4.8-1) indicates three major concentrations: Units E6 and E7, Unit K9, and a cluster from Units A15 to D18. These concentrations are adjacent to hearths in Units D6, B15, and K9 (Figure 4.2-1). A less dense concentration occurs in the northeast portion of the excavation area adjacent to the elongate hearth in Units F18 to H20.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	33	30.28	175.3	16.20
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	46	42.20	384.2	35.51
Pink Heel-Splitter (*Potamilus alatus*)	18	16.51	322.3	29.79
Maple-Leaf (*Quadrula quadrula*)	4	3.67	51.5	4.76
Pig-Toe (*Fusconaia flava*)	-	-	-	-
Three-Ridge (*Amblema plicata*)	8	7.34	148.5	13.73
	109	100.00	1081.8	99.99

Table 4.8-1: Frequency of Identified Butchering Remains by Taxon

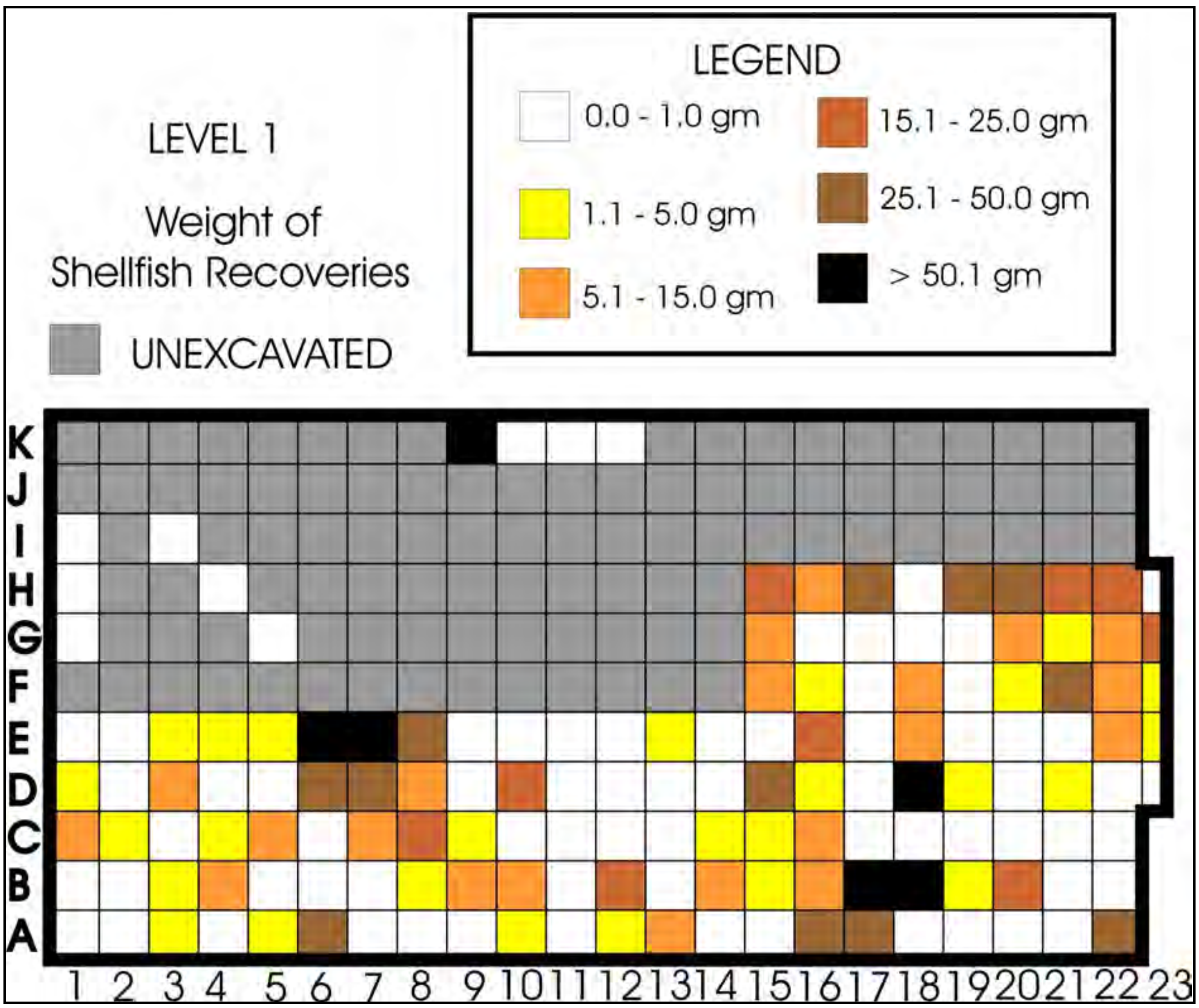


Figure 4.8-1: Density of Shellfish Recoveries

Of the seven species identified from all cultural levels at the site, five were present in Level 1 (Table 4.8-1). Only *Fusconaia flava* (Pig-Toe) and *Anodontoides ferussacianus* (Cylindrical Floater) were not present. The distribution of the five identified specimens is illustrated in Figure 4.8-2. The values in each unit represent the number of valves of each taxon. The concentration of identified species replicated the pattern of weight densities.

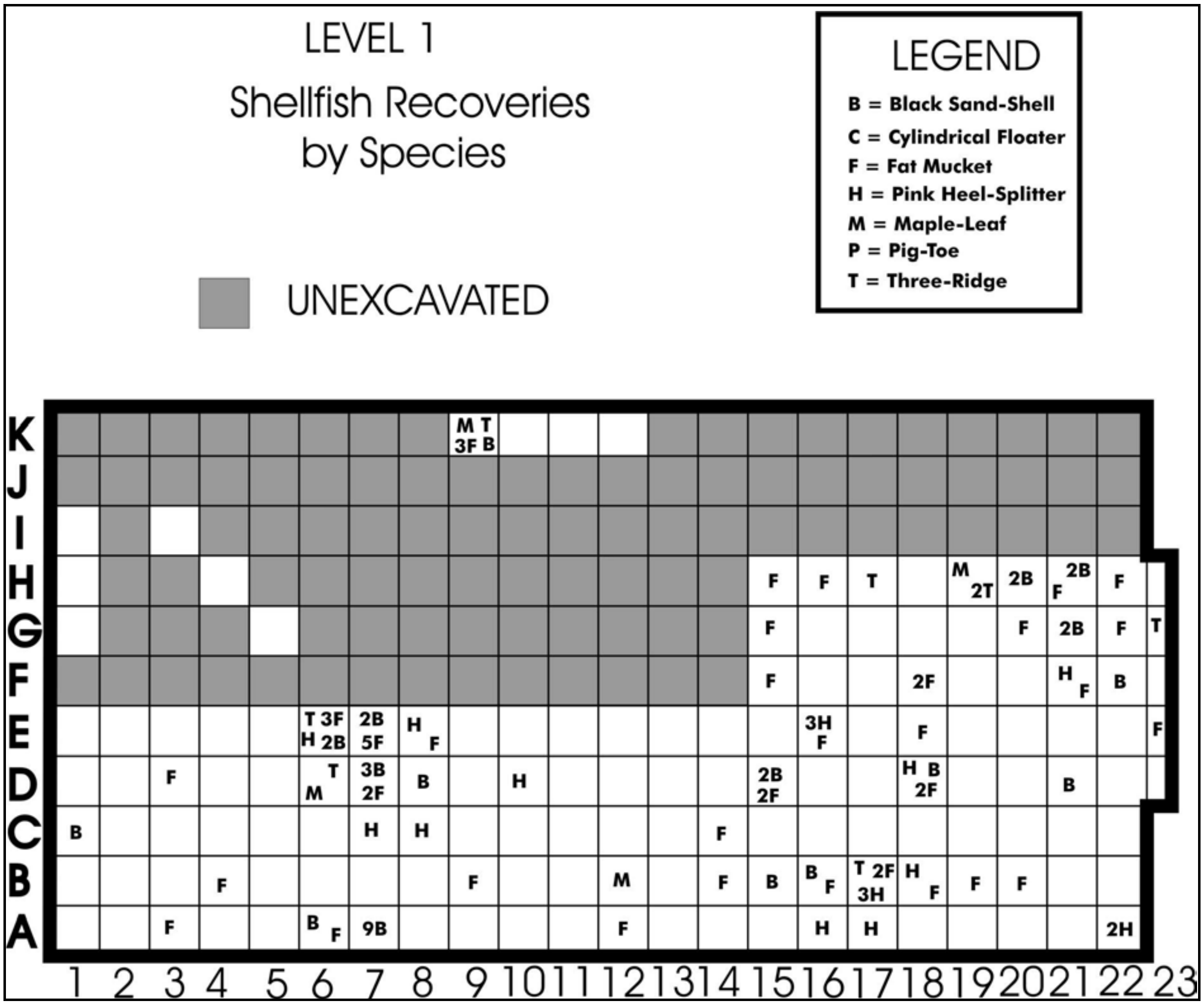


Figure 4.8-2: Frequency of Shellfish Recoveries by Species

Ten valves had evidence of charring through close contact with fire. Table 4.8-2 outlines the recoveries from Level 1 and their locations. Half of the specimens were identifiable to species with Three-Ridge being dominant. This contrasts with its position in the frequency of identified species (Table 4.8-1) where it ranked fourth with 7% of the assemblage. All of the charred specimens were recovered in close proximity to hearths (Figure 4.2-1) in Units B15/16, C7/C8, H19, and G23.

CAT. NO.	UNIT	QTY	SPECIES
5030	C7	1	Pink Heel-Splitter
9249	C15	1	Unionidae
10392	C16	1	Unionidae
13968	B15	1	Unionidae
14253	B17	1	Three-Ridge
19037	H19	2	Three-Ridge
22906	G23	1	Three-Ridge
23497	B16	2	Unionidae
TOTAL		10	

Table 4.8-2: Charred Shellfish Specimens from Level 1

It would appear that the processing of the clams for food preparation occurs in areas immediately adjacent to where they were cooked. The shells apparently were discarded where the processing occurred.

Another cultural attribute was observed on some of the shellfish recoveries in Level 1. Hematite staining was present on 6.32% of the butchering remains (Table 4.8-3). Only one specimen could be identified to species (DlLg-33:08A/19155). It is an open question as to whether the hematite discolourations were purposefully applied or the result of ground water percolation which carried hematite through the cultural matrix, depositing it on receptive material. The scattered aspect of the recoveries lends credence to the latter possibility.

CAT. NO.	UNIT	QTY	SPECIES
252	A4	1	Unionidae
987	C4	1	Unionidae
1510	D5	1	Unionidae
1887	E3	4	Unionidae
7935	A15	4	Unionidae
19155	G20	1	Fat Mucket
23444	G22	1	Unionidae
23564	G20	10	Unionidae
TOTAL		23	

Table 4.8-3: Hematite Stained Shellfish Specimens from Level 1

To calculate the Minimum Number of Individuals (MNI), it was necessary to side the valves and thus attribute the maximum number as the quantity of specimens which were present during the occupation. This is illustrated graphically in Figure 4.8-3.

In Level 1, Fat Mucket and Black Sand-Shell are the most common species with Pink Heel-Splitter as the third. These three species comprise nearly 90% of the recovered taxa. Black Sand-Shell clams could have been harvested from gravel beds along the Assiniboine River. Fat Mucket could have been gathered either from the Assiniboine River or the Red River. Pink Heel-Splitter could have been obtained from either the Red River or the Winnipeg River, a short distance to the north by water.

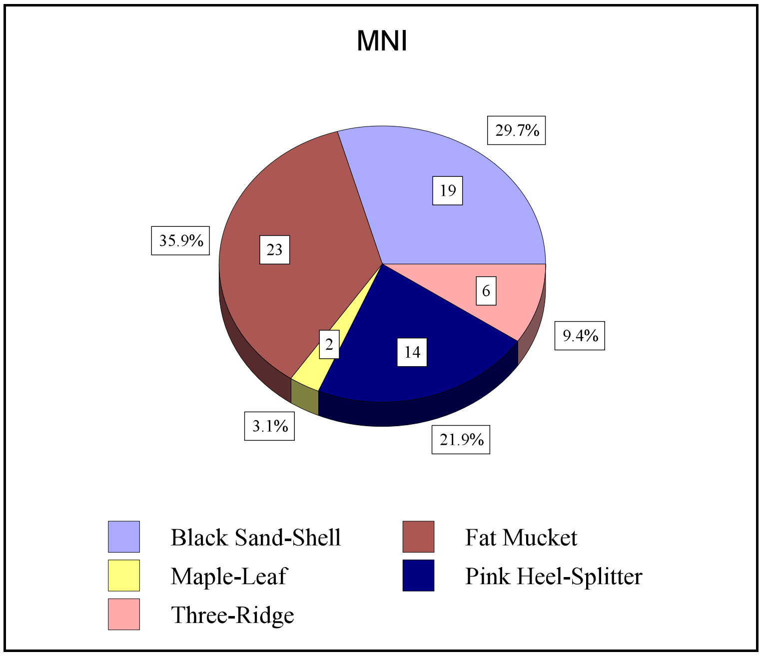


Figure 4.8-3: Frequency of Identified Taxa of Shellfish

4.8.2 Natural Shellfish

Naturally deposited specimens are only identified to the Family level. Further identification to the species level could provide environmental data but this lies beyond the scope of a mitigative report. The majority of the 110 recoveries (Table 4.8-4) were concentrated in the western end of the site. This may be a function of the riverine sedimentation pattern discussed in Chapter 2, wherein the sediment deposits were thin and several events were incorporated into a single active soil layer. Figure 4.8-4 illustrates the locations of recovered identified taxa.

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	44	40.00
Ramshorn Snails (Planorbidae)	61	55.45
Pea Clams (Sphaeriidae)	5	4.55
TOTAL	110	100.00

Table 4.8-4: Frequency of Naturally Deposited Shellfish

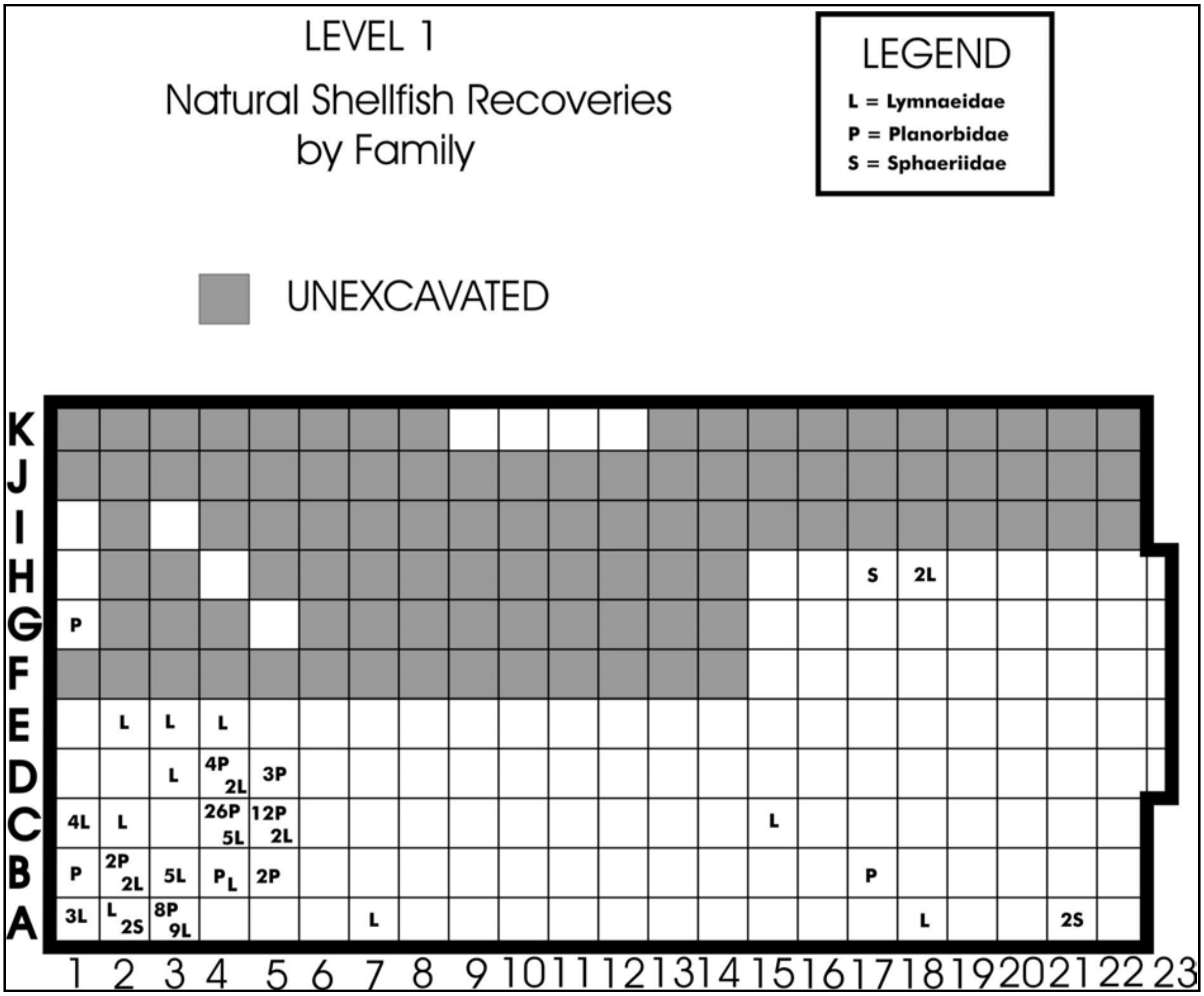


Figure 4.8-4: Location of Recoveries of Natural Shellfish in Level 1

4.8.3 Worked Shell

Four worked shell specimens, from Level 1, were identified as three beads and a tool. The three beads were all recovered from Unit D6, adjacent to a hearth. The shell tool was recovered from Unit C20, also adjacent to a hearth in Unit D20. It is impossible to identify the species from which these artifacts were derived. Predominantly, the landmarks for species identification are in the hinge region of valves.

4.8.3.1 Jewellery

DlLg-33:08A/5141 is a complete, circular bead consisting of two larger and two very small spalled off fragments. This bead is very friable and no photography was attempted as it was felt that any handling may lead to further disintegration. This artifact has a diameter of 9.1 mm with a thickness of 2.6 mm and a weight of 0.3 grams. The bore, which is slightly off-set from centre, measures 2.6

mm and is drilled from the external side of the parent shell material. Given the flat aspect of the inner (dorsal) face of the shell, it would have been placed on a hard surface to support the artifact while drilling to minimize the chance of shatter. The round circumference of the bead has been ground to a relatively smooth surface and slopes upward to the ventral face.

DlLg-33:08A/5143 is a complete, small thin bead (Plate 4.8-1). It is mainly circular with one slightly flattened side. The diameter is 8.9 mm, the width is 1.6 mm, and it weighs 0.2 grams. The bore of this bead is off-set from the centre and measures 5.3 mm in diameter. It was drilled from the internal side. Edge grinding has occurred but has not resulted in a totally circular outline. The slope of the edge of the bead is only minimal.

Plate 4.8-1: Dorsal and Ventral Faces of DlLg-33:08A/5143 (5x actual size)

DlLg-33:08A/5142 is a complete, rectangular-shaped shell bead that could possibly be a pendant (Plate 4.8-2). It has a length of 16.1 mm, a width of 12.4 mm, and it weighs 1.1 grams. This artifact was manufactured from the edge of a valve and the thickness tapers from 4.4 mm to 1.5 mm at the thin outer edge of the parent shell. The medial bore has been drilled from both sides with the deepest drilling occurring on the interior surface. The diameter of the bore on the exterior is 5.0 mm, while the interior is 6.6 mm. The effective diameter of the aperture is 3.8 mm. The interior, obviously, is very smooth shell, while the exterior is extremely corrugated due to the presence of nineteen pronounced growth rings.

A similar artifact, DlLg-33:92A/9335, was recovered during the excavation of a 3000 year old campsite at The Forks (Goundry 1993:196, 205) and also tentatively identified as a pendant rather than a bead. DlLg-33:08A/5142 is less modified than DlLg-33:92A/9335 and it is not possible to determine if it was meant to be used *as is* or if this specimen is the result of an interruption in the manufacturing process of a circular bead.

Plate 4.8-2: Ventral and Dorsal Faces of DlLg-33:08A/5142 (4x actual size)

4.8.3.2 Tool

DlLg-33:08A/23249 is a piece of Unionidae shell that has obviously been worked (Plate 4.8-3). It measures 31.2 mm in length, 19.0 mm in width, and 1.6 mm in thickness. The weight is 1.3 grams. The shorter lateral edge of this trapezoidal-shaped artifact appears to have been pressured flaked to produce a serrated working edge with the teeth spaced approximately 3.0 mm apart. This modification has occurred on the thicker portion of the valve, away from the exterior edge. The function of this tool is unknown. Speculatively, it may have been used as a pottery decorating device, although any design resulting from use would tend to resemble Laurel pseudo-scallops rather than the designs found in the ceramic assemblage from this site.

This type of worked shell is unique for recoveries from The Forks. A serrated-edge flesher, made from a complete clam shell, from central California is illustrated in Miles (1963:100). If DlLg-33:08A/23249 had been functionally used as a flesher, pressure could have broken the working edge from the body of the valve which would have been used as the handle.

Plate 4.8-3: Dorsal and Ventral Faces of Shell Tool - DlLg-33:08A/23249 (2x actual size)

4.8.4 Shell Summary

While 478 shell artifacts were recovered from Level 1, it was by no means the largest number of shell recovered during the excavation at the Canadian Museum for Human Rights project. Level 2 produced the highest number, 873 shell artifacts. The 478 shell artifacts in Level 1, recovered from 149 excavation units, have an average density of 3.21 artifacts per square metre. The density is greater in both Level 2 and Level 3.

The 109 identifiable species in Level 1 constituted 29.95% of the butchering remains and 22.80% of the total number of shell. Four of the five identified species in Level 1, Fat Mucket, Black Sand-Shell, Pink Heel-Splitter, and Three-Ridge, are common finds in Manitoba and most occurred in all other levels as well. Maple-Leaf is slightly less common but did occur in other levels too. Rarer finds such as Pig-Toe and Cylindrical Floater were not identified in the assemblage of Level 1. An argument can be made, based on the higher density of the shellfish recoveries being located around hearths and the presence of charred valves in the same vicinity, that food processing occurred closer to the cooking areas with the edible portions being tossed into a pot and the non-edible portions being discarded in the immediate vicinity. This explanation holds for all levels except Level 3.

The 110 recovered natural shellfish encompassed the Gastropods and the Sphaeriidae. While the natural shellfish was scattered throughout the site in the other levels, in Level 1 it is more heavily concentrated in the western end of the excavation area, possibly as a result of heavy riverine deposition.

Level 1 produced the largest number of shell beads, three, and the rarest recovery, a shell tool. Shell beads are not an uncommon discovery at The Forks. However, their recovery is not consistent across this site, across other sites, or by cultural occupation level.

During the 1992 Public Archaeology Project at The Forks, twelve worked shell specimens—beads, pendants, bead blanks, and worked shell scrap—were curated (Goundry 1993:192-199, Plate 10-1). Yet, during the following year, 1993, a second Public Archaeological project at the same location, same site, and same level yielded only a single bead and a single bead blank (Goundry 1994:191-193). A single broken shell bead was recovered from the Assiniboine Riverfront Quay Project (Kroker and Goundry 1993:127) and a complete shell bead was recovered during the mitigation of the Johnston Terminal Refurbishment Project (Quaternary 1993:25, Plate 7). Both of these projects were Archaic occupations of the same general time period as the Public Archaeology Projects. The eight levels excavated at the CMHR site have yielded six worked shell specimens. Why this variation in numbers recovered occurs is unknown.

Recoveries during the excavations at the CMHR site do not provide answers to the question of on-site jewellery manufacture. It is unknown whether the production of shell beads, pendants, or tools occurred at this site or were part of the clothing/decoration/tool kit brought into the site by visitors or traders.

What is known is that shell ornamentation, and possibly use as a tool, was a long-standing tradition from the Archaic period through to the Post-Contact period throughout North America. As well, it can be documented to be a long-standing tradition at The Forks with beads/pendants recovered in a 3000 year old site and from the A.D. 1000-1200 CMHR site.

4.9 Miscellaneous Recoveries

Certain types of recoveries do not readily fall into the previous classes of artifacts. They range from various types of soil samples to esoteric artifacts.

4.9.1 Soil Samples

During the field project, a one litre soil sample was collected from each occupation unit within a horizon as well as a similar sample from features within that unit. Thus, some units had more than one sample collected. A total of 168 soil matrix samples were curated. During future in-depth analysis, it is anticipated that these samples can be accessed to recover macro-botanical specimens, undertake pollen analyses, undertake soil chemical analyses, recover naturally deposited shellfish, and various other studies. In addition to the soil matrix samples, samples were taken when circumstances warranted. These include 14 hearth samples, 3 ash samples, one clay sample, and one sand sample.

Ten samples were taken of hearth clay (the fire-hardened clay under and adjacent to a hearth). These can be used for future analysis of phytoliths (to determine plant species present) or for thermoluminescence dating of the hearth. Similarly, twenty samples of heat-modified clay were recovered.

4.9.2 Coprolites

The presence of domesticated dogs is inferred from the presence of numerous coprolites. Many had been weathered to the condition where they were not retrievable but 22 samples were taken. It is hoped that a zoologist researching canid domestication would be interested in analyzing these recoveries.

4.9.3 Copper

A small fragment of an apparent green metal was recovered from Unit B16. DlLg-33:08A/14083 was tested for cuprite using Cuprotesmo strips and had a positive result (L. Croom 2009:pers. comm.).

4.9.4 Replica Cast

An extremely rare archaeological discovery was made by E. Reichert when he was excavating Unit A14. A localized soil anomaly was carefully troweled and discovered to be an impression of a human footprint (Plate 4.2-3). The impression depressed the surface material of the cultural layer with a ceramic sherd under both the heel and toe of the footprint. It was photographed and mapped and a plaster-of-paris cast of the impression was made. The cast (Plate 4.2-7) was given the catalogue number DlLg-33:08A/7791.

In the same unit (Unit A14), immediately adjacent to the human footprint, was a partially blurred imprint of an Artiodactyla (Plate 4.2-4). It is probable that this footprint represents that of bison, but the impression was too blurred to be able to compare with the spoor of other large cloven-hoofed mammals (moose, elk). A plaster-of-paris cast (Plate 4.2-8) was also made of this hoofprint (DlLg-33:08A/7792).

4.10 Level 1 Summary

One of the *a priori* assumptions in archaeology is that a block excavation is a microcosm of an entire occupation area. This usually is an invalid assumption as not all activities will be represented in a randomly chosen section of a site. With this proviso in mind, the evidence provided from this excavation area will be interpreted in terms of an overall picture/scenario as a window into the past.

It would appear that the Level 1 occupation occurred from mid-summer to fall as there are no foetal and minimal juvenile faunal remains which would be expected for a spring occupation. The lack of avian remains, especially migratory species, suggests that a late-fall occupation is not a viable option.

Fragments of 37 different vessels were recovered. Most of the vessels appear to be within the same stylistic/cultural family but seven appear to be from different ceramic traditions. Of these seven, at least three appear to be affiliated with western ceramic styles. One notable aspect deriving from the ceramic recoveries is that with such attrition, replacement manufacture likely occurred at or near the occupation site. However, no direct evidence of ceramic manufacture was uncovered within the excavation area.

The lithic recoveries suggest a combination of localized recovery of usable tool-grade stone with trade from the south and, perhaps, the northeast. A large majority of the lithic flakes, which are the best indicator of material being used at this location, could be found in gravel deposits in the adjacent regions. Also, Selkirk Chert, from quarry areas a short distance downriver, is a dominant material. Swan River Chert is also dominant and could indicate that the group had travelled from the west prior to establishing this campsite. The presence of Knife River Flint can indicate either a trade network with groups from the south or that a party had travelled south on the Red River to obtain the material from the quarries in North Dakota.

The faunal record indicates a moderate amount of meat was available, most notably a bison which could provide as much as one thousand kilograms. The other mammal species would add variety, but only a small portion of the diet. Fish and shellfish also appear to be a significant component of the diet. It is very difficult to archaeologically assess the plant component. The only indicators are those obtained through residue analysis which suggests a combination of active harvesting and use of stored previously obtained foods. Two cultigens were observed in the residue—corn (*Zea mays*) and beans (*Phaseolus* sp.). It is not discernible whether the occupants of the site practiced horticulture or whether these foodstuffs were imported through trade although the identification of fragments of a scapula hoe and a squash knife suggest the establishment of seasonal gardens.

It appears that the duration of the campsite was of moderate length. This is borne out by the number of broken, discarded, and lost tools as well as the manufacture of replacement implements. A large quantity of lithic tools—hunting, hide preparation, and cutting—were recovered from Level 1. A considerable number of bone tools, primarily awls and spatulas, were also curated. In addition, decorative items, shell beads, and a rare shell tool were recovered.

The overall picture is that of a self-sufficient, well-adapted group of people, who were familiar with the area, camping near The Forks as part of their seasonal round. The probable rationale for this campsite was to obtain fish resources which would be dried or smoked to preserve for the winter season. In addition, surplus mammal meat could be dried for preservation.

5.0 LEVEL 2

5.1 Introduction

Level 2 was encountered in every unit that was opened (Figure 5.1-1). It occurred throughout the block area on the south, the isolated units in the north, the exploratory trench at the north edge, and the expanded elevator shaft area in the east. The layer ranged from very sparse to quite dense.

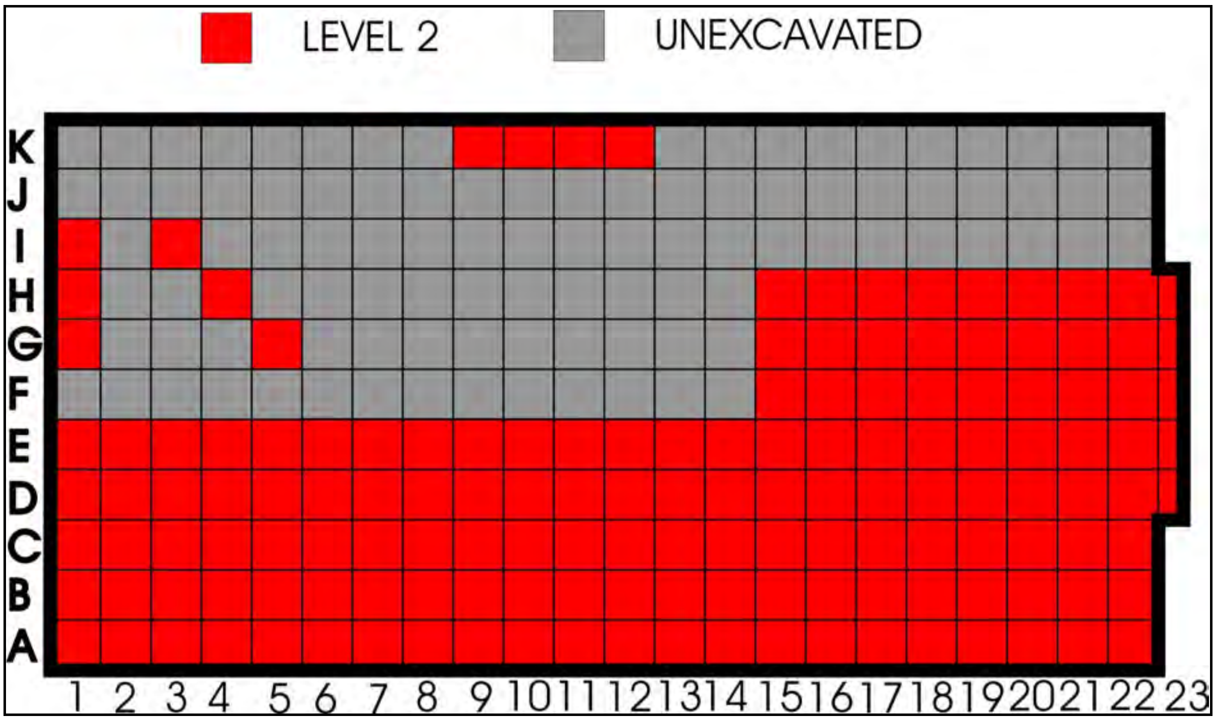


Figure 5.1-1: Map Showing Presence of Level 2

5.2 Features

5.2.1 Hearths

The primary feature that was recorded during the excavations was that of hearths (Figure 5.2-1). There are twenty hearths identified for Level 2. Several approach one square metre in size. Some, being on the periphery of the excavation area, could not be determined. The density of hearths in the western portion of the area could be the result of collapsed stratigraphy as discussed in Chapter 2. Alternatively, this could have been a generalized food processing and preparation area and fires were established as needed. Some hearths were shallow indicating a single usage while others had a considerable build-up of ash (Plate 5.2-1).

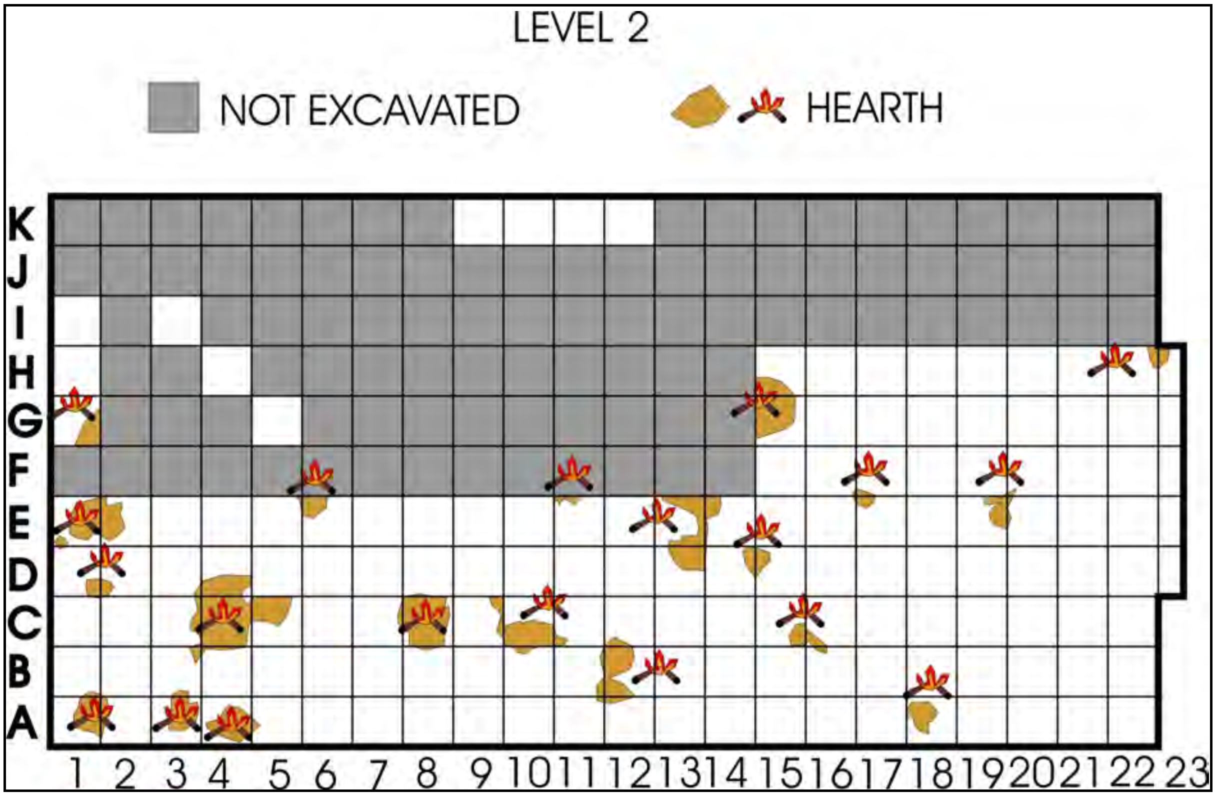


Figure 5.2-1: Distribution of Hearths in Level 2

Plate 5.2-1: Cross-section of Hearth

5.2.2 Footprint

A second footprint was excavated by Sara Halwas in Unit G20. This impression was made when a person stepped onto wet soil while walking across the occupation area. In contrast with the footprint recovered from Level 1, this impression was much more amorphous as the person, walking southeast, stepped on a mat of discarded fish scales (Plate 5.2-2). Again, no toe impressions were present, suggesting that the foot was moccasin-clad. As was the case in Level 1, a plaster-of-paris cast was made of the footprint impression (Plate 5.2-3).

Plate 5.2-2: Pedestalled Footprint From Level 2

Plate 5.2-3: Cast of Level 2 Footprint with Fish Scale Adhering

5.3 Ceramic Artifacts

5.3.1 Level 2 Complex- Preamble

Due to the complications in interpreting the group of levels included in the Level 2 Complex, a preamble was deemed necessary to attempt to clarify the issues faced in the interpretation of the ceramic recoveries. Despite best efforts in the field to delineate each level consistently (following the natural stratigraphy), the chaotic taphonomic influences of water flowing on slopes and burrowing rodents, among other things, none of which are constrained by buried cultural horizons, created many challenges for later interpretation. As a result of the magnitude of dynamic non-linear influences, the locations of the archaeological material did not necessarily correspond to the excavators' best efforts to define cultural horizons. The analysis of the ceramics highlighted the difficulties that were faced in the field and certainly raised more questions. The following outlines some of the issues.

5.3.1.1 Depositional Issues - Occupational Horizon versus Level

The data revealing a change in preference from sprang to textile impressed in the surface treatment table for the Level 2 Complex (Table 13.5-4) illustrate a trend that is linked progressively from Level 3 below to Level 1 above. If this apparent progression is considered to be a true reflection of events, then the five levels of the Level 2 Complex could very well be temporally and socially distinct occupations. However, the diminishing quantities of ceramics from Level 2 to Level 2D as it relates to site topography, and the vertical distribution of individual vessels across stratigraphic boundaries discovered during the analysis, might suggest that the Level 2 Complex actually represents fewer occupations, with some of the artifactual materials being redeposited by erosion influences and displaced by animal and human actions.

There are two depositional scenarios which have completely different connotations for the interpretation of the ceramic sequence during the period of Level 2 occupations and, therefore, also the larger area encompassed by the Canadian Museum for Human Rights site.

The single occupation scenario could be described by intermittent sediment deposition occurring during occupation, primarily below the slope on the eastern end of the excavation area. This sediment is proposed to have been laid down by temporary ponding, the source of the water can be interpreted as the ebb and flow of high water on the Red River or run-off coming in from the northwest (as suggested by the topography), or both. The occupational debris laid down in and on top of these sedimentary events could have been washed down the slope(s) from the main occupation area(s) above (generally west) by rain events.

To illustrate this scenario further, the sites occupants camped on the area above the slope (west end of the excavation area). The area to the east may have been wet on their arrival, but eventually temporary utilization of this area resulted in limited deposits accruing as the water receded. The water returned, either from rain and run-off, or the rising river, or both. Some materials were washed down and some, perhaps, tossed in. The water receded and the area was then utilized again. Further cultural deposition and the potential for human and animal traffic compressing and displacing some material prior to the sediments drying completely add to the record. This process may have occurred several times. Then, the post-depositional effects of further run-off and rodent burrowing, after the site is abandoned, could conceivably largely explicate all the problems encountered.

In the second scenario, a sequence of multiple occupations, which also likely included the ponding mechanism as a depositional influence, created the identified levels. But in this version of events, the deposition may have been seasonal, occurring over successive years. As seen in the level and recovery density maps, these horizons varied in extent and density. The physical extent of occupational presence appears to progress westward in successive occupations but generally stays below the slope. This suggests that the ponding area below the slope was drying before people returned. The centre of each of these occupations appears to shift, with only peripheral presence in the excavation area. The primary occupational area may have been to the northeast of the ponding area. The general assumption, due to the typical scatter pattern of the vessels (southwest to northeast), the topography, and the apparent easterly shift of the lower levels, is that the primary occupation area was west of the slope. But it is also likely that there may have been another to the northeast that may have provided some of the occupational debris recovered from the "ponding area". Eventually, by the Level 2 occupation, the last in the sequence, the people were occupying the area above the slope with the periphery of that occupation descending this slope into the ponding area.

Both of these scenarios seem reasonable. However, the presence of many cross-over vessels is explained more convincingly with the first scenario. Vertical separation, as mentioned earlier, is problematic, especially upward displacement. The general tendency, it appears, is for smaller sherds to be more easily transported upward by rodents and logical inference suggests that larger sherds tend to move downward when soil is disturbed. These simple mechanisms would easily explain minor displacements of a few centimetres for the larger sherds. The smaller sherds can move much greater distances, as was shown by a small rim sherd from a Level 1 vessel recovered in Level 2 and one from a Level 3 vessel also recovered in Level 2. If a larger animal were doing the burrowing, physical displacement would obviously be more dramatic. Given the stratigraphy displayed in the Level 2 Complex, especially on the area above the slope, 1-2 cm could make a tremendous difference. Yet, identified vessel separation on the upper level is minimal. Vertical separation is most evident in vessels that have fragments recovered above and below the slope. In these cases, the sherds found below the slope are always lower, sometimes two or more levels below where the material was identified above the slope. This could be due to the difficulties in defining the very thin levels above the slope where the layers were likely physically compacted and where there was significantly less sediment deposition and likely more surface erosion. An alternate scenario would require a mechanism that would enable large scale upward and lateral displacement to achieve what is seen in the vessel distribution. How would the majority portion of a vessel originating on Level 2C find its way to Level 2? Cryoturbation, or the mobilization of solid objects in disturbed soil during repeated freeze/thaw cycles, may account for some of the vertical movement but not the lateral relocation.

Of the five horizons identified in the Level 2 Complex, the lower two are not particularly convincing campsites from the point of view of the ceramic recoveries alone. Level 2C had a single vessel identified as originating there, but this vessel is represented by only one sherd from Unit G5. Level 2D had zero vessels identified. These two levels combined only account for 5.0% of the total ceramic recoveries from the Level 2 Complex. The overall ceramic quantities and the number of defined vessels attributed to each layer increased in successive levels. Meaning the lowest and earliest level, Level 2D, contained the least (0.7%) and the highest and latest level, Level 2, contained the most (53.1%). This gradation seems likely to be an artifact of the taphonomy, but the exact mechanics of how these stratigraphic separations developed has confounded concise interpretation.

5.3.1.2 The Vessels as They Relate to Deposition

Identifying fragments of a single vessel from the surface scatter of a large campsite can allow more than insight into the vessel itself. In sites that are poorly stratified, the fragments can provide reference points to help identify a particular horizon. In the horizons identified in the field as sub-levels of Level 2, it was hoped that vessel identification would do the same. This series of deposits are stratified, but inconsistent. The Level 2 Complex formation also has depositional influences related to topography. The site is divided by a slope to the east, toward the Red River. This slope, though small, would have impacted the users of the site but also would influence water flow. Water is the primary source of sediment deposition and erosion. The deposition of sediments is generally easily read in the stratigraphy of an overland flood zone. Removal is a more complicated function to interpret. Rising and falling water levels would cause inflow and outflow or both could occur at the same time, depending on surface contours. By adding less subtle elevation changes and the possibility of secondary flow or even tertiary flows which could influence deposition, the result becomes highly dynamic. This seems to be the nature of the conditions which transpired during the deposition of the cultural material identified as the Level 2 Complex. In a highly dynamic depositional environment influenced by water, artifacts become particles like any other and they are subject to the same conditions. Add to this, post-depositional rodent burrowing, human and animal foot traffic, and flood-born ice, and you have a recipe for chaos, at least for the archaeologist. The meeting of terrestrial and aquatic influences is illustrated in the stratigraphy of the Level 2 Complex. The identification of vessels in this environment was considered to be an opportunity for guidance.

Unfortunately, the ceramic recoveries from these levels further highlighted the complicated and confusing depositional circumstances. In many cases, fragments of individual vessels were found crossing level boundaries. Some of these vessels were found in 3, 4, or even 5 different levels, represented by several sherds on each layer. Just what caused certain vessels to become split vertically and others not remains elusive. With so many potential influences in play, sequencing the events that affect the stratigraphic relocation of sherds and other objects is difficult to envision. No satisfactory answer has emerged.

One unit in particular illustrates the complex deposition and post-depositional effects. In Unit A14, two refitting rim sherds were exposed centimetres apart. One was revealed to be sitting in an otherwise sterile layer between two occupational horizons with no evidence of rodent burrowing near the sherd. This sterile layer had varied thicknesses throughout the unit, but was also entirely absent in patches. The other sherd was sitting upon an occupational horizon, which on the whole was directly below this sterile layer, and the two pieces were less than a centimetre apart in depth. The sherd in the sterile layer was either raised from the occupational layer below and suspended in the sterile silty-clay or the other was deposited cleanly on the occupational level below with little or no damage to the surface and without sediment remaining beneath it. The former seems the only possible answer that does not include magic. The first scenario affords this interpretation; the suspended sherd was lifted in a fluid sediment caused by run-off. This liquid was fluid enough to flow quickly and erode surface and shallow sub-surface deposits. This may have occurred via a ponding mechanism, where the sediment laden run-off or flood waters were temporarily slowed by an obstruction, causing the suspended sediments to deposit quickly. The water is then released as the retention is eased or the obstruction removed. These kinds of events were significant enough to move and cover artifacts, yet apparently not significant enough to force people to abandon occupation of this location as it appears cultural deposition then resumes.

Thirty-four of the 49 vessels recovered from the Level 2 Complex are represented by only one or two sherds. These vessels escape stratigraphic confusion because their limited numbers can not illustrate scatter. Of the vessels represented by three or more sherds (17), eleven are cross-over vessels. Most of the recoveries from the west end, or above the slope, are well contained within one level, with an occasional displaced sherd. Those displaced sherds (often singular) were commonly recovered from the area east of the slope. In the east end, on and below the slope, vertical separation appears to occur more readily (east of the 11 line, on the south wall, and toward the E line to the north). In this case, the stratigraphy and taphonomy combined to create a scenario where the distribution of a single vessel actually helped confuse instead of helping to define levels.

The problem became a matter of which level to choose as the level of origin for the cross-over vessels. For this report, cross-over vessels were committed to the level from which they were recovered in proportional majority. Essentially, each vessel's sherds had to be evaluated for the likelihood of being located on their original surface. It was observed during the excavations that small sherds were most likely to have been moved (in almost any direction) and larger sherds were deemed to be more likely to remain in their original positions. When disturbed, by a rodent for example, the larger sherds would most likely drop as opposed to being carried vertically. These, admittedly, are generalizations, but since analysis time was limited it was decided that this generalization would be ascribed to and evaluated in relation to the proportional distribution of identified vessel sherds. So quantity and size were compared to judge the likeliest level of origin for each cross-over vessel. Only four vessels were left unassigned to a particular level. Level 2 had a count of 27 vessels, Level 2A had 12 identified vessels, Level 2B had five, Level 2C had a single vessel, and Level 2D had none. These are reviewed in the discussions of each level.

Of the four vessels which could not be committed to a particular horizon due to their even distribution, three, Vessels 35, 45, and 62, were excavated from three or more levels and are represented by 17 or more sherds. Vessel 60 is represented by only six sherds. They also happen to be found on multiple levels in a particular area of the site. These four vessels are distributed vertically in rows E and F, 15 to 17 East. This corresponds with a depression centred in the area surrounding Units D15 to E16. This feature, as mentioned in the stratigraphy section (Chapter 2), was significant and represents a major disturbance. It could be described as scorping caused by rapid and focussed flow of water. Or it could result from a tree fall, the displaced root ball creating a depression, subsequently filling in with flood or run-off from the campsite and surrounding area. On the E line, two units were excavated with dramatic declinations to the south (one to the southwest and one to the southeast), likely caused by continuous focussed erosion. This type of rapid moving flow was easily strong enough to carry and displace ceramics. It may have been a single moderate volume flow event caused by sudden run-off.

If viewed this way, the flow direction appears to follow the slope, NW to SE. No clear channel was defined in the excavation, possibly because the flow may have been carrying a fairly high density of soil and quickly filled with alluvial material once the waters flow rate decreased. Due to time and fiscal constraints, the crew was unable to pursue resolving this feature and the further vexing issues of secondary or tertiary flow directions and sources. Level 3, in the east end of the site, was not excavated because it went beyond the depth limits of the proposed impact at the time, so nothing could be elucidated from the levels below the Level 2 Complex.

5.3.1.3 Surface Treatment as it Relates to Deposition

The surface treatment analysis created figures revealing a flip-flop in presence of sprang versus textile impressed. The Level 2 Complex horizon materials, at first glance, appear to illustrate a progressive transition between Level 3 and Level 1. This progression, spread out through the figures of Level 2D to Level 2, probably should be viewed as an imperfect representation because of the significant difference in the quantities of materials recovered. The percentages are true to the ceramics recovered and are based on weight, but sample size from each level is not equal. The smaller the sample size, the less likely the sample has a fully representative mixture. Level 2D accounted for only 0.7% of total recoveries from the Level 2 Complex while Level 2 accounted for 53.1%. As Level 2C, Level 2B, and Level 2A provided 4.2%, 19.1%, and 22.7% respectively, this may represent a skewed picture. But when the figures are totalled and reviewed, sandwiched between those of Level 3 and Level 1, a progressive inversion is still seen. This seems to confirm that the period represented by these occupational layers occurred during a change in approach to the manufacture of ceramics and also the textiles that relate to the production of ceramics.

As mentioned with the identified vessel fragments, the body sherds will likely be mixed and displaced horizontally and vertically as well. This will no doubt be a hindrance to reconstruction efforts. Reconstructions would best be initiated by beginning with well contained ceramic concentrations.

5.3.2 Artifact Distribution

Of the five layers excavated in the Level 2 Complex, Level 2 was the most significant in terms of area and ceramic quantity. A total of 2487 sherds/sherdlets with a weight of 6624.4 grams were recovered from this level. There were no ceramic recoveries in 25 of the 149 units excavated.

Level 2 recoveries account for 53.1% of the Level 2 Complex materials, based on weight. Most of these were in the eastern end of the excavation area, from the 14 East line to the 23 East line (Figure 5.3-1). The highest ceramic density was recorded in Unit E16, 530.1 grams for 131 sherds. Unit E16 and Unit E15 are also prominent in Levels 2A and 2B with large weight totals.

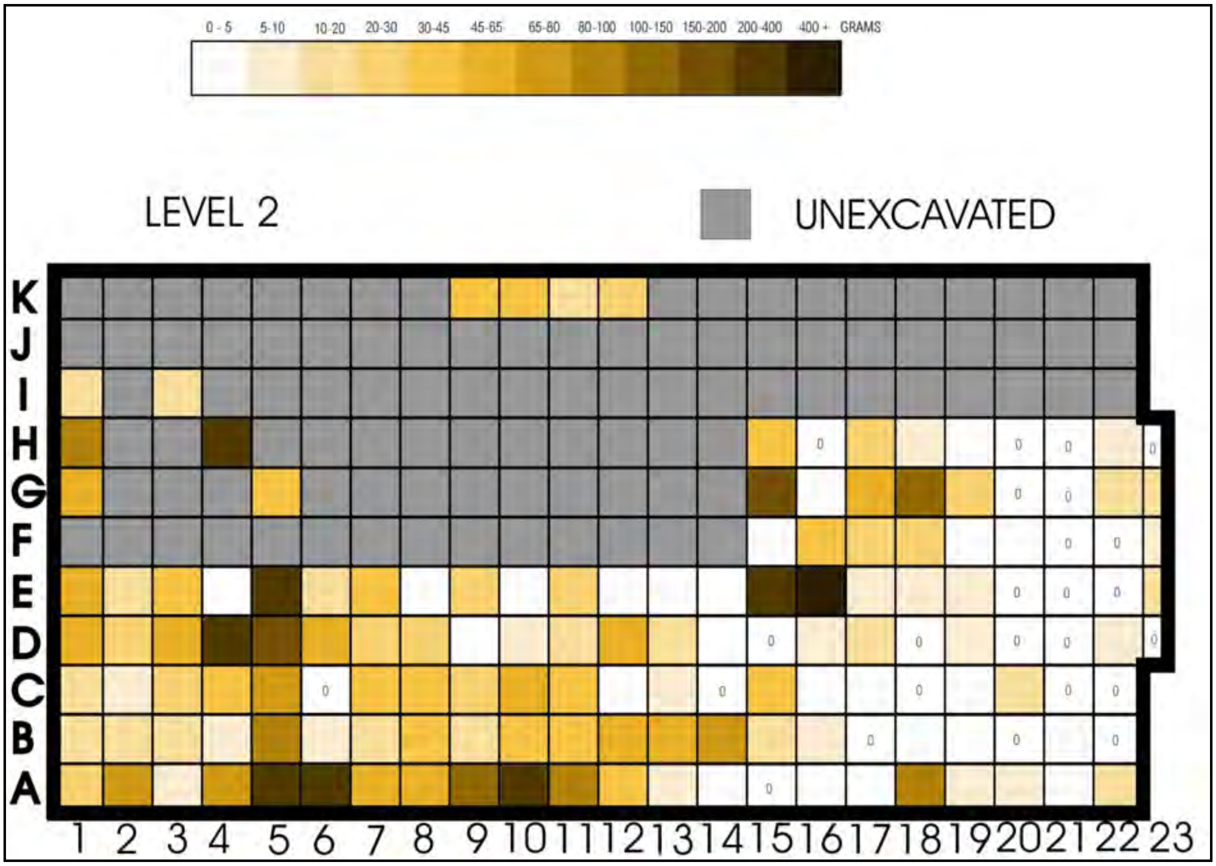


Figure 5.3-1: Distribution of Ceramic Recoveries from Level 2

Unlike Level 1, Level 2 distributional patterning isn't as clear, with no obvious areas of density and absence (Figure 5.3-1). But, as in Level 1, the deposition of ceramics appears to reflect surface contours. The slope seems to divide the area. The upper section, or the west end of the excavation on the whole, has a relatively even density. The east end, below the slope, has markedly less material scattered across the surface.

In the west half, three densities are apparent in the main excavation area, and possibly another one on the G and H-lines. Two are visible on the A-line. One, between Units A4 and A6, had Vessels 6, 7, and 8 identified. The other, between Units A9 and A11, contained Vessels 34 and 36. The third, centred on Unit D4 to Unit E5, had only Vessel 10. Outside the main block on the G and H-lines, there is a high density deposit from which Vessels 34, 76, and 77 were identified. As much of this area was not excavated, it is unknown if this apparent density merges with that on the D and E-line.

The ceramics in the east half of the excavation area were sparsely scattered, except for an area in the northwestern portion of the elevator shaft mitigation section, with the greatest emphasis in Unit E15 and Unit E16. This location has the highest density of ceramics recorded for this level and is relevant on all 5 horizons of the Level 2 Complex.

As mentioned, cross-over vessels are common. From Level 2, three particular cross-over vessels illustrate the scatter tendency for vessels found primarily on Level 2. Vessel 6 is unique in that, on Level 2, it was recovered from six different units in the southwest corner. Then it was recovered again on Level 2A, eleven metres to the east below the slope, then again another metre further east on Level 2C. Vessel 32 was recovered from Units A7 and A8 on Level 2, then Unit B11 on Level 2A and finally Unit H18 on Level 2B. Vessel 34 was first recovered from Units A9, A10, and C10 and more distantly in Unit H15. All three of these vessels illustrate a west to east distribution. Vessels 32 and 34 show a similar distribution axis which runs southwest to northeast. Vessel 6 is more or less straight west to east. The direction of west to east is the only logical option. For vessel fragments to move east to west, they would have to move uphill and through successive occupations.

5.3.3 Artifact Recoveries

The recoveries consist of 305 rim sherds/sherdlets, 2182 body sherds/sherdlets, and six non-vessel ceramics.

5.3.3.1 Identified Vessels

Twenty-seven vessels were identified on Level 2 (Figure 5.3-2). Other vessels, originating in lower levels, are also portrayed on the distributional map.

Four were not able to be committed to a particular level and another was recovered from outside the excavation area , Vessel 61 in the SW sump pit. This vessel cannot be physically tied to materials recovered from the excavated area. These five vessels (Vessel 35, 45, 60 , 61, and 62) will be described first, followed by the remaining vessels identified within the Level 2 occupation horizon.

Vessel 35

Identified as a Kroker Mid-neck vessel of the Rainy River Composite, it exhibits a neck which is tall and fairly thin with a slight outward flare. It also exhibits the pseudo-chevron motif, but is not committed to that type because the fundamental form and decorative structure of the Kroker Mid-neck (a Coalescent type in Level 3) were deemed to trump the single decorative motif of the pseudo-chevron which appears to be a later adaptation shared on many vessel forms. This vessel was recovered from Units A9, D9, E9, E12, and E16 in Level 2 and E13 in Level 2A.

Vessel 45

This vessel shows the interesting combination of combing, incipient S-neck profile, and the pseudo-chevron motif with punctates and bosses. This pot could be held as an example of cross pollination of traits which typify this assemblage. Sherds from this vessel were widely displaced and occurred in Units C11, D12, D17, and E12 in Level 2, Units A14, D15, and G17 in Level 2A, Units A14 and E14 in Level 2B, and Unit F17 in Level 2C.

Vessel 60 and 62

These two pots are described together because they are nearly identical and were recovered in the same units except for a few sherds. Vessel 60 is found in Unit C15 in Level 2, Unit E15 in Level 2B, Unit F16 in Level 2C, and Unit F17 in Level 2D. Vessel 62 occurred in Units E16 and E17 in Level 2A, Unit E15 in Level 2B, and Unit F16 in Level 2C. It is possible that the same decorating tool was used on both as well. One vessel was quite a bit smaller however. There is a slight possibility that these two could actually be the same vessel but this could only be determined by reconstruction efforts. If they are in fact the same pot, it would have been seriously asymmetrical. This seems unlikely in the light of the apparent care and quality exemplified by this maker's work. They are named as a new type to indicate their distinctiveness, Rainy River Willow.

Vessel 61

This vessel was recovered during the digging of the Southwest sump pit, after the excavation had begun. It is not physically connected to the excavated materials and thus its provenience is uncertain. The vessel does have particular traits which suggest that its stratigraphic origins were probably equivalent to the lower levels of the Level 2 Complex. It has been identified in the context of the materials recovered from the excavation and is considered a Coalescent variety of the Rainy River Pseudo-chevron type.

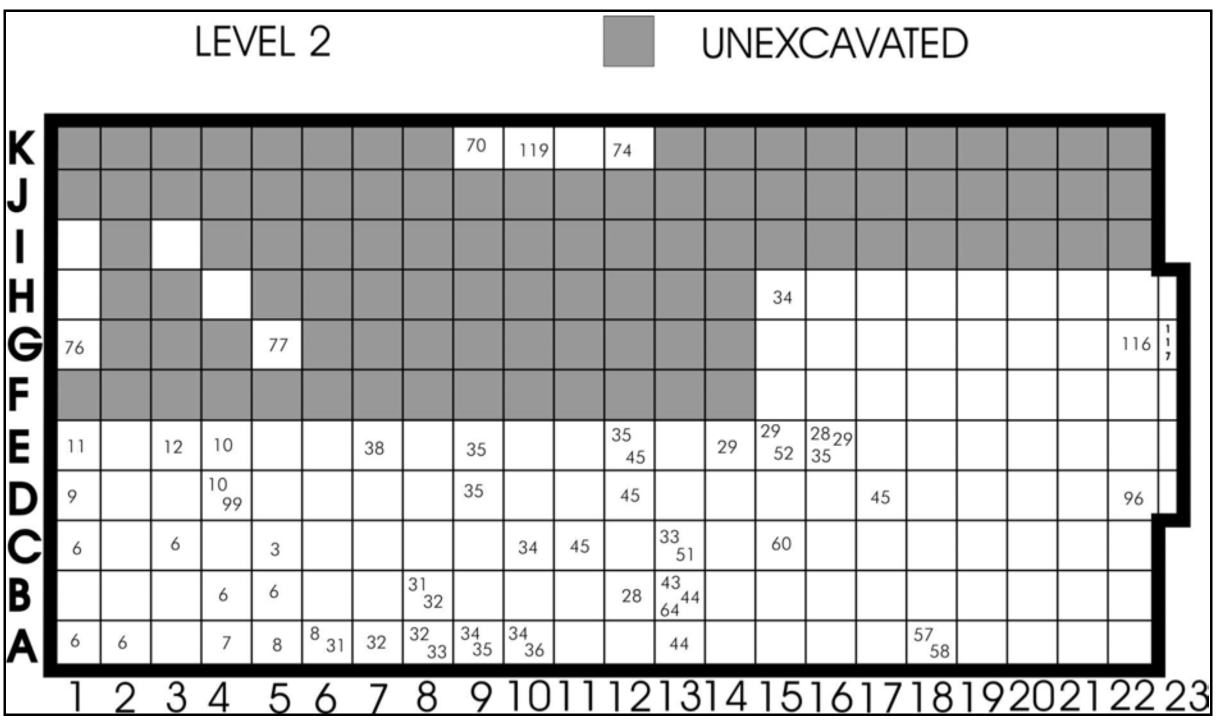


Figure 5.3-2: Distribution of Identified Ceramic Vessels

The following vessels are identified from recoveries from Level 2.

Vessel 6

A steeply sloping shoulder, undefined neck juncture, and punctates push this Rainy River Pseudo-chevron vessel into the Coalescent phase. It shares characteristics with many vessels in Level 3, but the pseudo-chevron, as is typical for the Level 2 Complex, is well defined and prominent. This vessel was recovered from Units A1, A2, B4, B5, C1, and C3 in Level 2, Units A16 and B16 in Level 2A, and in Unit B17 in Level 2C.

Vessel 7

Rainy River Plain vessels show a disconnection from the pseudo-chevron style by deliberately not producing that motif while retaining the same elements of a row of stamps directly below the oblique CWOI. This vessel, in particular, has a vertical, straight neck which is smoothed down to the neck juncture. The decoration descends to the mid neck leaving a distinctive, proportionally equal, delineation. This vessel was found in Unit A4.

Vessel 8

This vessel, recovered from Units A5 and A6, has a combination of traits which suggest a strong affinity with Duck Bay ceramics. The neck is decorated only with three rows of vertically oriented linear to crescentic stamps and the rim is decorated with criss-crossing CWOI. The neck profile is straight with an outward lean. This pot has an angular quality, which also is suggestive of Duck Bay. The stamp size and rim motif are uncharacteristic though and so this vessel will be labelled as only Duck Bay-like. Like many in this assemblage, this vessel raises several questions regarding relationships between the known and the undefined types of the Rainy River Composite.

Vessel 9

This pot is unlike any others in this collection. Although the single sherd, located in Unit D2, identifying this vessel is quite small, it does suggest a vessel form that had little or no neck. It appears that the slope of the shoulder merges toward the rim very high on the pot. It is undecorated, but there are two small marks at the broken edge, the lowest margin, which might be interpreted as intentional trailed elements. This cannot be confirmed or denied.

Vessel 10

The Little Owl type vessels are decorated with small scale motifs. The vessels themselves also have a slight stature. Vessel 10 is one of these. Its distinctive features include a chevron created with small asymmetrical stamps below the horizontal CWOI. It is the reverse direction of the chevron above the horizontal CWOI, a position typical of the chevron on this type. This vessel was recovered from Units D4 and E4.

Vessel 11

This vessel was located in Unit E1. The exterior vessel wall below the shoulder junction appears to be vertical and vertical cord marked. It may be related to the Mortlach traditions of the central northern Plains/Parkland boundary. What can be said definitively is that this is not a Rainy River vessel form as currently understood.

Vessel 12

Recovered from Unit E3, this is a distinct pot in the assemblage with several characters which are unique. This vessel has wide, flat CWOI applied parallel to the rim, a set of at least five stamps at the mid-neck on the horizontal CWOI, and what appears to be a laminated neck. A second layer of clay has been added to the exterior to build thickness. With the chevron motif and decorative structure most similar to the Little Owl type, pointing to a possible relationship, the question arises whether the Little Owl type had a larger vessel in its repertoire. This is a question that has no answer at this point and so it has not been identified as that type.

Vessel 28

There are some Bird Lake traits and others that are not creating an identification dilemma for this vessel. It is being identified as Bird Lake-like for this reason. It is the only vessel to have a chevron motif impressed on the rim. To add to the complications, this vessel was recovered from Units B12 and E16 in Level 2, Unit C12 in Level 2B, and Unit C12 in Level 2C.

Vessel 29

Vessel 29 is a comparatively large utilitarian pot, which appears to have been produced expediently. The rim is rounded and the oblique CWOI, above the horizontal CWOI, are short and appear almost as stamps, quite deep. It occurred in Units E14, E15, and E16 in Level 2 and Unit E15 in Level 2B.

Vessel 31

This vessel, identified from sherds recovered from Units A6 and B8, is part of a trend identified in Level 3 with Vessel 94 and Vessel 113. The primary characteristic is the rather definitive approach to the application of the CWO decoration. The deep impressions are close together and are applied in a very controlled manner. Vessel 94 and Vessel 113 are being considered close to Blackduck, one of the Rainy River Coalescent lineages. Vessel 31, although maintaining the decorative approach no longer, has the Blackduck-like neck profile with the rim decoration being a complete departure, thin crescentic stamps applied almost perpendicular to the rim (possibly finger or thumbnail impressions). The neck is also very thick and slightly contracting at the rim. In this way it is similar to Vessel 12. It also shares aberrant decoration on the rim. No sherds have been identified from below the horizontal CWOI of this pot. Because the profile and extent of decoration are not fully understood, it will remain an undefined Rainy River Composite vessel.

Vessel 32

Vessel 32, from Units A7, A8 and B9, and Vessel 46 (from Level 2B) are the only two vessels which have horizontal CWO stamping below the upper oblique CWOI (Vessel 78, from Level 2B, has horizontal stamps but not CWO stamps). Vessel 32 and Vessel 46 were segregated based on the lower row of stamps and a few other minute differences (for description see Vessel 46 in Level 2B). On Vessel 46, these stamps are impressed with the tool held at an angle, while on Vessel 32 they are impressed directly at roughly perpendicular to the surface. It is possible that they could be the same vessel. Perhaps reconstruction efforts could give a definitive answer. Vessel 32 and Vessel 46 are likely part of the diffusion of the Coalescent types which adopted the pseudo-chevron motif. With the absence of combing and punctates this vessel falls into the Rainy River Composite as Undefined.

Vessel 33

This vessel, from Units A8 and C13, represents one of the identified threads isolated from the assemblage. The type name of Little Owl has been adopted for this report. Along with Vessel 10 from this level and Vessel 37 from Level 2A, they are the only pots of this type in the Level 2 Complex. This type continues from Level 3 and also appears as late as Level 1. The chevron on the upper neck, of Vessel 33, above the horizontals is not quite symmetrical but the lower impression is a linear stamp, unlike the pseudo-chevron variety where the lower impression is usually an ovoid or a CWO stamp. The precise and even approach covers the entire neck. On this vessel, there is a second row of vertically oriented stamps below the neck juncture. Vessel 33, like the others of this type, has even thickness through the neck and the stance of the neck is angled outward slightly. The profile would be described as incipient S, with an outward lean. Since this type appears in all levels, allocation to either Rainy River Coalescent or Composite is troublesome. That's why the name chosen to refer to it is not a simple addition of a suffix to Rainy River.

Vessel 34

This vessel was recovered from Units A9, A10, C10, and H15. Lenius and Olinyk (1991:100) isolate the paired (or sets of) stamps in the punctate position of the neck as one of the traits to be found in their list of suspected additional Rainy River Composite Complexes. This vessel has this motif. The form of this pot would likely place it in the realm of the Bird Lake Complex, as would the liberal use of stamping. Vessel 34, like Vessel 28, has suggestions of Bird Lake, but specific traits exclude it from the current definition. Another similarity with Vessel 28 is two rows of stamps below the oblique element, above the horizontal CWOI. On Vessel 34, these two rows are different impressions while on Vessel 28 they are the same. The upper row is made of small ovoid to crescentic stamps, the lower row is vertically oriented linear stamps. This approach does not create a pseudo-chevron which places it with a small and diverse group of atypical vessels from the Level 2 Complex. Vessel 2 of Level 1 shares neck profile and general decorative appearance with Vessel 34. One very distinct attribute for Vessel 34 is the trailed design which extends from the base of the neck, over the shoulder, and onto the body portion of the pot. This motif has not been completely revealed by analyzing the refitted sherds, but enough of the design is present to illustrate the general shape of the design. It appears to be made up of an expanding triangular or delta form emanating from the base of the neck and defined by multiple lines. The details of this form are not decipherable with any confidence. This basic form could be considered similar to Thunderbird tail motifs or possibly even star motifs, both of which have cultural connotations which will not be addressed in this report. The other aspect of the design is what appears to be a series of horizontal infill lines presumably between the delta forms. It is assumed that these two design forms repeat to create a pattern. Shoulder decoration is considered to be a Rainy River Composite trait when executed using stamps, but trailed rectilinear motifs are not. These suggestions of affiliation implied by comparing decorative motifs from elsewhere must be accepted as suggestions at this point. Obviously further work is required to establish a better understanding of what this vessel means to the social/political world from which it came. At this point, Vessel 34 will be considered a Rainy River Composite vessel.

Vessel 36

This vessel was found in Unit A10. This narrow rimmed vessel was identified by a single small sherdlet. Not enough remains to be identified beyond the general categorization of Rainy River.

Vessel 38

This vessel occurred in Unit E7. Vessels 12, 31, and 38 have similar rim treatment, where the distance lip to lip is less than the upper neck thickness. These three vessels as well as Vessel 57 and Vessel 58 (from Unit A18) share a form trait. When viewed in profile, the line of the exterior neck is convex, or appears to bow outward, and except for Vessel 58, the interior does not tend to be straight from the neck juncture up to the rim. Vessel 58 has a concave interior line. Vessels 12, 31, and 38 also share thinning toward the neck juncture and unusual stamped rim decoration. This thickening of the mid-neck would have no appreciable structural value and is thus considered as a trait intended to create a distinctive appearance. Vessel 31 and Vessel 38 have the same dense, deep and controlled approach to the application of the decorative elements. The oblique ovoid stamps below the oblique CWOI are angled in the same direction as the CWOI, defying the pseudo-chevron norm for the Level 2 Complex. Ignoring the pseudo-chevron is seen on Vessel 7 and Vessel 117. Vessel 38 has something else in common with those vessels, that is the oblique direction carrying over from the upper neck to the rim, or vice versa. This is another very uncommon trait. Whether these vessels are all somehow connected by more than these traits is impossible to know at this point. The punctates on Vessel 38 are small and, despite being impressed quite deeply, bossing is subtle.

Vessel 43

This vessel was recovered from Unit B13. This pot is considered to have originated in Level 2B where it is described.

Vessel 44

This vessel, from Units A13 and B13, is represented by small rim, upper neck sherdlets which are physically degraded. It is identified as Rainy River, but no further distinction could be made.

Vessel 51

This vessel derives from Unit C13. This vessel is designated as originating in Level 2A where it was recovered from Unit H1. It is described in that chapter.

Vessel 52

This vessel, which occurred in Unit E15, is part of a unique group of four pots that appear to have been made by the same person. If it weren't for the oblique stamps on this single sherd, it would have been lumped with one of the other vessels. They all share sprang impression up to the exterior lip with right oblique CWOI on the exterior upper neck and left oblique CWOI on the rim. The angles and lengths are the same, as is the profile. The stamps on Vessel 52 are left oblique and linear to slightly crescentic. The two elements do not create a convincing pseudo-chevron, there is a gap between the stamps and the CWOI above which detracts from the motif. The spacing of the stamps is a bit too wide, typically the two elements of the pseudo-chevron motif are touching and the spacing roughly coincides to create the illusion of the repeating pseudo-chevron. With the addition of the stamps, a feature that Vessels 43 (from Levels 2, 2A, and 2B), Vessel 60, and Vessel 62 do not have, Vessel 52 becomes easily absorbed into the Rainy River Composite. Since this group of vessels, Vessel 52 included, are so similar they have been isolated by being given a name, Rainy River Composite, Willow Type.

Vessel 57

This vessel was recovered from Unit A18 in Level 2, Units A19, B20, and H16 in Level 2A, and Unit B20 in Level 2B. This pot is considered to have originated in Level 2A where it is described.

Vessel 58

This vessel was also recovered from Unit A18 in Level 2. The profile of Vessel 58 has been defined as incipient S. It shares an appearance similar to other vessels described as in-curved (Vessel 38, for example), but this vessel has a very uniform neck thickness and a rounded rim. The exterior contour of the two however is quite similar, at least above the neck juncture. Vessel 58 maintains thickness into the shoulder which appears to have been well defined. The stamp row of the pseudo-chevron motif is CWO. This can be compared with the overall form with Vessel 29, which does not have the pseudo-chevron motif.

Vessel 64

Recovered from Unit B13, this variety of vessel may be the most focussed expression of the Rainy River Pseudo-chevron type which comes into fruition in the Level 2 Complex. Although the profile is incomplete and we can not tell if there might have been another row of stamping at the neck juncture or not, the pseudo-chevron is the primary motif. There is some vertical and horizontal brushing on the exterior though the vertical is not very visible and was likely not intended to be a decorative element as combing was in earlier types. The interior shows horizontal scraping at and above the neck juncture. The oblique CWOI on the rim are large and deeply impressed, with relatively wide spacing creating a nearly crinolated appearance. The cord on these impressions is obliterated by accumulated clay on the tool.

Vessel 70

This vessel was located in Unit K9. This is the only pot with a three stage alternating oblique motif, also called herring bone. This motif is included in the range of decorative variability for the Duck Bay Complex. The neck is straight with a significant outward lean and thins toward the upper neck before widening again at the rim. This is being considered a Duck Bay vessel.

Vessel 74

This is a Bird Lake vessel, found in Unit K12, in form at least but some of the decorative elements are considered by Lenius and Olinyk (1991) to be non-Bird Lake. These include the Blackduck traits of punctate/boss and combing, both of which this vessel has. Other unique elements, also not considered typical for Bird Lake, are the wide oblique CWOI on the rim and large oblique linear stamps used on the upper neck like CWOI. All in all, Vessel 74 appears to have the fundamental Bird Lake vessel neck flare, with stamps and horizontal CWOI, with the addition of remnant Blackduck traits. All these things have connotations for origins of Bird Lake. Unfortunately, the dates that we have from the Level 2 Complex are not reliable. Two proposed adjustments that attempt to account for our problem dates are illustrated in the Stratigraphy section. In the first corrected scenario, Level 2 would fall somewhere around A.D. 1220. In the second correction scenario, Level 2 would come in around A.D. 1110. Lenius and Olinyk (1991) suggest a date range of A.D. 1100 to around A.D. 1350 for the cultural peak of the Rainy River Composite Complexes, including Bird Lake and Duck Bay. That is only a 250 year window, so a difference of 110 years between our dates for Level 2 is significant. This vessel's attributes suggest an earlier date because of the lingering Blackduck influence. If the true date for Level 2 is A.D. 1220, then these Blackduck traits were retained well into the cultural peak of the Rainy River Composite. If the Level 2 date is A.D. 1110, then the Blackduck traits become more acceptable. A wrench in the works here is the general trend for Rainy River Composite materials to exhibit an increase in neck flare over time (Lenius and Olinyk 2009:pers. comm.). Vessel 74 has a very pronounced neck flare akin to late material and has interior stamping, also considered a later trait, bringing decoration back to a more visible area as the necks began to flare more and more (Lenius and Olinyk 2009:pers. comm.). If the earlier date is valid, then the pronounced neck flare was present at the beginning of the Rainy River Composite period, as were all of the other traits exhibited by this pot. Like the two identified Duck Bay vessels (Vessel 119 and Vessel 70, this vessel too comes from the K-line.

Vessel 76

This vessel is identified by a single small sherd, recovered from Unit G1. What makes it unique is the fairly wide and quite shallow CWOI, only slightly off perpendicular to the rim, and the very short oblique CWOI in the interior. The exterior CWOI are nearly vertical.

Vessel 77

Unfortunately, the neck portion of this vessel has not been identified. This vessel, located in Unit G5, has short linear stamps. At the neck juncture, they are vertically oriented and there appears to be a second row below that which is right oblique. From there, descending rows of horizontally oriented stamps extend onto the shoulder. Stamping on the shoulder is a Rainy River Composite trait. The size of these stamps fall within the range of Bird Lake.

Vessel 96

This vessel was identified from a sherd from Unit D22. This fragment is described here to highlight the presence of double rows of small stamps on the lower neck (see also Vessel 51 from Level 2A). The stamps on Vessel 96 are very similar to those on Vessel 117. At some point, reconstruction efforts may determine whether they are the same vessel or not.

Vessel 99

This vessel was recovered from Unit D4. This vessel is considered to have originated at a stratigraphically lower horizon. It was recovered from Units E6 and E8 in Level 3, where it is described, as well as Units E4 and E6 in Level 3A.

Vessel 116

Vessel 116, found in Unit G22, has an interesting set of traits which set it apart. The clay used for this pot is grainy. It appears to have very fine sand as part of the body giving it a gritty feel and appearance. This is not a temper additive as the temper is a crushed and/or crumbled granite. There also appears to be some pyrite affixed to at least one of the observable granules of temper. This would have to be confirmed through higher resolution magnification than was available during this analysis. The profile is straight to slightly flaring and angled outward. The combination of decorative motifs and their positioning would place this vessel with the Little Owl variety. It shares the symmetrical chevron above a limited number of horizontal CWOI (2-4) and a row of stamps below that. It has asymmetrical stamps high on the horizontal set in punctate position. The profile is inconsistent with the other vessels identified as this type in this assemblage. On the whole, the transferring of traits and motifs between traditions seems to be very common during this period, at least as it is seen in this assemblage. A distinctive feature of this single sherd, which represents Vessel 116, is the impact scar on the rim. The impact, which caused the notch, would have been significant and it may have been the demise of the vessel.

Vessel 117

This pot, recovered from Unit G23, and Vessel 7 are distinct from the rest, but they are not identical. Vessel 117 has punctates while Vessel 7 does not. These two vessels continue the thread of mid-neck emphasis. There is a possibility that Vessel 117 had rows of small stamps above the base of the neck (Vessel 96). This is consistent with the mid-neck emphasis thread.

Vessel 119

This vessel was recovered from Unit K10 and is the second Duck Bay vessel identified from this assemblage (Vessel 70 is the other). Both were recovered from the K-line on the northern edge of the originally proposed impact area. Vessel 119, despite the lack of an identified neck, fits the Duck Bay Stamped type. The stamps are comparatively large for this assemblage and create bossing on the interior.

5.3.3.2 Undesignated Vessels

Both Bird Lake and Duck Bay have a stamped vessel type within their identified repertoires. One trait for each is a descending decorative element, emanating from the neck region of the vessel comprised of rows of stamps in series, often found in conjunction with a horizontal element that follows the shoulder around the vessel. On Bird Lake Stamp vessels, in particular, this shoulder decoration takes on a swag-like or necklace pattern (Lenius and Olinyk 1990).

This decoration is present on Vessel 28. Two sherds, DlLg-33:08A/6162 and 6163 (Plate 5.3-1), from Unit A9, show a similar necklace pattern, but cannot be assigned to a particular vessel. The size of these stamps fall easily into the Bird Lake range. Later work may be able to connect the two through in-depth reconstruction efforts.

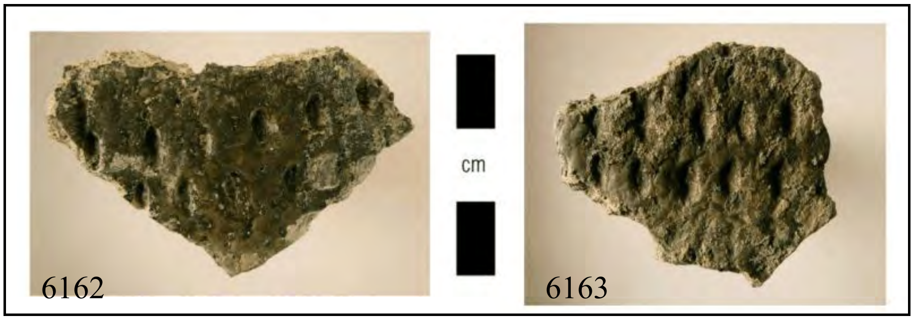


Plate 5.3-1: Shoulder Sherds Showing Necklace Pattern

5.3.3.3 Body Sherds

A total of 2182 body sherds and sherdlets were recovered from Level 2. The analysis is discussed under manufacturing characteristics.

5.3.4 Manufacturing Characteristics

Textile impressed is more common than sprang impressed in this level. This marks the decline of sprang bag techniques in the manufacture of the ceramics in this assemblage. By the time the Level 1 occupation takes place, sprang drops to a mere 8.0%. The emerging dominance of textile impressed surface finish is interpreted as a major technological shift, the significance of which we do not fully appreciate at this point. It is assumed that since a warp and weft weave lacks the flexibility of sprang weave that forming within a fabric bag was no longer done. The fabric suspension system, in a practical sense a bag held open by framework, may have sufficed without the constraining smaller vessel-size bag. The full meaning of this transition of textile is not fully understood, but it is plain that sprang was no longer the choice.

Of the sprang weave that was identified, there was a range of thickness from very thin to thick (7-8 mm). Generally, the thinner sherds are better consolidated. In some cases, the thin sherds are orange-brown and are then crumbly, softer, and exfoliating. These sherds don't seem to have residue which may be an indication of incineration or exposure to high heat for a duration period, but this is speculation. Textile impressed sherds are thicker than the others. It appears that there is an inverse relationship between thickness and quality of consolidation. Statistical analysis of the sherds by thickness and paste quality is required to confirm these observations. The colour range is orange-brown, tan, buff, grey, to grey-black.

5.3.4.1 Surface Treatment

Table 5.3-1 lists the quantities and weights of the different types of surface treatment. Textile impressed sherds accounted for 50.2% of the total recoveries by weight. Sprang weave impression was tallied at 33.1%. Obliterated textile came in at 10.5%. Two other surface treatments were identified in small quantities, vertical cord impressed at 0.7% and smooth at 0.1%. Due to exfoliation and other conditions, 5.2% were catalogued without a recorded surface treatment.

LEVEL 2	149 units	WT / grams	QTY	%
SPRANG		2196.3	691	33.2
TEXTILE IMPRESSED		3289.7	1416	49.7
OBLITERATED		700.7	174	10.6
VERTICAL CORD		44.3	5	0.7
SMOOTH		10.1	13	0.2
No Recorded Surface		383.3	188	5.8
TOTAL		6624.4	2487	100.2

Table 5.3-1: Types of Surface Treatment Recorded in Level 2

5.3.4.2 Modifications

One sherd, DlLg-33:08A/3843 from Unit D3, showed evidence of secondary modification. Identified as a textile impressed body sherd, though it could be from the shoulder region, it has been drilled from the outside (Plate 5.3-2). It is the only example of vessel drilling from any of the Level 2 Complex materials. It looks very similar to DlLg-33:08A/7978 from Level 1 and have also been used in the suspension of the vessel.

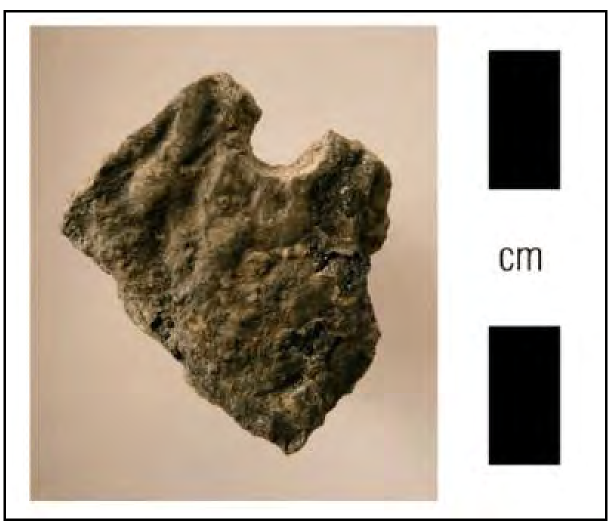


Plate 5.3-2: Drilled Sherd from Level 2

5.3.5 Residue Analysis

A rim sherd representing Vessel 116 (DlLg-33:08A/22158 from Unit G22) was submitted for analysis by Quaternary Consultants Ltd. The phytoliths indicated utilization of grass seeds, *Helianthus* (sunflower) or *Iva axillaris* (poverty weed), and *Zea mays* (maize). The FTIR analysis showed matches with *Pinus* (pine) and *Quercus* (oak) nuts, *Cleome* (beeweed) seed pods, *Helianthus* (sunflower) seeds and leaves, *Phaseolus* (beans), *Antilocapra* (pronghorn), and *Odocoileus* (deer) (Appendix B).

Parks Canada submitted DlLg-33:08A/10633, an undesignated shoulder sherd. Analysis revealed the presence of *Allium* (wild onion), *Helianthus* seeds, *Pinus* nuts, *Quercus* nuts, *Atriplex* (saltbush), *Ribes* (currant), *Zizania aquatica* (wild rice), *Phaseolus*, *Zea mays*, and duck (Appendix C).

5.3.6 Undesignated Sherd

This sherd, DlLg-33:08A/23878 from Unit D5 , remains a curiosity (Plate 5.3-3). The vessel portion is unknown, as is the vessel type. The very thin wall and the angle displayed is suggestive of the shoulder portion of a vessel. No decoration is present. It is uncertain what portion of the vessel is represented by this sherd. One surface is presumed to be the interior due to the presence of charred residue. A small amount of curvature is observable along one edge, suggesting a concave surface for the interior, but on the whole the sherd is flat. There is no discernable textile impression as the exterior surface is obliterated by brushing. One explanation could be that the vessel, while drying, was bumped or dropped thus creating a flat spot at the shoulder juncture which remained unrepaired before firing.

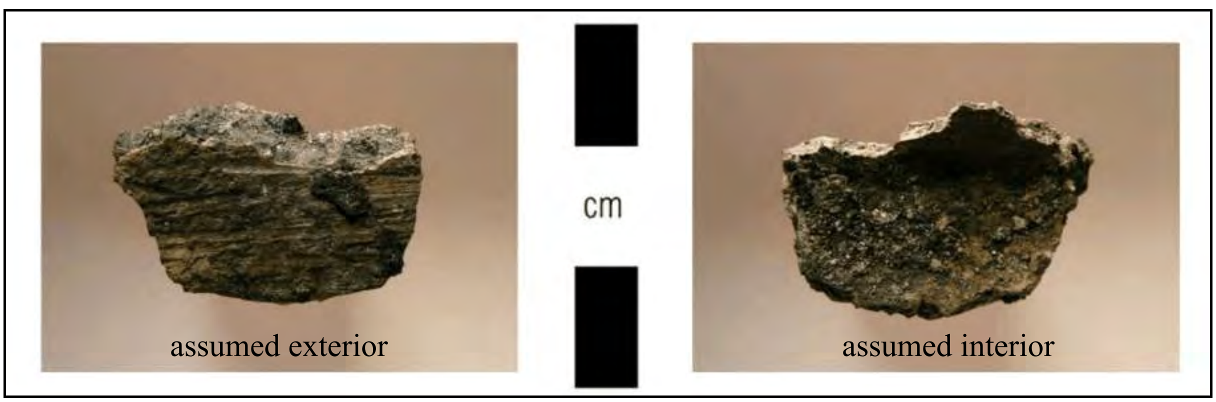


Plate 5.3-3: Portrayal of Both Sides of DlLg-33:08A/23878

5.3.7 Non-Vessel Ceramics

Six artifacts were designated as non-vessel ceramics. DlLg-33:08A/2776, from Unit A5, DlLg-33:08A/4075 and DlLg-33:08A/23881 from Unit E1, and DlLg-33:08A/23826 from Unit A1 were all designated as cast-offs. DlLg-33:08A/23826 had two items, the remainder were single objects.

5.4 Lithic Artifacts

A total of 2023 lithic artifacts were recovered from Level 2, which was encountered in all 149 excavation units.

5.4.1 Lithic Tools

The lithic tools for this level totaled 74 artifacts with a combined weight of 1766.2 grams. Seventeen different lithic tool types are represented (Table 5.4-1) with a total weight of 1766.2 grams. The different lithic materials are detailed in Table 5.4-2, while the distribution of these tools is shown on Figure 5.4-1. A retouched flake, made of Selkirk Chert, was recovered during the excavation of the Southwest Sump Pit. Stratigraphically, it is the equivalent of Level 2 but, as it was located beyond the boundary of the excavation area, it is described in this section but is not included in the level totals.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	8	10.81
Scraper	14	18.91
Spokeshave	3	4.05
Biface	8	10.81
Knife	4	5.41
Retouched Flake	12	16.22
Utilized Flake	12	16.22
Graver	2	2.70
Adze	1	1.35
Chitho	2	2.70
Chopper	1	1.35
Drill	1	1.35
Palette	2	1.35
Ochre Bowl	1	2.70
Pipe	1	1.35
Sucking Tube	1	1.35
Pecking Stone	1	1.35
TOTALS	74	99.98

Table 5.4-1: Lithic Tool Types in Level 2

The vast majority of the tools recovered in Level 2 are concentrated in the southwest corner of the site, bunching around the hearths in that general area. Excepting one projectile point in Unit K 12, all projectile points in this level's assemblage were recovered in the area around the hearths in Units E1 and C4.

LITHIC MATERIAL TYPE	QUANTITY	%
Knife River Flint	20	27.03
Chert (Undifferentiated)	14	18.92
Swan River Chert	14	18.92
Denbeigh Point Chert	5	6.76
Granite	4	5.41
Agate	3	4.05
Chalcedony	3	4.05
Quartzite	3	4.05
Limestone	2	2.70
Soapstone	2	2.70
Quartz	1	1.35
Selkirk Chert	1	1.35
Shale	1	1.35
Syenite	1	1.35
TOTALS	74	99.99

Table 5.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 2

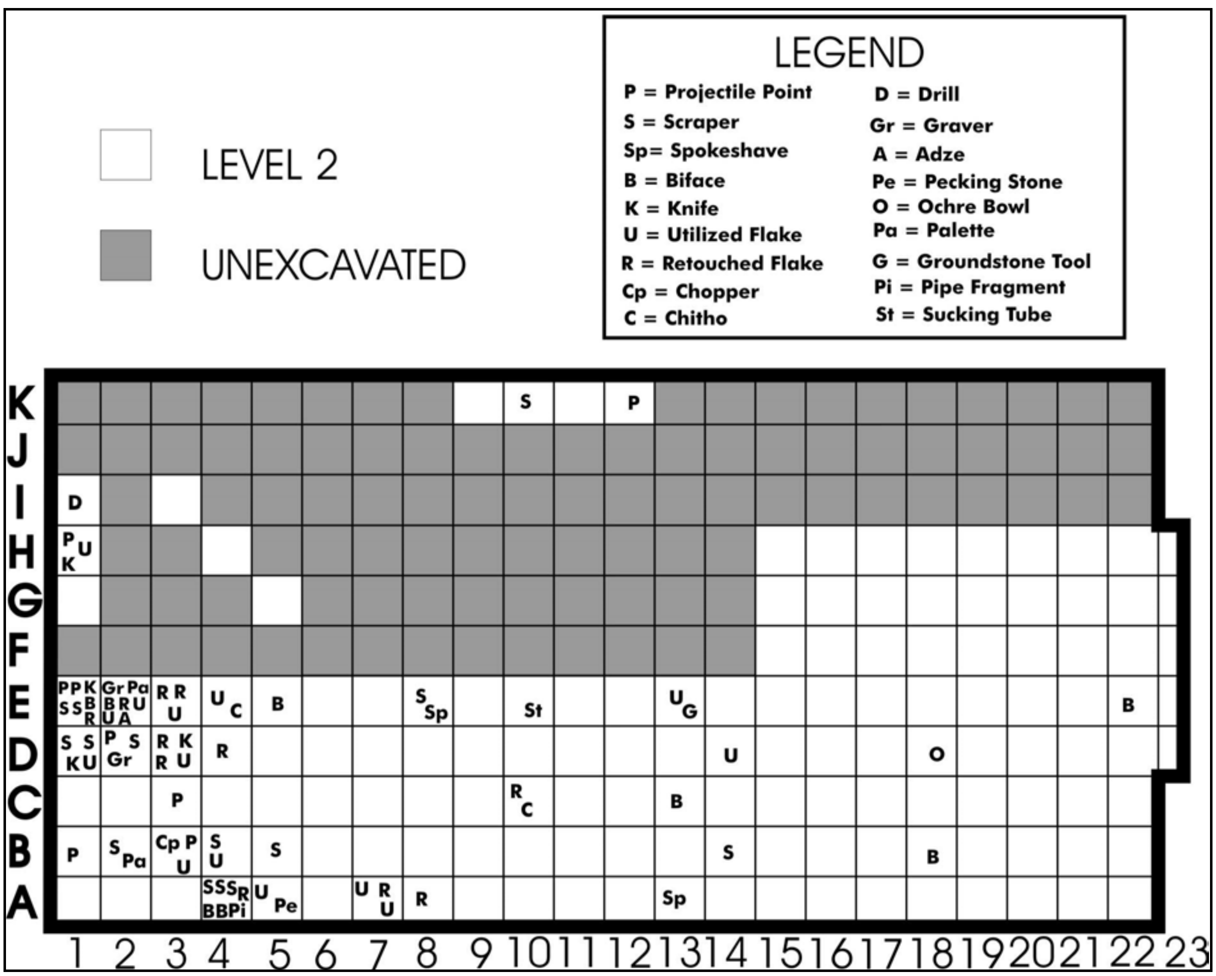


Figure 5.4-1: Distribution of Lithic Tools in Level 2

5.4.1.1 Projectile Points

A total of eight projectile points were recovered in Level 2. The type of point and the material from which it is made are within each individual description. The measurements of these are compiled in Table 5.4-3 and they are illustrated in the text at twice actual size.

Plate 5.4-1: DlLg-33:08A/2842

DlLg-33:08A/2842 is a broken KRF projectile point from Unit B1. It is well made; the base is ground, the notches are fairly shallow; one is shallow with a squared base and the other slightly deeper with a rounded base. The base consists of ten flake scars, ranging from 0.94 mm to 2.45 mm. The notch on the left edge appears to have been created with a minimum of ten flakes; more could have occurred but would be obscured by the last set of flake scars. The remains of the left edge has four flake scars in only 3.0 mm., which is the total length of this edge. The right edge is broken in such a way that no flake count can be reliably done, so the notch on this edge is composed of at least seven flake scars (with the caveat that a real flake count is impossible in these notches). The squared-off base has three flakes removed (a fourth has been counted along with the base count); these are quite small at 0.74, 0.77, and 0.82 mm. The obverse of the base consists of seven flake scars, three of which are partially obscured by step and hinge fractures that are the result of the basal grinding. These flake scars range from1.28 to 2.73 mm. On the left (squared) shoulder, two flake scars only make up the squaring at 1.51 and 1.55 mm, followed by the notch which appears to be made out of five flake scars. The left edge is composed of seven flake scars up to the break, measuring 9.66 mm overall.

DlLg-33:08A/2976 is a Denbeigh Point Chert Prairie Side-Notched Projectile Point, recovered from Unit B3. This small, utilitarian projectile point has lost a small section of one shoulder. The rest of the point is complete. The basal thinning on this face consists of three flake scars, one large flake scar in the center of the base, and one smaller, earlier flake scar on each side of the larger flake scar. The large flake scar is 5.25 mm wide and 10.56 mm long. The small section of the base that is not affected by the break has been ground down. The notch on the left edge is well rounded but shallow, which is in accord with the normal pattern for Prairie Side-Notched points. The left edge is made up of seven flake scars, four of which truncate in hinge fracture, ranging from 2.26 to 3.73 mm. These make up the 15.57 mm edge. The right edge has seven flake scars that range from 1.59 to 4.54 mm. The notch on this edge is also small but rounded. The shoulder on this edge is broken off. On the dorsal face, the base is made up of at least four flake scars, three of which end in a hinge fracture. Six flake scars make up the edge above the notch, ranging from 1.65 to 3.54 mm. The right edge is made up of five flake scars, ranging from 1.79 mm to 3.67 mm. The shoulder is squared but only one flake scar

Plate 5.4-2: Both Sides of DlLg-33:08A/2976

is complete on this shoulder, and it terminates in a step fracture. Other step fractures above it are obscured by this last flake scar.

DlLg-33:08A/3355 is a complete black quartzite projectile point, from Unit C3, that appears to be lightly reworked. One face shows the undulating surface of the inner face of a flake just removed from the core. Only a few flakes have been removed from this face and all of these appear to be sharpening flake scars. The flake scars along the left edge on this face intrude a maximum of 2.5 mm into the body of the point. A total of eleven flake scars are visible on the left edge of this face, ranging from 3.0 mm to 13.0 mm, while the opposite edge of the same face has six flake scars moving a maximum of 4.0 mm into the body of the point. They range from 2.0 mm to 14.0 mm in width. The base of this point on the same face has six flake scars moving a maximum of 2.0 mm into the body of the point. The opposite face has much more invasive knapping with a large shearing platform that runs 14.0 mm up from the base of the point and covers the lower half. The base has had three shaping flake scars all terminating at the shear platform and four sharpening flake scars in the middle of the base. These sharpening flakes run a maximum of 3.0 mm into the body of the point and range from 2.0 mm to 3.5 mm. Along the left edge of this face, fourteen flake scars are visible, four of which are step fractures that all lead from the same area of the edge. These flake scars run a maximum of 5.0 mm into the body of the point and range from 3.0 mm to 7.0 mm. On the opposite edge, thirteen flake scars remain. These flake scars run a maximum of 8.0 mm into the body of the point and they range from 1.5 mm to 6.0 mm.

Plate 5.4-3: Both Sides of DlLg-33:08A/3355

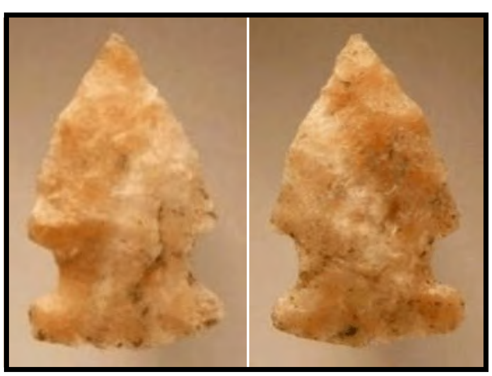


Plate 5.4-4: Obverse and Reverse of DlLg-33:08A/3775

DlLg-33:08A/3775 is a SRC Plains Side-Notched projectile point, from Unit D2. It is complete and still sharp. It is likely that was simply lost even though the left notch appears to have a break at the base. The base is slightly excurvate and grinding has occurred. There are three flake scars, ranging from 1.29 to 3.40 mm, removed at the base on the ventral face . The base on the right side is squared and the notch is well formed with light grinding marks at its deepest point. The right edge above the notch is made up of five flake scars ranging from 1.51 to 3.5 mm. The left edge from the tip to the notch is made up of seven flake scars ranging from 1.34 to 5.1 mm. The notch, as mentioned above, appears to be broken as it is larger and more rounded than its opposite. Grinding is clearly visible in this notch. The base is broken in such a way as to obscure flaking. On the dorsal face, the base is made up of five flake scars ranging from 1.8 to 2.7 mm. The edge from the notch to the tip is made up of four flake scars, ranging in size from 1.74 to 5.49 mm. On both faces the knapping is invasive and there are numerous hinge and step fractures crossing the surfaces. Of some note is a 'potlid' on the ventral face adjacent to, and slightly above, the right hand notch. Other than this potlid, no other evidence of heating can be discerned. It is unlikely that this tool was heated, but the potlid stands out.

Plate 5.4-5: Front and Back of DlLg-33:08A/4065

DlLg-33:08A/4065 is a Triangular chert projectile point from Unit E1. It is complete, with invasive knapping covering all of the dorsal face and 90% of the ventral. The base is slightly incurvate due to one flake that has been removed at a steep angle from the dorsal side of the base. This flake scar is centered against the tip and on each side of this flake scar are at least two other, smaller flake scars (they have been obscured by this large central flake scar). Above this flake scar are several step fractures. A flake count here is not possible due to the occultation of these earlier shaping flakes. The left edge has eleven flake scars, three at the base are at a 45° angle into the body of the point. The rest move horizontally into the body of the point, including one flake removed directly below the tip. These flake scars range in size from 1.38 to 3.62 mm, with a maximum depth of 6.83 mm, which is more than 50% of the width of the point. On the right edge from the tip, there are eight flaking scars ranging in size from 1.72 to 4.56 mm with a maximum depth of 6.48 mm. On the dorsal face, five flake scars removed from the base require further description. A central flake has been removed that measures 4.43 by 8.56 mm and is triangular in form due to the three flake scars that are on each side of it—two to the right and one to the left, all are at a 45° angle. The small flake scar to the immediate right of the central flake scar is 3.35 by 6.82 mm and terminates in a step fracture. Again, this is triangular in form due to the interaction of the central and outer flake scars. The flake scar to the right is 3.72 by 11.27 mm and also terminates in a step fracture. The flake scar to the left of the central flake scar is 3.73 by 9.48 mm, terminating in the same step fracture as does the far right flake scar. Previous attempts to remove this step fracture have resulted in a triple-step. This and the far right flake scar meet to create the beginning of an undulating central ridge. Twelve flake scars make up the length of the left edge. These flake scars range widely in size, some are sharpening flakes and at least two at the tip are clearly meant to be reduction flakes. Flake scars range from 1.23 mm to 3.85 mm with a maximum depth of 5.75 mm. All flake scars on this edge move horizontally into the body of the point. On the right edge, nine flake scars range in size from 0.84 to 6.73 mm with a maximum depth of 6.73 mm. Again, one flake scar at the tip is clearly a reduction flake. This is an expertly manufactured point; flaking is even and well placed to create two undulating and slightly serrated edges.

Plate 5.4-6: #4068

DlLg-33:08A/4068 is the basal portion of a KRF Plains Side-Notched projectile point, which occurred in Unit E1. Barely 0.5 mm of the point, above the notches, survives at the distal end of the most complete notch. The base is squared off and the notches are small and deep; the base is straight and has been ground. Not much can be said about this piece as so little material remains.

Plate 5.4-7: Dorsal and Ventral Faces of DlLg-33:08A/13414

DlLg-33:08A/13414 is a finely made SRC Side-Notched projectile point from Unit K12. It is complete but for one base, which has broken off from the innermost point of the notch straight down the base of the point. It may have been heat treated but, as there is a smoky and greasy sheen on the lower half of the point, it is more likely that this point spent some time in or near a fire. There are no hearths in the K9 to K12 line but, as the areas around this have not been excavated, this point could easily have been in the presence of a hearth that the excavation did not uncover. One face has a slightly incurvate motion to it, and the ripples in the areas not reduced by further knapping suggest that this face was the inner face of the original flake. The flake scars on this face are not very invasive along the two edges, but the flakes do meet near the tip, such that 13.0 mm of this face (from the tip to the center of the face) are covered with flake scars. The majority of this face is untouched by flake scars. The flake scars on the base of this face run a maximum of 4.5 mm into the body of the point and range from 2.0 mm to 5.1 mm. There are five flake scars on the base of this face. Four flake scars make up the surviving notch, moving a maximum of 3.0 mm into the body of the point and ranging from 2.0 mm to 5.5 mm. Thirteen flake scars make up the left edge, running a maximum of 4.5 mm into the body and ranging from 2.0 mm to 4.0 mm. The right edge has ten flake scars along it, running a maximum of 6.0 mm into the body and ranging from 1.0 mm to 4.0 mm. The notch on this edge has been broken off. On the opposite face much more knapping has occurred with flake scars running across the majority of it. Seven flake scars can be seen along the base, with a maximum depth of 3.5 mm and a range from 1.3 mm to 2.5 mm. On this face, the break from the notch to the base is on the left. The left edge of this face has nine flake scars, one of which runs almost all the way to the opposite edge. Its length cannot be measured as flake scars from the opposite edge obscure it, but it would have been at least 13.0 mm long. It runs diagonally across this face. The next longest flake scar is 7.0 mm. The widths range from 2.0 mm to 5.0 mm. Nine flake scars can be counted along the right edge of this point. Their maximum depth is 4.5 mm and they range in width from 1.5 mm to 3.0 mm. There is a ridge where the flake scars crossing from the opposite edge meet the flake scars from this edge; on a theoretically perfect point this ridge would be equidistant from both edges, in this instance it is 4.5 mm from the right edge. The surviving notch on this face is made up of six flake scars, ranging from 2.5 mm to 4.5 mm.

DlLg-33:08A/13760 is a broken SRC Triangular projectile point recovered from Unit H1.This projectile point appears to have been basally thinned on the dorsal face in an attempt to remove a stack of step-fractures; the attempt was powerful (heavy ridging near the striking platform) and partially successful. The ventral face also has had large, forceful thinning flakes removed, resulting in a hinge-fracture. Two flake scars move from the working edge to approximately one-half of the way across the width of the face. Both flake scars terminate at the same hinge fracture; it appears that the flake nearest to the shoulder was struck first and a heavier blow removed more depth in the second flake but it too terminated along the pre-established hinge fracture line. This point could well have been a slightly larger than average side-notched point but the break obscures any evidence of this. The artifact is covered in hematite.

Plate 5.4-8: Obverse and Reverse Sides of DlLg-33:08A/13760

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
2842	16.45	13.97	2.94	13.23	8.78	3.52	4.37	75	78	n/a
2976	23.65	11.65	4.61	11.31	8.75	5.24	3.50	70	79	41
3355	32.00	18.00	7.00	16.50	n/a	n/a	n/a	n/a	n/a	40
3775	21.08	12.90	3.93	12.78	8.81	4.27	4.47	75	78	n/a
4065	21.93	15.56	4.18	5.08	n/a	n/a	n/a	n/a	84	68
4068	8.58	14.79	3.77	14.79	10.20	4.56	3.68	n/a	n/a	n/a
13414	28.70	14.00	3.00	n/a	n/a	n/a	5.10	50	100	35
13760	21.75	15.10	3.20	15.10	n/a	n/a	n/a	n/a	n/a	75

Table 5.4-3: Measurements of Projectile Points from Level 2

5.4.1.2 Scrapers

Three are a total of fourteen scrapers in Level 2. The assemblage consists of seven end scrapers, two thumbnail scrapers, one side scraper, and one side/end scraper, plus three scrapers sufficiently exhausted or broken that further identification is not possible. The metric attributes of these tools are compiled in Table 5.4-4 and they are illustrated, at two times actual size, in the text.

DlLg-33:08A/2410 is a KRF end scraper from Unit A4. The tool is broken along the left edge, removing a portion of the working edge. A small section of stone juts out of the point of contact between the left

Plate 5.4-9: DlLg-33:08A/2410

edge and the working edge. It appears that after the tool was broken, a single flake was knapped off of this outcropping and the tool was used after this. The left side of the tool is entirely missing. The working edge consists of sixteen flake scars, ranging in width from 1.2 mm to 3.5 mm, with a maximum depth of 6.65 mm. There is some wear polish on the working edge. The knapping of this working edge continues in an unbroken chain around to the right side of the tool; a total of six flake scars ranging from 2.14 to 3.32 mm with a maximum depth of 5.69 mm. On both the dorsal and the ventral face, there are numerous spots with medium to high polish. The working edge and the right edge have some wear polish as well.

Plate 5.4-10:
DlLg-33:08A/2411

DlLg-33:08A/2411 is an agate end scraper, also from Unit A4. This end scraper is broken in two places—at the base of the tool and on the left side at the working edge. It appears that the tool, similar to DlLg-33:08A/2410, was then reworked at this working edge break and reused for a time. Approximately 40% of the dorsal face is cortex. The working edge consists of eight flake scars ranging from 2.31 to 3.87 mm, with a maximum depth of 8.06 mm. There is some slight wear polish on the working edge and step fractures all along the working edge. As well, there are numerous high polish spots on the ventral face, all following the ridges of the original knapping that removed this flake from the core.

DlLg-33:08A/2412, a KRF thumbnail scraper, is also from Unit A4.This partially complete thumbnail scraper has seen a lot of use; the ventral face has numerous high polish spots and three of the edges have polish on them as well. Also, the same three (working, partial left, and complete right edges) have been heavily utilized with step and hinge fractures running all along these edges. The break at the base of the tool also impacts most of the left edge. Sixteen flake scars make up the working edge, ranging from 0.83 to 4.93 mm, with a maximum depth of 5.03 mm.

Plate 5.4-11:
DlLg-33:08A/2412

Plate 5.4-12:
DlLg-33:08A/2913

DlLg-33:08A/2913 is a broken Denbeigh Point Chert scraper recovered from Unit B2. This roughly knapped scraper has seen extensive use; the working edge has polish all along it and the ventral face has medium polish all over the ridges formed by the initial removal of this flake from the parent core. The bulb of percussion is clearly visible as are the compression ridges, all of which have light to medium polish on them. The working edge is the left edge and there are six flake scars, taking up 11.82 mm. No other flaking is visible on this face. The dorsal face of this scraper is approximately 40% cortex and once again the flaking on this face is very roughly done. It appears that this scraper was a tool of opportunity. The working edge consists of a minium of seven flake scars, taking up 18.69 mm. The major break on the tool is opposite to the striking platform and bulb of percussion. Due to the nature of this artifact, no other metrics can be gleaned from it.

DlLg-33:08A/3101, a SRC side scraper from Unit B4, has highly varied knapping scars on it. The blank from which this tool was made is a classic trihedral blank with large inclusions directly adjacent to the striking platform. It appears that the inclusion was destroyed by the hard percussion that would have removed this flake. The ventral face is heavily rippled at the distal end, suggesting this flake may have originally truncated in a hinge fracture. It appears that this tool was utilized without sharpening or shaping flakes. However, there is high polish on both sides of the tool right at the working edges but only a few use wear scars—four in total for the entire tool—which strongly suggests this tool was used on soft substances. Both the proximal and distal ends are relatively rough and have no evidence of utilization.

DlLg-33:08A/3655 is a chalcedony scraper from Unit D1. This scraper is a bit of a puzzle. There is knapping along sections of all four edges. However, wear polish that appears on the ventral face does not appear to accord with any visible working edges. One end has some fairly major flaking on the dorsal face, however no real use wear or work polish is discernable near this area. The material itself is somewhat low quality; inclusions abound and it is possible that this tool was abandoned during either during manufacture or in the resharpening process. One large section of the dorsal face has been knapped away. It is possible that this weakened the tool enough that the knapper abandoned this tool in manufacture. Approximately 40% of the dorsal face is cortex. Knapping exists on all edges of the dorsal face. Ten large flake scars make up the working edge of this tool; they range in size from 1.13 to 4.44 mm and have a maximum depth of 12.77 mm.

Plate 5.4-13:
DlLg-33:08A/3655

Plate 5.4-14:
DlLg-33:08A/3657

DlLg-33:08A/3657, a KRF scraper, was also recovered in Unit D1.This scraper is broken in such a way that further definition is not possible. As well, no real polish is notable on this tool, so it could be that it broke in the manufacture or sharpening process. The dorsal face has cortex on it where material has not been removed to create the working edge. The ventral face is made up of a very strong bulb of percussion and bulbar scar. On the dorsal face, the distal end and the right edge are the two worked edges. The right edge has had two flakes removed from it, one that takes up almost the complete face (14.10 mm wide and 8.71 mm deep), while the second is quite thin 3.45 mm but the same depth, 8.71 mm. The distal face of the tool has had five flakes removed from it, ranging from 1.3 to 3.68 mm.

Plate 5.4-15:
DlLg-33:08A/3776

DlLg-33:08A/3776 is a chalcedony end scraper from Unit D2. This end scraper is a chocolate brown with reddish overtones and appears to be complete. The ventral face has neither bulb of percussion or striking platform but very strong compression rings. Medium use wear is visible on the base of the working edge, with some high polish on the highest points of the compression rings. No knapping scars are visible on this face. On the dorsal face, at the working edge, a total of eight flake scars make up the working edge, ranging in size from 2.23 to 7.61 mm in width with a maximum length of 11.29 mm. The base of the tool is made up of five flaking scars with the central one being a long flake scar that terminates in a step fracture. This flake scar is 6.68 mm wide and 19.84 mm deep, which means it terminates 2.27 mm from the largest of the flakes removed from the working edge. On the right edge, twelve overlapping flake scars create the steep face of this side. One of these flake scars terminates in a hinge fracture, but is interesting in that its terminus faces the proximal end, meaning this flake was knapped prior to the working edge being manufactured. These flake scars range from 1.54 to 5.68 mm, with a maximum length of 20.55 mm. The left edge is made up of eight flake scars, three of which terminate in step-fractures, ranging in size from 1.84 to 7.41 mm and have a maximum length of 14.78 mm. The two flake scars that are the longest on this face terminate at the long central flake scar that runs from the base of the tool to the working edge. One small area on this face directly adjacent to the working edge is cortex.

DlLg-33:08A/4069 is a broken KRF end scraper from Unit E1.This tool is small—15.59 mm in length—but well formed. There are two clear hafting areas near the base of the tool, 6.35 mm from the proximal end of the scraper, and some mild polish on the edges as well at these spots. The left edge was broken 4.41 mm from the working edge, creating a graver-like point. It appears to have been used after the break as there is some very light polish at this point. The working edge is made up of fourteen flake scars, most of which are obscured by use wear step fracturing. Some polish exists at the edge below the step-fracturing. The flake scars range in size from 0.77 to 2.65 mm. The ventral face has some light polish on the high spots and a clear bulb of percussion and compression rings.

Plate 5.4-16:
DlLg-33:08A/4069

DlLg-33:08A/4094, a KRF thumbnail scraper, was also located in Unit E1. This scraper is broken across its working edge so metrics for this tool are somewhat misleading. The working edge is on the left side. The knapping scars are small, regular, and unifacial occurring on the dorsal face. There are seventeen flake scars on the working edge, ranging from 0.4 mm to 1.1 mm.

Plate 5.4-17:
DlLg-33:08A/7401

DlLg-33:08A/7401 is a complete chert end scraper from Unit E8. This tool has a hard twist to its overall form. The result of this is that it fits excellently between right thumb and forefinger. Whether this is intentional or not is a point for discussion. The working edge is steep, but due to the twist, any measurement would be unreliable. Depending on how one measures, the working edge angle varies from 30º to 85 º. There is a section on one edge that has cortex and a small attempt to remove this had been made. The corticated edge of the tool has been knapped to allow a smoother hafting face. Flake scar sizes along the working edge range from 1.9 mm to 2.6 mm. There is hematite staining on this artifact.

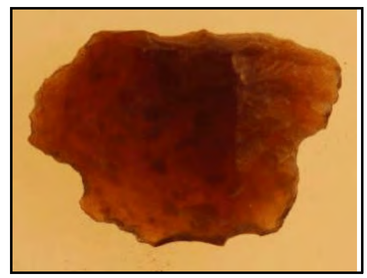


Plate 5.4-18:
DlLg-33:08A/11828

DlLg-33:08A/11828 is a broken KRF end scraper recovered in Unit B14. This tool is a reshaped point preform; the base of this scraper is shaped into shoulders and base; the left edge has a spot 9.18 mm from the base with bifacial flaking that gives every appearance of being a notch. The opposite side has unifacial flaking on the dorsal face only. Two flakes were taken out of the base as thinning flakes, one larger flake (7.69 mm) and one smaller flake (2.60 mm). No other work has taken place along the base. The working edge of this piece displays some polish along one half of its edge. However, there is extensive step/hinge fracturing along the material directly above the edge. It is most likely that heavy use caused fracturing along the edge that the knapper could not repair.

Plate 5.4-19:
DlLg-33:08A/13080

DlLg-33:08A/13080 is a broken KRF end scraper from Unit K10. This tool appears to be recently resharpened and broken soon afterwards. This estimate is based on the minimal amount of use wear and step fracturing at the working edge, not to mention a near-absence of fracturing on the ventral face (something that usually occurs on utilized tools). This tool may have been used as a combination edge/side scraper as there is some evidence of knapping/step fracturing along the left edge. One large flake scar on the ventral face at this left working edge is 4.8 mm wide and highly shouldered. In total, there are only six flake scars on the ventral side of the left working edge. No use wear polish could be seen on this left working edge so its utility is questionable. The use wear on the front working edge of this tool is minimal and consists of step-fracturing and some limited polish. This tool is broken at the proximal end. It appears that this break occurred on or near a hafting point, but the break itself obscures whether the tool broke due to resharpening or whether the tool broke during use. The artifact has an observable hematite stain.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
2410	end	23.74	19.45	6.17	n/a	n/a	76
2411	end	20.43	17.12	7.89	12.59	0.10	72
2412	thumbnail	15.55	20.86	5.18	19.17	3.12	76
2913	undeter.	26.07	21.45	7.26	19.73	-0.10	56
3101	side	33.63	18.29	7.11	n/a	n/a	n/a
3655	undeter.	36.75	19.70	9.54	n/a	n/a	n/a
3657	undeter.	17.66	14.75	6.55	n/a	n/a	n/a
3776	end	29.75	22.20	10.49	17.40	4.77	70
4069	end	15.59	14.23	4.18	14.23	2.42	68
4094	thumbnail	15.40	17.20	2.60	9.40	3.00	n/a
7401	end	27.30	14.15	6.10	14.20	2.00	n/a
11828	end	14.66	21.10	4.53	21.25	7.00	77
13080	end	18.35	16.70	7.50	17.00	2.50	75
23359	side/end	22..0	11.00	4.10	E 9.50	E 5.00	E 15
					S 23.00	S 3.50	S 30
4184	spokeshave	41.20	19.54	5.67	17.24	3.23	52
8524	spokeshave	41.69	21.54	11.46	24.00	4.15	50
13759	spokeshave	16.20	15.40	2.20	L 14.90	L -1.90	L 36
					R 16.10	R 3.20	R 31

Table 5.4-4: Measurements of Scrapers and Spokeshaves from Level 2

DlLg-33:08A/23359 is a side/end scraper from Unit B5. This extremely small scraper, made from Swan River Chert, has cortex on approximately one-quarter of the dorsal face. The ventral face has four flakes removed from the working edge straight into the tool to a maximum of 6.2 mm. Two of them end in step fractures and it is likely that these flakes were removed to flatten the working end edge. Three flakes were removed from the end edge on the ventral face, most likely to aid in the thinning of that edge. The side edge is much more serrated than the end, three large flakes removed from the ventral face result in serration. This edge has some polish on the shoulders of the serrated edge, as well as use wear fracturing. The polish is minor and none could be detected on the end edge. It is possible that this tool was lost or abandoned prior to any further use, again possibly due to this tool's diminutive size.

5.4.1.3 Spokeshave

Spokeshaves, by definition, are concave scrapers and, accordingly, the measurements are taken on similar attributes (Table 5.4-4). The main difference is that the length of the working edge is always negative. These tools are illustrated at twice actual size.

DlLg-33:08A/4184 is a chert spokeshave/scraper/multipurpose tool from Unit E8. This multipurpose tool has two incurvate areas, one on each edge with one at the proximal edge on the right face 16.96 mm long and one on the left edge at 21.32 mm in length. No use wear polish is visible on this tool, however, the material itself seems to preclude this. Use wear is visible all along the utilized edges of the spokeshave. The proximal/right concavity has seven flakes removed ranging in size from 3.17 to 4.42 mm with step and hinge fracturing below these scars. The remainder of the length of the tool itself on this edge is not flaked, but it has been utilized. Several hinge fractures are visible directly along the edge. A triangular inclusion of lower-quality material may have influenced the knapper. The tip of this tool has been used and there are hinge and step fractures at the tip. The left edge of the tool from the tip also has an incurvate edge 20.02 mm in length with a total of eight flake scars ranging in width from 2.14 to 6.42 mm. Below this concavity, the edge is slightly excurvate (2.84 mm long and 20.3 mm wide) and is also knapped with flake scars ranging from 1.81 to 5.7 mm. These flake scars are not very invasive, with a maximum depth of 4.06 mm. There is no flaking at all on the ventral face.

Plate 5.4-20: DlLg-33:08A/4184

Plate 5.4-21: DlLg-33:08A/8524

DlLg-33:08A/8524 is a quartzite spokeshave recovered in Unit A13.The utilized edge is unifacially flaked from the ventral face; steeply edged at 63°. Flake scars on this working edge are uniform in depth, all approximately 2.9 mm, and fairly even in spacing. There is a second, much smaller level of flaking/polish/stepfracturing that is consistent with tool use against a hard surface. Comparison with known use wear would be required prior to any definitive statement. A second working edge runs along the distal end of the tool, on the ventral face. The flaking on this edge is more indicative of dragging/scraping and is fairly minimal; 0.24 mm in depth and consisting of step and conchoidal flaking. It should be noted that the distal end of this tool is unusually flat.

Plate 5.4-22: DlLg-33:08A/13759

DlLg-33:08A/13759 is a KRF spokeshave (from Unit H1) which appears to be a broken segment of a larger tool. Too much has been lost to tell for certain what kind of tool it might have originally been, but two edges of this roughly rectangular artifact have been flaked. One edge is incurvate (1.6 mm) and the other is fairly flat. The incurvate face has clear knapping flake scars; however, the opposite side's flake scars are deep and random, perhaps as an untouched edge it was used to scrape back-and-forth briefly. Such a process would account for the depth and lack of precision in the flaking of that edge. There is some slight evidence of polish along the incurvate face but too little to determine a process. Nevertheless, the incurvate nature of this edge and its work polish strongly suggests that this portion, at least, was used as a spokeshave.

5.4.1.4 Bifaces

Eight tools were identified as bifaces, a sub-division of lithic flaked tools which indicates flaking on both sides of the artifact. The measurements and their working edges are listed in Table 5.4-5.

DlLg-33:08A/2418 is a broken KRF Biface from Unit A4. This tool is bifacially flaked along one edge and unifacially flaked along another. It is broken in such a way that dorsal/ventral and proximal/distal are not identifiable. One face is quite flat and the opposing face is pyramidal in form so for the purposes of description the faces will be identified using these terms for this biface only. The flaking along both edges/faces is not invasive (it does not cover the tool completely) but there is a high degree of use wear polish on both faces, most notably along the pyramidal face where the polish is banded along the higher ridges of the tool's natural surface variations. There is some cortex at the peak of the pyramidal face. The knapping along the pyramidal face's working edge (peak of pyramid is opposite the working edge) is asymmetrical with four flake scars overlapping each other in such a way that this area of the working edge was 'flattened' by the knapping or the edge straightened by this knapping. The eighteen flake scars, along this edge, range from 0.6 mm to 2.5 mm. The other working edge (pyramid up, major working edge facing researcher) is on the right hand side of the tool and shows extensive use wear and polish but no knapping scars. This edge was most likely utilized as it was without retouch. The opposite face has much more extensive flaking that runs uniformly along the working edge. Flake scars range from 0.6 mm to 2.1 mm, and there are twenty-one flake scars along that edge. As that edge is 24.1 mm long, there are 1.15 flakes per mm on average.

DlLg-33:08A/3139 is a broken Denbeigh Point Chert biface recovered from Unit B4. Only a small portion of this tool remains. Broken on both edges, this artifact is more of a cross section of a tool than a tool *per se*. Because of this, caution must be employed when regarding the metrics as they can be misleading. The working edge of this tool has step fractures along the working edge on both faces, but the nature of the material precludes the gleaning of more information. The edge opposite the working edge is 5.1 mm long and not enough remains to provide more information. There is hematite staining on this biface.

Plate 5.4-23: DlLg-33:08A/3139

DlLg-33:08A/4066 is a broken KRF biface from Unit E1. This fragment of a larger tool appears to be one corner of the prior incarnation of this object, but little can be said about this previous tool as not enough of it remains intact. The quality of the material is low. The biface has broken in such a way that only one working edge and corner are extant; the other face has lost a large section of the surface in a plate fracture, possibly due to high degree of inclusions in the material. Due to the nature of the break, it is not possible to distinguish this tool's original size or shape, so more general terms must be employed to describe it. The shorter edge is battered and completely step-fractured. Perhaps this was a chopper/chopping tool. Two large, possibly basal thinning, flake scars can be seen above the step-fracturing at the edge. The longer edge has twelve flakes removed from it. These appear to be percussive flakes due to their depth and somewhat random shapes. This edge has battering on the more distal end but the area immediately adjacent to the corner is clear of battering. Perhaps this tool was being resharpened when it broke and was discarded. On the obverse side, the shorter edge is almost completely removed due to the plate-like break this tool endured. Perhaps three flake scars can be noted near the corner, but this is difficult to say for certain. Although flake scars can be noted along the long edge, a count is not possible due to a combination of heavy step-fracturing and battering, the low quality of the material, and the plate-like break. A small section at the distal end of the long edge has three or four flakes removed; again a count is difficult and measurements on this tool would be conjectural at best.

DlLg-33:08A/4067 is a fragment of a chert biface from Unit E2. Very little remains of this artifact with the total length being less than 20.0 mm. It appears to have been the corner of a tool , possibly a projectile point. A total of seven flake scars make up the knapped area of both faces. The edge that survives is strong and serrated. Due to the break, only two flake scars can be measured—5.35 mm and 5.23 mm. These are corresponding flake scars on each face. There is some slight battering on the edges but as this tool is so small there is no way to tell if this was accidental or due to tool use. No polish could be discerned.

Plate 5.4-24:
DlLg-33:08A/4496

DlLg-33:08A/4496 is a SRC biface from Unit E5. This biface is the vestigial remains of a projectile point. Two notch-like indentations sit opposite each other below the working edge. These notches are only 0.68 and 0.81 mm in depth, but edge reduction on those edges could be the cause of their apparent thinness. The working edge is opposite the remains of the base (below the notches) and the edges on the right and left have been reduced as well. The right edge has some medium polish along the majority of that edge and the working edge has both medium polish and step-fractured use wear. The left edge has a large bulb midway on that edge that would preclude knapping that area, as any knapping to remove this bulb would be highly invasive. The dorsal face of this tool has been knapped invasively while the ventral face has knapping only from the working edge to approximately one-third of the length of the tool. This reworked projectile point has been heat treated as well, the inclusions visible on the surface of the tool have a rim of slightly reddened chert around them which is often found in heat-treated Swan River Chert. The base of the biface is broken just below the notches (1.8 mm) and neither use wear or polish is visible on that edge.

DlLg-33:08A/11408 is a broken Swan River Chert biface from Unit C13. This artifact is quite narrow in cross-section and its general shape suggests it is the base of a hafted knife. A large, crystalline inclusion at the break appears to have been the weak point that caused the break. As the material itself has a naturally high luster, no work polish could be identified. Another larger crystalline inclusion sits at the base of the tool. Due to the nature of the material and shape of the biface, no flake counts have been performed on this flake, although at least one oblique, invasive flake scar is identifiable near the proximal end, across one face.

DlLg-33:08A/16135 is an ovate Swan River Chert biface, recovered from Unit B18, with bifacial flaking on both lateral edges. This blade is complete and is still useable. It is probable that it was lost or misplaced after retouch as the working edges are still sharp. Upon recovery, it was noted by the excavators that there may be some blood residue on the blade and it was subsequently sent to Paleo Research Institute for residue analysis (Appendix B).

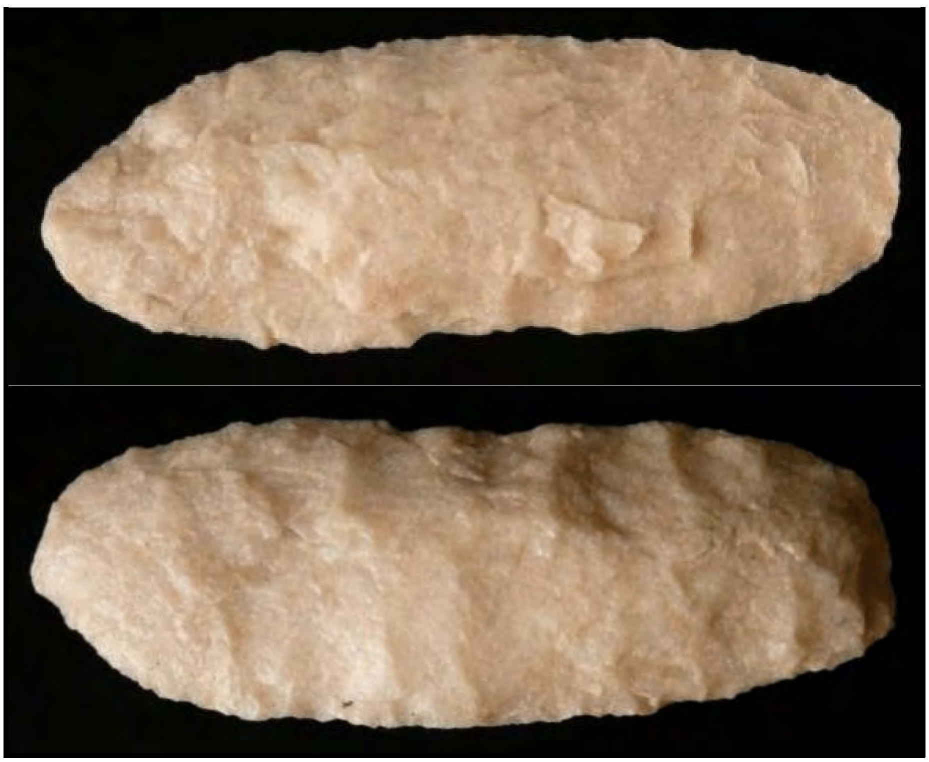


Plate 5.4-25: Obverse and Reverse Sides of DlLg-33:08A/16135

The blade is slightly tilted to one side, such that there is an inner and an outer edge on it. The tip is a flattened arc. The thinning/sharpening flake scars that are visible have removed the possibility of detecting use wear or polish that may have been present on the blade during its working life. One exception is one of the two possible hafting points; one is near the distal end of the tool and the other, the one in question, is approximately halfway up the tool. One edge of this hafting point has a slight indent and the indented edge is slightly worn, suggesting that it was rounded purposefully to lessen the chance of the sharpened edge cutting through any bindings that may have held this blade to a handle. The distal end of the tool has what could be described as a striking platform; a section of stone that is at an angle approximating 90º to one of the faces of the tool. This is not the original striking platform that would have been used to remove this blade from its originating core. It is possible that this is a prepared platform for further edge reduction. It is also possible that this is a break that caused the tool to be abandoned. However, this is not a likely scenario as this break could have been quickly and easily reduced to a sharpened edge without impacting the tool's usefulness. There is a large hinge fracture that has limited the knapper's ability to reduce the thickness of the blade along the inner edge of the blade near the tip.

Starting at the distal end, there are four flakes scars on the inner edge that are visible up to the beginning of the hinge fracture. These four flake scars are 4.8, 5.9, 6.1, and 8.0 mm wide. Each of these flakes terminates in the central ridge that runs the length of this tool, ranging from 10.0 to 13.0 mm from the inner edge. After these are the three flake scars that terminate in the 12.0 mm long hinge fracture. These scars are 5.5, 6.95, and 7.1 mm wide. The first two of these scars are 5.1 mm deep and the third is partially impacted by the hinge fracture while the majority of it continues to the central ridge. Following these, up to the flattened tip, is one more flake, 5.0 mm wide and 8.2 mm deep. The tip itself is made up of two flake scars, 4.9 and 5.1 mm wide. These move a maximum of 6.0 mm into the body of the blade. On the outer edge of the tool from the tip to the base, there are a total of nine flake scars, ranging from 4.2 to 8.9 mm wide with a maximum depth of 13.0 mm. On the reverse side, the base is made up of one flake scar that is 6.6 mm wide and 4.6 mm deep. Moving up the outer edge are a total of ten flake scars, ranging in size from 2.4 to 10.0 mm in width, with a maximum depth of 12.0 mm. The tip of the blade is made up of one flake scar, which is 5.7 mm wide and 6.5 mm deep. Moving from the tip of the blade to the base along the inner edge are seven flake scars, ranging in size from 5.5 to 8.8 mm. It should be noted that this face of the tool is considerably flatter than the obverse, which has a more noticeable ridge running down its longitudinal axis.

The protein residue on this lithic tool was tested against various antisera. It yielded a single positive result to sheep antiserum, indicating that it was used to process meat from a bighorn sheep (*Ovis canadensis*) (Paleo Research Institute 2009). Today, this species is largely confined to the Rocky Mountain region, although range maps indicate former presence in both western North Dakota and western South Dakota (Chapter 3).

DlLg-33:08A/17268 is a Swan River Chert biface from Unit E22. This tool has an extremely straight working edge on the right side of the impact platform. It is bifacially flaked, however, the flake scars are not invasive, moving 5.1 mm maximum into the tool. Due to the high sheen naturally existent in the material, polish is not discernable. Flake scars range from 1.3 mm to 3.4 mm. The distal edge of this flake is broken laterally across the face of the tool. At the point of the break at the working edge, there are some flakes removed from the broken edge. Three flakes in total were removed from the dorsal face along the broken edge, so it is possible that this tool was used as a graver. This biface is large enough and of good enough quality that it is more likely that this tool was lost than abandoned as it could quite readily be reworked.

5.4.1.5 Knives

Plate 5.4-26: Both Faces of DlLg-33:08A/3656

A total of four lithic tools were defined as knives. Their metrics are outlined in Table 5.4-5. DlLg:33:08A/3656 is a complete KRF knife recovered in Unit D1. This knife is a beautiful example of the genre. It is extremely well-made with invasive knapping on a slightly oblique angle into the knife, creating an undulating central ridge on both faces. Knapping scars cross all areas of this tool. Both edges have use wear and grinding beginning at 19.58 mm from one tip; the 19.58 mm area has little grinding on both edges, so this is the most likely place for hafting to occur. However, no real hafting wear or scars can be discerned on the faces. Both edges of the tool have light polish on them which is discernable only under 80x magnification. The distal end is broken slightly. Using a simple projection method in which the end of the tool is outlined with pencil on paper and the edges of the tool are projected beyond the break to give a rough estimate of the amount of material lost, a maximum of 7 mm is suggested to have been lost. One edge of this knife has a more excurvate shape than the other which will be referred to at the leading edge. The flaking along this edge has been carefully done so that the edge is not serrated or undulating but instead quite straight. There is a high area 17.17 mm from the broken tip on this face that has two step-fractures angling in toward each other. For a knapper, this is a bit of a nightmare as reducing this high area is necessary to continue creating a smooth edge, but removing sufficient material to rid this knife of the high area would ruin the working edge. However, this tool overall is in excellent shape and could have been reused, so it is probable that it was lost or accidentally abandoned rather than discarded.

Plate 5.4-27: Front and Back of DlLg-33:08A/3842

DlLg-33:08A/3842 is an agate tool which was a projectile point that had been broken and shows evidence of being reworked. The artifact was located in Unit D3. It is broken along its length, splitting it in half. The flaking is not invasive, the maximum depth of flake scars is 4.79 mm. The base is strongly excurvate and the notch, while a corner notch, has a very squared shoulder. The base that survives appears to be strongly excurvate with no evidence of grinding. The surviving portion of the base has one step-fractured flake scar and one partially visible shaping flake removed. The notch itself is deep at 4.32 mm and has been ground. The shoulder is sharp with nearly a 45° angle. Above that, four flakes have been removed, ranging from 3.65 to 4.62 mm in width and a maximum of 4.61mm in length. Five flakes have been removed from the remaining portion of the tip and there is some polish at the tip. Beyond this is the break. One partial and four complete flakes have been removed along the surviving portion of the base. These range from 1.39 mm to 2.44 mm. Beyond the notch, the edge is composed of seven flake scars, ranging in size from 0.91 to 2.78 mm. The polish on the tip could suggest that this point may have either been reused or was utilized as a scraper in conjunction with its primary use as a knife. It is most likely that this tool served a multiple of purposes but its overall shape and the indications of use wear indicate its use as a knife. Most likely, though, this point had both the base and the tip reworked.

DlLg-33:08A/4107 is a chert knife from Unit E1. This specimen is unusual; it is extremely small—15.44 mm in length—and intricately knapped. The flake used to create this tiny blade was a quadrihedral plunging flake with a strong central ridge running from the tip to the point where the tip extension meets the main body of the knife. Although the original bulb of percussion is gone, compression rings signal the proximal end of this tool. The very delicate ventral knapping on the right edge runs from the proximal end to 10.73 mm from the base and becomes dorsal flaking for the remaining distance, although it appears that there is a one flake overlap. The flake count on the ventral knapping is 20 with sizes ranging from 0.33 to 0.51 mm, with a maximum depth of 0.29 mm. These flake scars are too regular and lamellar in form for them to be use wear. As well, a medium polish is visible on all edges. The dorsal flaking on the right edge, including the right side of the tip, is eleven scars. The largest flake scar in this range is 0.87 mm wide and 1.81 mm deep and this is the single flake scar that makes up the right hand edge of the tip. Once again, polish is notable on both the edge and the ventral face. On the ventral face of the tip, medium polish is visible with one use wear hinge-fracture flake removed from that face. On the dorsal face at the tip, medium polish is also visible. From the tip on the ventral face following the left edge, use wear scars run the length of the tool, totaling sixteen flake scars. There are blank spaces between these work scars, but all of this edge also has medium polish on it. On the dorsal face, the same is true in that there are no knapping scars but polish along its edge up to the tip. At the tip itself, the left side of the central ridge is made up of one large flake scar taking up the width of the face and measuring 1.8 mm in width and 1.69 mm in length. Again, work polish is visible. Overall, this is a beautiful example of delicacy in flaking. It is possible that this tool was hafted as well, a slight shoulder on the right edge is observable at the base. However, this could easily be a break from usage or a post-depositional occurrence, but a blade this small would by necessity be hafted.

DlLg-33:08A/13758 is a fragment of a bifacially flaked KRF hafted knife. It was located in Unit H1. This knife has two approximately parallel notches which were removed through great force rather than small


Plate 5.4-28: Both Sides of DlLg-33:08A/13758

pressure flaking. There is some rubbing polish at each edge of the notch that appears consistent with hafting wear. The tip of the tool has been broken in a step-fracture. Were it not broken, the working edge would wrap around itself.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
2418	biface	32.80	18.00	6.85	24.10	0.00	42
3139	biface	48.60	16.90	10.10	14.30	0.10	indeterm
4066	biface	27.29	17.49	4.98	indeterm	indeterm	45
4067	biface	14.05	7.46	2.74	n/a	n/a	n/a
4496	biface	16.53	16.16	3.45	13.41	2.01	40
11408	biface	14.32	15.40	2.84	indeterm	indeterm	indeterm
16135	biface	60.55	22.20	12.10	L 53.10	L 6.10	L 45
					R 55.00	R 9.50	R 44
					E 10.85	E 1.30	E 33
17268	biface	44.10	35.50	7.50	35.10	0.00	45
3656	knife	46.74	13.17	5.93	45.4	5.74	55
3842	knife	22.00	11.00	4.50	L 16.00	L 3.00	L 25
					R 8.50	R 1.10	R 30
4107	knife	15.44	4.77	2.49	L 15.00	L 2.00	L 45
					R 15.00	R 1.50	R 55
13758	knife	34.90	17.25	3.30	22.00	2.00	35

Table 5.4-5: Measurements of Bifaces and Knives from Level 2

5.4.1.6 Retouched Flakes

A retouched flake is, by definition, a flake which has had some modification by a stoneworker in order to produce a tool for cutting or other use. Twelve retouched flakes were recovered from Level 2 and their metrics are detailed in Table 5.4-6. Another retouched flake, DlLg-33:08A/15577, was recovered from the cultural level impacted during the excavation of the SW Sump Pit. Its description and metrics are included in this section.

DlLg-33:08A/2430 is a chert retouched flake from Unit A4. This bright orange retouched flake has knapping on a short section of one edge with a total of eight flakes removed from it. These range from 2.03 to 5.14 mm. No work polish or scarring has been noted on this flake. There is a thin band of flaking on the dorsal face. Except for this thin band, the dorsal face is entirely cortex.

DlLg-33:08A/3662 is a chert retouched flake from Unit D1. It has one working edge that appears to be knapped with eleven flake scars visible. There is very light use wear along the edge and some slight polish along the upper edges of the flake scars. This tool is quite thin and this thinness most likely contributed to its breaking. The working edge and the tool itself could have been substantially larger but too little remains for further analysis.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
2430	retouch fl.	28.36	22.82	5.14	19.61	1.77	50
3662	retouch fl.	17.00	11.50	1.50	14.00	0.80	24
3865	retouch fl.	32.00	11.60	5.10	15.30	0.10	31
3938	retouch fl.	34.80	16.95	5.57	31.50	3.10	54
4099	retouch fl.	13.70	10.00	2.75	12.70	0.00	49
4212	retouch fl.	11.00	17.60	5.10	indeterm	indeterm	indeterm
4354	retouch fl.	17.14	22.17	3.80	16.08	-0.20	54
4358	retouch fl.	24.00	15.80	6.30	17.90	1.50	46
5962	retouch fl.	16.20	26.20	5.20	16.40	3.50	28
6069	retouch fl.	18.79	21.24	3.35	18.53	0.20	32
8762	retouch fl.	23.20	21.20	3.30	L 14.90	L 0.05	L 15
					E 11.40	E -1.90	E 15
					R 22.50	R 0.10	R 15
15577	retouch fl.	27.88	21.92	3.90	L 27.48	L 2.33	L 44
					R 29.52	R 2.08	R 38
23374	retouch fl.	20.10	17.70	3.70	11.20	-1.20	43
2666	utilized fl.	45.64	15.60	3.60	L 19.10	L -0.80	L 20
					E 5.30	E 0.50	E 16
					R 23.20	R 1.25	R 22
3096	utilized fl.	16.50	14.70	3.50	14.30	0.10	indeterm
3940	utilized fl.	21.70	17.40	5.70	13.30	0.00	28
4199	utilized fl.	25.80	10.60	5.40	21.90	5.00	40
4352	utilized fl.	26.12	20.60	3.35	9.81	-1.12	indeterm
4431	utilized fl	19.70	12.90	3.40	7.40	0.00	62
5961	utilized fl.	17.20	14.50	3.00	13.80	3.00	indeterm
5963	utilized fl.	28.09	26.44	3.71	22.30	2.61	28
9419	utilized fl.	28.55	21.45	6.75	24.00	9.7	14
23361	utilized fl.	16.02	15.17	3.28	10.95	1.21	15
23368	utilized fl.	10.40	7.20	2.20	12.00	1.70	indeterm
23769	utilized fl.	26.95	15.30	4.40	22.00	1.40	23

Table 5.4-6: Measurements of Retouched Flakes and Utilized Flakes from Level 2

DlLg-33:08A/3865 is a SRC retouched flake from Unit D3. This tool looks a great deal like a hafted tool; however no evidence of hafting can be found on the surface of the tool. Just under one-half of the tool is a 'tang', but once again this is not definite. Flaking is almost uniformly on the ventral face. One small portion of the dorsal face has some flaking scars centered around a high point on the ventral face. Most likely the toolmaker was straightening the edge and, as material could not be removed on the ventral face, some sharpening was carried out on the dorsal. Seven flake scars on the dorsal face range from 0.6 mm to 1.4 mm. On the ventral face, there are fourteen, ranging from 0.6 mm to 2.0 mm. No flake scar on this tool is more than 2.2 mm from working edge into the tool. Some cortex is visible on the ventral face.

DlLg-33:08A/3938 is another SRC retouched flake. It was recovered in Unit D4. This flake has gone through the process of heat-treating or burning. It has one knapped edge; once again the knapping is quite small but uniformly distributed along the majority of the working edge. One large conchoidal fracture, 17.8 mm from the distal end, coincides with one spot of high polish on the upper area of the ventral face, 8.7 mm from the working edge. Flake scars along the working edge range from 0.8 to 1.8 mm. Cortex is present on the dorsal face at the proximal end.

DlLg-33:08A/4099 is a Denbeigh Point Chert retouched flake from Unit E1. Very little remains of this tool; it has broken along three of the four edges, leaving only a small portion of the working edge. Seven flake scars on the working edge (two are prior shaping/sharpening flakes) range from 1.2 mm to 2.3 mm.

DlLg-33:08A/4212 is a retouched flake, of chalcedony, found in Unit E2. This tool is broken in such a way that there is no definable working edge. The flaking exists on both faces so this flake could be a portion of a bifacial tool. There is no way to tell if either of the existent edges is a working edge. The tool's shape is triangular but again not enough remains to glean much information.

DlLg-33:08A/4354 is an agate retouched flake from Unit E3. This relatively small artifact was once a part of a larger tool. It is broken at the bulb of percussion and bisects the working edge at a 40° angle. The knapping on this tool is bifacial but noninvasive. The ventral face has knapping scars on the working edge but there is enough use wear step fracturing that a flake count is not possible. On the dorsal face, eleven flakes have been removed. Three flake scars, which are the result of heavy percussive flaking, are mostly obscured by later pressure flaking for shaping and sharpening. These flake scars range from 2.09 to 8.96 mm (this last being the most extant of the three percussive flake scars). Some polish is detectable on the working edge.

DlLg-33:08A/4358, a retouched flake of chert, from Unit E3, has been heat-treated and has very small flake scars all along the working edge. Flake scars range is size from 0.7 mm to 1.3 mm. Some minor polish exists on the ventral face. The working edge has a total of 25 flake scars. The opposing edge has some use wear polish but no flake scars.

DlLg-33:08A/5962, from Unit A7, is a KRF retouched flake. This tool has lost all of one and most of its other working edge. Originally a conchoidal flake, it was retouched lightly along the working edges before it broke laterally across the width of the tool. The break appears to have curved around the dorsal surface in a way that removed evidence of retouch along the left edge of the tool on the dorsal face. The ventral face has some evidence of use wear along that edge. Most of the ventral face is slightly incurvate and covered in cortex. The right edge has ten visible flake scars on the dorsal face, ranging from 1.0 mm to 2.5 mm in width and 2.0 mm in depth. Only this small amount of the working edge survived the break.

DlLg-33:08A/6069 is a chert retouched flake from Unit A8. This tool has a greenish tinge to it, along with the 'smoked' quality of some heat-treated material. The flake is a classic conchoidal flake, with an overall clam shape, a visible bulb of percussion, and heavy rippling on the ventral face. The working edge is directly opposite the striking platform. This edge has some indications that this flake terminated in a hinge fracture in that a small portion of the edge has the terminal ripple and thinned edge consistent with these kind of terminations. The working edge has been slightly knapped at the right side; the ten sharpening flake scars total 8.47 mm in length, which is less than one-half of the working edges length. This slight knapping may have been performed mainly to flatten the already very straight working edge. This appears to be a tool of opportunity.

DlLg-33:08A/8762, a KRF retouched flake, was located in Unit C10. The artifact is knapped on three edges; the left edge is 18.95 mm long, the edge opposite impact platform is 12 mm long, and the right hand edge is 12.5 mm. All are knapped on the dorsal face. Flake scars on the left edge are large and unevenly spaced and are from 1.5 mm to 3.25 mm. The flake scars on the edge opposite the impact platform are smaller and create a slightly incurvate shape, ranging from 0.7 mm to 2.1 mm. The flake scars on the right edge are step-fractured and range from 1.0 mm to 3.1 mm. Protein analysis showed the presence of *Antilocapra* (pronghorn) blood (Appendix C).

Plate 5.4-29:
DlLg-33:08A/8762

DlLg-33:08A/15577 is a broken Selkirk Chert bifacially retouched flake that was located in the Southwest Sump Pit. This tool is a curious piece; the dorsal face has flake scars that cover the entire face while the ventral face is largely composed of untouched material, with tertiary scars non-invasively visible on both edges. The tool is broken across its width. The dorsal face's right edge has use wear scarring at the edge of the tool. Starting at the break, on the right edge of the dorsal face, three flakes entirely cross the dorsal face. They are (from base to tip) 7.2, 3.9, and 5.1 mm in width and 20.1, 18.9, and 14.3 mm in length. Two smaller scars make up the majority of the remaining length of this edge; 2.2 and 3.1 mm in width and 4.2 and 3.9 mm deep. A section of 5.1 mm of unknapped stone makes up the rest of the right edge of the dorsal face. Moving from the tip along the left edge of the tool are four complete and the beginning of a fifth flake scar; the lowest four flake scars serrate this edge. The first from the tip is 5.1 mm wide and 4.9 mm deep. The next is 7.1 mm wide and 4.6 mm deep. The remaining two complete scars are the continuations of the scars described as travelling all across the dorsal face of this tool. The fifth partial flake is possibly the beginnings of a larger serration. On the ventral face from the break along the right edge to the tip are eight flakes with a maximum depth of 2.9 mm and a maximum width of 5.0 mm. There are some use wear scars visible along the 21.1 mm from the tip to the break. However, the last 7.9 mm of this edge is unknapped and shows no signs of being utilized. Moving from the tip along the left edge of the ventral face, nine flake scars are visible. These range in size from 2.8 mm to 8.9 mm wide and 2.2 to 4.0 mm deep.

DlLg-33:08A/23374, recovered from Unit D3, is a Swan River Chert retouched flake. This unifacially retouched tool has a small section of a worked edge. All flakes are removed from the dorsal face. As the knapping on the edge starts 10.2 mm from the proximal end and runs to the broken distal end, combined with the lack of use wear or polish, it is most likely that this tool broke during manufacture and was subsequently abandoned. Nine flakes were removed from the working edge, making an average of 1.24 flake scars per mm.

5.4.1.7 Utilized Flakes

Occasionally, waste flakes from the manufacture of tools have some qualities which lend themselves to expedient usage *as is*. These are identified from wear polish and/or step fracturing on the working edge. The measurements of these twelve artifacts are tabulated in Table 5.4-6.

DlLg-33:08A/2666 is a utilized flake of Knife River Flint from Unit A5. It has been heat treated/burnt and has seen fairly heavy use on three of four edges. The flake itself is shaped rather like Florida, with a central ridge that adds strength to it. Use wear and polish are visible all along the 'coasts'; particularly in the southwest and along the eastern coast. In other words, work-polish and flaking occur on the left, proximal, and right edges, with more polish on the right edge than on the left. The flake appears to have been subjected to fire at some point; a potlid on the ventral face and some embedded charcoal on the dorsal face suggest this. As the potlid is on the ventral face, it is most likely that this firing occurred after the flake was knapped off of its parent core.

DlLg-33:08A/3096 is a utilized flake of Swan River Chert. It was recovered from Unit B4. This tool is an unmodified flake that has light polish on the working edge, which is the left edge. No knapping scars occur along that edge, but some use wear conchoidal fracturing is present. There is hematite staining on this artifact.

DlLg-33:08A/3940, from Unit D3, is a quartz utilized flake that has been utilized in one fairly small area on something highly abrasive such as bone. One of the difficulties of identifying use wear on quartz is that it is has a highly reflective surface and quartz of this quality is very hard. Not much can be gleaned from a quartz tool vis-a-vis polish or use wear. This tool has classically strong use wear along one small portion. The scarring forms a criss-cross pattern along the edge and runs into the tool to a depth of 3.3 mm. Due to the quality of material, this tool may be eligible for quartz hydration.

DlLg-33:08A/4199, a chert utilized flake, from Unit E2 has some polish on the ventral face and use wear on the dorsal face. There are no knapping scars, so this tool was used as it was knapped off of the core. The flake is broken in half along the long axis. The polish on the ventral face runs 3.1 mm into the tool.

DlLg-33:08A/4352 is a utilized flake of KRF recovered from Unit E3. This flake has seen light utilization along one portion of one edge. No real polish is notable, although there is some use wear along the edge. This was a flake that was briefly utilized and then either abandoned or discarded.

DlLg-33:08A/4431, a heat-treated utilized flake from Unit E4, is made of chert. This tool has light use wear on the working edge, which is on the left side 4.8 mm from the impact platform. No polish could be determined, however there are some flake scars consistent with tool use.

DlLg-33:08A/5961 is a small SRC utilized flake recovered from Unit A7. It has slight use wear on one edge; some conchoidal fractures along that edge and a hint of polish on the high spots. There is a break across the face of this flake which reduced it to a length that would not be easy to use and is therefore the probable reason for the abandonment of the flake.

DlLg-33:08A/5963, a quartzite utilized flake from Unit A7, has some use wear along one edge with a very slight polish along the working edge. The tool is roughly rectangular in shape and one edge has been used. This tool saw light use prior to being lost or abandoned.

DlLg-33:08A/9419 was recovered from Unit E13. It is a chert utilized flake that has some very light use wear/polish on its working edge and some minor polish on the faces. This tool was most likely used briefly and then thrown away, lost, or purposefully abandoned.

DlLg-33:08A/23361, from Unit D14, is a Denbeigh Point Chert utilized flake. It is quite small and has been heat treated or abandoned in or near a hearth. One face of this tool has cortex covering most of it. It is broken at both ends of the working edge and appears to be broken along the edge opposite to the working edge. Very light use wear is visible along the working edge, but there are no knappping scars evident.

DlLg-33:08A/23368, recovered from Unit E2, consists of two Selkirk Chert flakes which appear to be utilized. These two flakes are broken in such a way that refit is strongly suggested but cannot be absolutely stated, as some small fragments between the two flakes are missing. This tool is quite small, 10.4 mm in length, and thin, 2.2 mm, but the utilization marks are definite and are mostly on the larger of the two artifacts. The smaller of these flakes may have evidence of utilization and, due to its diminutive size, little information can be gleaned from it. The presence of use wear along one edge suggests that this tool was used to rub along a rounded edge prior to its breaking.

DlLg-33:08A/23769 is a utilized flake, made of chert, from Unit B3. This tool has been either heat treated prior to use (to improve the knapping qualities of the object) or was abandoned in or near a hearth. The edge opposite the working edge has cortex along its length. The working edge has some very minor use wear on it. No knapping scars exist along the useable edge.

5.4.1.8 Gravers

Plate 5.4-30:
DlLg-33:08A/3792

DlLg-33:08A/3792, recovered from Unit D2, is a KRF graver (Table 5.4-7). This is a very odd piece; the flake must have been removed right at an incurvate section of a core in such a way that the dorsal face has a distinctive scoop to it. The dorsal is incurvate and the ventral is excurvate. The working edge of this tool appears to be only at the tip and, due to the nature of the shape of the flake, no metrics can be taken. It appears to have been broken and abandoned.

Plate 5.4-31:
DlLg-33:08A/4203

DlLg-33:08A/4203 is a KRF graver from Unit E2 (Table 5.4-7). It is in general form much like a cat's claw with a thick end at the base curving sharply to a thin tip. The inner curve has a medium to high polish all along the curve and the outer curve has polish only near the tip. This tool is broken in such a way that the base of the tool is completely missing. The knapping on this graver is minimal; on the outside curve, the dorsal face has eight flakes removed but many more areas with extensive use wear. The ventral face along the same edge appears to be free from flaking but also has considerable use wear damage. On the inner curve, practically no flakes have been removed for shaping or edge reduction. It appears that the original flake was in a shape that was exploited by the knapper.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
3792	graver	24.93	11.06	2.50	15.60	8.81	indeterm
4203	graver	25.84	15.82	4.61	L 19.10	L -2.00	L 34
					R 25.70	R 4.50	R 32
4191	adze	69.59	60.21	1.77	L 54.50	L 5.10	L 31
					R 56.60	R 4.80	R 27
					E 45.00	E 1.60	E 27
4425	chitho	124.10	55.34	10.68	105.41	7.19	38
6816	chitho	102.86	94.21	8.49	indeterm	indeterm	indeterm
2981	chopper	134.40	57.59	31.67	82.23	16.91	38 to 45
18705	drill	28.10	31.90	7.90	L 7.70	n/a	n/a
					R 10.00	n/a	n/a

Table 5.4-7: Measurements of Other Flaked Lithic Tools from Level 2

5.4.1.9 Adze

DlLg-33:08A/4191 is a shale adze that was recovered from Unit E2 (Table 5.4-7). This chopper/chopping tool is broken approximately half way along its projected working length. It is roughly rectangular in shape and has a working edge angle of 30º for all working edges which run along three sides of the tool, proximal, left, and right—the distal end is broken. The full length of the tool would be approximately twice the length of the tool as is. Two patches of ruby-coloured, microcrystalline structures partially cover both sides of the tool. Plating has broken off of the surface. However, what working surface has been left has polish consistent with sharpening and use. There are some step-fractures at the proximal end, along the length of the working edge which is consistent with this tool being used as an adze. Were this tool complete, it would have a rectangular/oblong shape.

Plate 5.4-32:
DlLg-33:08A/4191 (actual size)

5.4.1.10 Chithos

Plate 5.4-33: DlLg-33:08A/4425 (actual size)

DlLg-33:08A/4425 is a granite chitho from Unit E4 (Table 5.4-7). It has a knapped working edge which appears to be unifacial, with some work polish along the working edge. This chitho is relatively thin and may have been too weak in structure to withstand much use. It is broken in half longitudinally and at each end. The working edge appears to continue beyond the breaks at both ends. This tool may have had a substantially larger working edge during is useable life.

Plate 5.4-34: DlLg-33:08A/6816 (50% actual size)

DlLg-33:08A/6816, from Unit C10 (Table 5.4-7), is a tabular granite chitho that has the appearance of a large ulu, i.e., a proximal wide tang and a semi-lunate distal working edge. The working edge runs 104.18 mm along an excurvate arc with hematite staining across more than half the face. The granular texture would result in the stone crumbling rather than cutting when being used a flesher on large hides. This artifact was submitted by Parks Canada for residue analysis with surprising results. No trace of animal fat or blood was present—only plant material. Present were *Helianthus* (sunflower) leaves, *Cleome* (beeweed), *Poaceae* (grass), and *Sagittari*a (arrowhead) roots (Appendix C). It would appear that this tool, contrary to expectations, was used exclusively as a slab on which to grind plant material.

5.4.1.11 Chopper

DlLg-33:08A/2981, from Unit B3, is a limestone edged tool (Table 5.4-7). It resembles a chitho but is a bit of a puzzle. It is made of limestone yet it has a clear working edge that has been knapped. However, this tool has undergone some chemical processes that have broken it down over time so that all faces have a kind of patination on them. There is hematite, but it has bonded to the face. This artifact fits easily into the hand and was probably used as a chopping tool. This tool is now dry and the surface is very easily abraded by running a finger over the surface.

5.4.1.12 Drill

DlLg-33:08A/18705 is a Swan River Chert drill recovered from Unit I1. It is a tool of opportunity. There is no evidence of purposeful shaping of this tool. No flake scars are visible along the edges and the visible flake scars are likely the remains of flakes which had been removed from the core prior to this flake being removed. There is a strong central ridge on the dorsal face that terminates at the working tip. On the ventral face, this utilized tip is at the opposite end of the tool from the striking platform. The ventral face has a bulb of percussion and a bulbar scar clearly visible. The working edges of the portion of the tool that was used as a drill have use wear on both faces. The drill portion sticks out of the flake and truncates on both edges with an in-stepped shoulder. This is the point at which the drill could go no farther into whatever it was being used on. These two in-stepped shoulders are the result of use wear. The utilized portion of this flake is 7.7 mm from the tip to the in-stepped shoulder. On the left edge of the tool, from the tip to the in-stepped shoulder, the utilized portion is 10.0 mm in length. The working edges are rounded and there are flake scars on both faces. The measurements are listed in Table 5.4-7.

5.4.1.13 Palettes

DlLg-33:08A/2901 is a granite palette/multipurpose tool, recovered from Unit B2. The dimensions of this artifact are: length - 167.80 mm; width - 57.22 mm; and thickness - 15.32 mm. This object is listed as a palette and, while it shows hematite staining, a pronounced concavity on one face, and circular grooving on the opposite face (indicative of crushing/mixing activity), it also has three edges smoothed at an angle toward the convex face. This is problematic for tool use definition as this could have been the result of using this tool as a grinding stone for other tools, or that this tool was ground into its flattened oblong form for use as a mano, or that this tool was simply used for many different purposes, one of which was grinding or reduction of hematite for decorative or religious purposes. The concave face of this tool has ridges running along its length; these are broad and shallow and the scratching that covers this face criss-crosses it at somewhat random angles. It is unclear if these scratches are pre- or post-depositional. The opposite, convex face has two areas of circular scratching but these do not show consistency under magnification. This tool has been left unwashed and should be left so as the material is degrading fairly rapidly. Since it has been removed from the matrix, several cracks have developed along the convex face and along the flattened edge of the overall oblong shape.

Plate 5.4-35: DlLg-33:08A/2901 (actual size)


Plate 5.4-36: DlLg-33:08A/4224 (actual size)

DlLg-33:08A/4224 is a syenite palette from Unit E2. Overall, this palette is roughly rectangular in form with one corner still complete. The palette has been purposely formed and is the result of careful manufacture. All faces of this palate have very smooth surfaces. The excurvate face is slightly smoother when compared with the very gentle incurvate face, which is the slightly rougher surface. Hematite particles and staining is everywhere on this artifact. There are numerous random scratches on the smoother surface. These scratches do not appear to be intentional. The sides of the palette angle very slightly towards the excurvate surface with a range of 79º to 82º. The palette is broken evenly across the face, with a small piece missing from one of the two remaining corners. The palette gives the appearance of being broken just short of a midline (this projection is based on extending the mild curves of the outer edges to create a symmetrical object which may not necessarily be the case). The original length of the palette cannot be ascertained. The measurements on DlLg-33:08A/4224 are overall length 90.2 mm with a width of 83.3 mm. The length of the break edge is 90.2 mm, the unbroken edge is 72.0 mm, the shortest edge is 57.0 mm, and the broken edge is 56.0 mm. The thickness at the midpoint of the break is 9.0 mm, at the midpoint of the unbroken edge is 9.2 mm, at the midpoint of the shortest edge is 8.5 mm, and at the midpoint of the broken edge is 8.8 mm.

There is a small crack along the side of the complete corner running parallel with the faces 45.65 mm long toward the break; this may affect the thickness measurements along that side. The highest measurement, 8.88 mm at midpoint of that side, would not be the measurement were the palette measured before it was discarded. It is recommended that this palette should be subjected to residue analysis to ascertain whether plant seeds were crushed/ground.

5.4.1.14 Ochre Bowl

DlLg-33:08A/12742 is an ochre bowl recovered from Unit D18. It is a limestone cobble that was broken roughly, resulting in a slight depression. The area in the center of the depression is covered in ochre and the staining is holding fast to the limestone. There are a few portions of this bowl that are slightly smoothed, probably from the grinding stone that was used to pulverize the ochre. As very little smoothing or polish exists on this bowl, and no alterations on any other surface have been made, it is clear that it is a tool of opportunity that was used for a short period and then discarded or abandoned. The measurements are length 134.0 mm, width 101.5 mm, and thickness 52.5 mm.

The area used for pulverizing the ochre is a roughly rectangular shape set in from three of the edges and a strong step fracture running across the utilized face of the bowl that serves as the fourth edge of the utilized area. The utilized area dimensions are 39.0 mm by 47.0 mm.

Parks Canada submitted the bowl for residue analysis. Paleo Research Institute tested the black residue and the red residue separately. The black residue was identified as *Cleome* (beeweed) which can be boiled down to a thick black paste that can be used as paint. The red residue, in addition to ochre, had *Helianthus* (sunflower) leaves, *Quercus* (oak) nut shells, and *Antilocapra* (pronghorn) blood (Appendix C). It appears that these were mixed together as a paint and the bowl functioned as an artist's palette holding different colours of paint for decorative purposes.

Plate 5.4-37: DlLg-33:08A/12742, Ochre Bowl (actual size)

5.4.1.15 Pipe

DlLg-33:08A/2409 is a soapstone pipe that was recovered in Unit A4. There are two very small pieces. The larger piece has evidence of polishing on the outer face as well as some markings on the

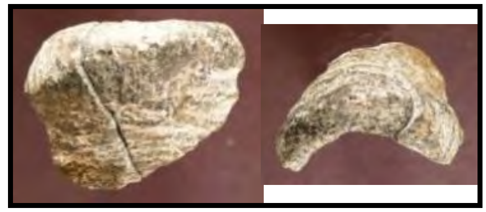


Plate 5.4-38: Longitudinal and Vertical Views of Pipe Fragment (2x actual size)

inner surface that are consistent with manufacture, i.e., striations along the inner tube. The outer surface has decorative carvings (non-connecting rings) and a general step between the upper rim of the bowl and the curving stem portion. No noticeable residue occurs along the inner face of the pipe. The length of the fragment is 12.08 mm. The diameter of the complete pipe, based upon measurements of the two refitting fragments, is calculated to be 18.73 mm. The thickness of the lip is 3.13 mm, which provide an approximate diameter of the bore of 12.47 mm. This is quite small, so it is possible, given the lack of any residue, that this is a very small fragment of some other object. It is equally possible that the pipe was broken in manufacture and never used.

5.4.1.16 Sucking Tube

Plate 5.4-39: DlLg-33:08A/7522 (2x actual size)

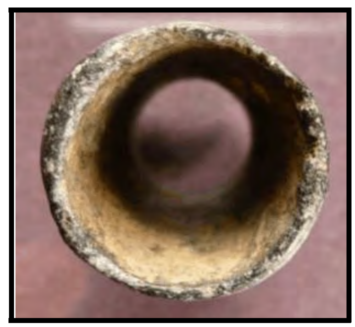


Plate 5.4-40: View of Interior of DlLg-33:08A/7522 (2x actual)

DlLg-33:08A/7522 is a soapstone sucking tube. It was curated from Unit E10. The measurements are: length 32.20 mm, width (narrow end) 16.19 mm, (midpoint) 17.63 mm, (wide end) 19.10 mm. The wall thickness is 2.14 mm to 2.38 mm at the narrow end and 1.4 mm to 2.54 mm at the wide end. There are numerous teeth marks at the narrow end. Short, parallel cuts in vertical groups range all the way around the piece. The average length of these cuts is approximately 3.5 mm. The few striations that run along the length of the sucking tube appear to be either accidental or post-depositional. The inner surface is heavily scarred with striations that run the length of the tube. This is consistent with pipe and sucking tube construction. Both ends are rounded and the outer surface of the pipe would have been highly polished. There is little residue present.

5.4.1.17 Pecking Stone

Plate 5.4-41: DlLg-33:08A/2663 (actual)

DlLg-33:08A/2663 is a granite pecking stone, from Unit A5, that has been broken at one end. It is ovoid with a length of 50.80 mm, a width of 40.60 mm, and a thickness of 34.10 mm. Directly beside the break is an area of pecking impacts. It is most likely that pecking is the reason for the break. The opposite side of the stone also has heavy pecking impacts, enough that the area is flattened out of the round of the stone's original shape. The impact zone measures 26.8 mm in length by 17.46 mm in width.

5.4.2 Detritus

Detritus, the waste material from lithic tool manufacture, consists of cores and flakes.

5.4.2.1 Cores

Three cores were recovered from this level. DlLg-33:08A/3666, from Unit D1, is a chert core that has one large flake scar on one end, with two other, smaller flake scars on each side of the largest of the three. The rest of this core has an extremely rough surface which is heavily corticated and contains deeply incised vugs on the surface. Although the material exposed would be of medium to high quality chert, the amount of impurities on the surfaces of the stone were most likely the reason for this object's abandonment.

DlLg-33:08A/3871 is a chert core from Unit D3. It is roughly oblong in shape, 45.3 mm in length, 24.4 mm in width, and 15.6 mm thick with a weight of 17.59 grams. There are two flake scars that run the length of the core along one face. The material is uniform in consistency and the core would be a difficult shape to work with. Most likely it was abandoned due to this.

DlLg-33:08A/12687 is a chert core from Unit D17. This core, roughly rectangular in form, has had flakes taken off all faces. Cortex remains on one corner. There is no edge battering, so this core did not undergo bipolar reduction. The material is good quality and one of the edges remains quite sharp.

5.4.2.2 Flakes

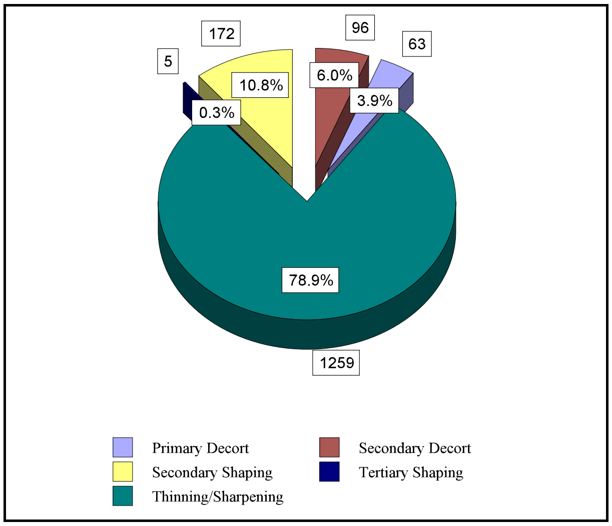
A total of 1595 flakes, weighing 1011.5 grams, were recovered indicating considerable stoneworking. The recoveries from Level 2 include representations of all five categories of types of flakes (Table 5.4-8, Figure 5.4-2).

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	63	341.7
Secondary decortication	96	201.5
Secondary shaping	172	301.3
Tertiary shaping	5	0.7
Thinning/sharpening	1259	166.3
TOTAL	1595	1011.5

Table 5.4-8: Frequency of Types of Recovered Flakes

The material type for all flakes was determined, as the frequencies (Table 5.4-9, Figure 5.4-3) can provide information as to cultural preferences, trading patterns, and often the previous locations at which the people had visited during their seasonal round.

The distribution of the flakes by weight is shown in Figure 5.4-4. The quantity of flakes recovered from each excavation unit is also depicted on the map, as is the size range of the recovered flakes.



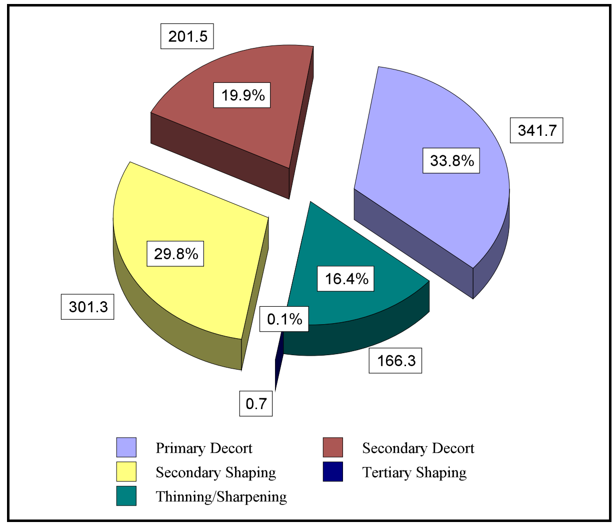
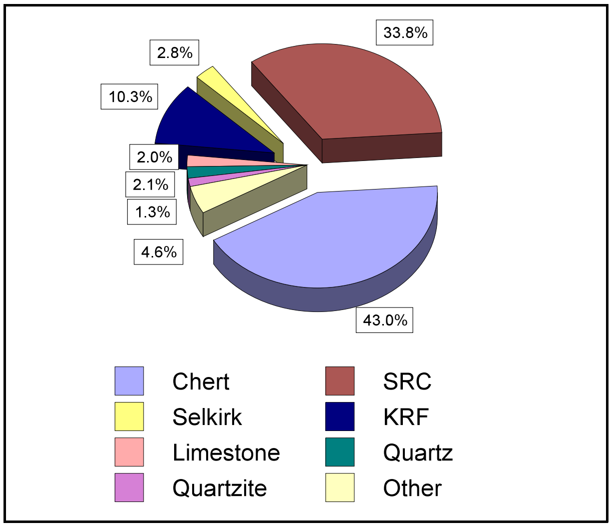


Figure 5.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

MATERIAL	QTY	%	WT	%
Agate	1	0.06	1.6	0.16
Soapstone	1	0.06	0.2	0.02
Taconite	1	0.06	0.1	0.01
Chalcedony	2	0.13	2.3	0.23
Rhyolite	2	0.13	1.9	0.19
Cathead Chert	3	0.19	7.6	0.75
Schist	3	0.19	0.9	0.09
Siltstone	3	0.19	0.9	0.09
Gabbro	4	0.25	2.5	0.25
Mica	6	0.38	0.1	0.01
Porcellanite	7	0.44	3.8	0.38
Phyllite	13	0.82	2.9	0.29
Quartzite	20	1.25	43.5	4.30
West Patricia Recrystallized Chert	27	1.69	5.6	0.55
Limestone	32	2.01	179.9	17.79
Quartz	33	2.07	29.4	2.91
Selkirk Chert	45	2.82	20.4	2.02
Knife River Flint	165	10.34	106.5	10.53
Swan River Chert	540	33.86	124.5	12.31
Chert (Undifferentiated)	687	43.07	476.9	47.15
	1595	100.01	1011.5	100.03

Table 5.4-9: Frequency of Level 2 Flakes by Material Type



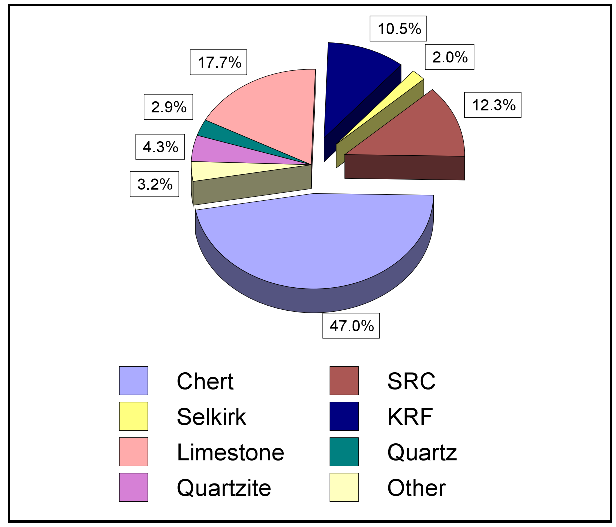


Figure 5.4-3: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

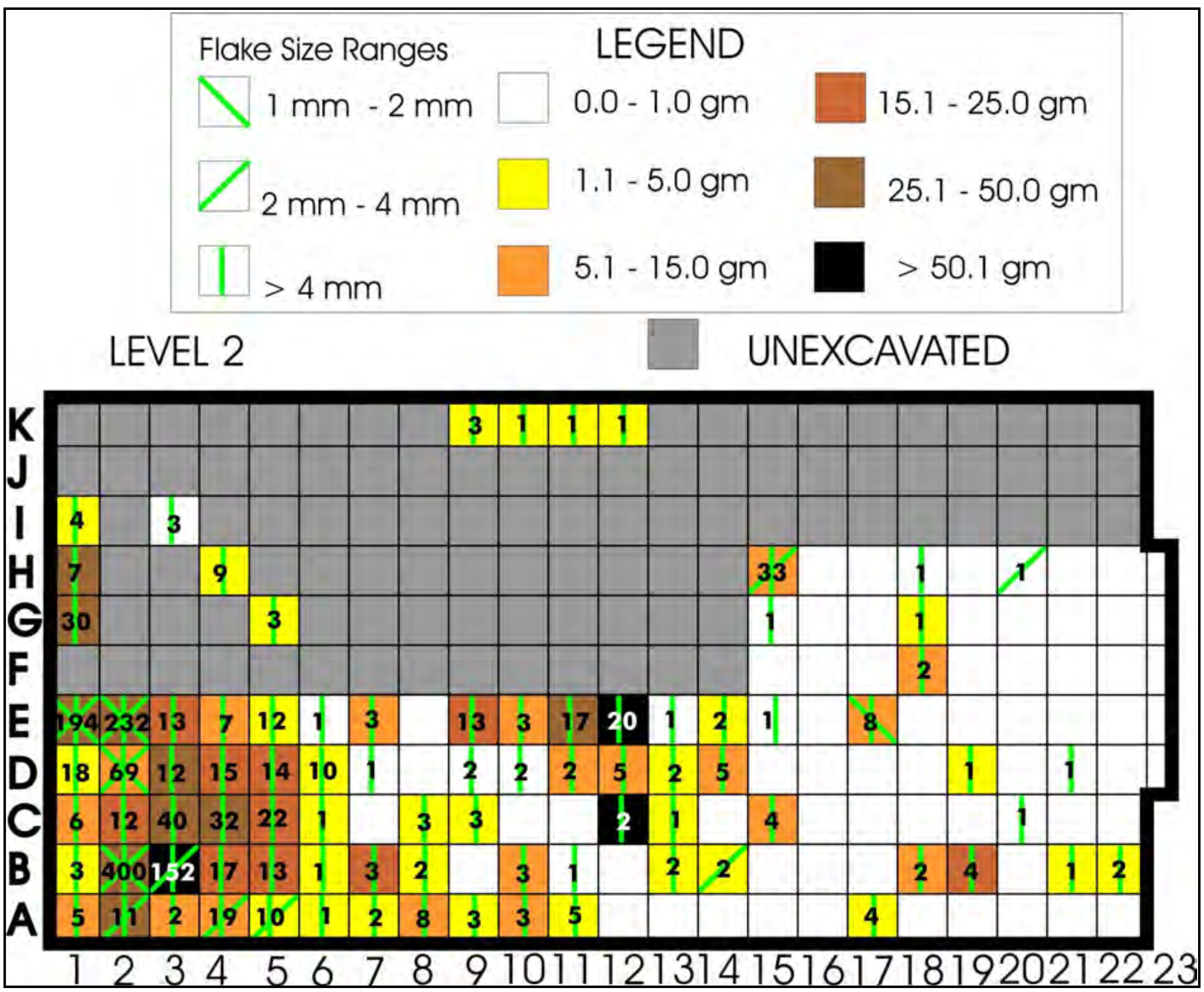


Figure 5.4-4: Distribution of Flakes in Level 2

The flake distribution pattern in Level 2 displays three concentrations around Units B2 and B3 and around Units E1 and E2. Units E1 and E2 both have hearth components and Units B2 and B3 have three hearths on the south side and one large hearth on the north side. Only four units contain all three flake sizes; Units E1, E2, D2, and B2. This lends credence to the idea that these two concentrations are tool manufacturing areas. The concentration of flakes is mostly on the west end of the excavated area, with a fairly uniform diminishment across the site from west to east. The presence of flakes on the K9 to K12 line is interesting but there is not enough evidence to indicate another knapping station. Unit E12 also has a concentration around it, but in much smaller weights and numbers than the concentrations discussed above. The presence of a hearth suggests that once again knapping stations are associated with hearths. It is possible that some knapping was performed after sundown and was necessarily near the hearths for light, not to mention warmth.

The lithic material types that are represented by the flakes (Table 5.4-9) are mapped in Figure 5.4-5. This table and the associated map show a surprising amount of variation in materials.

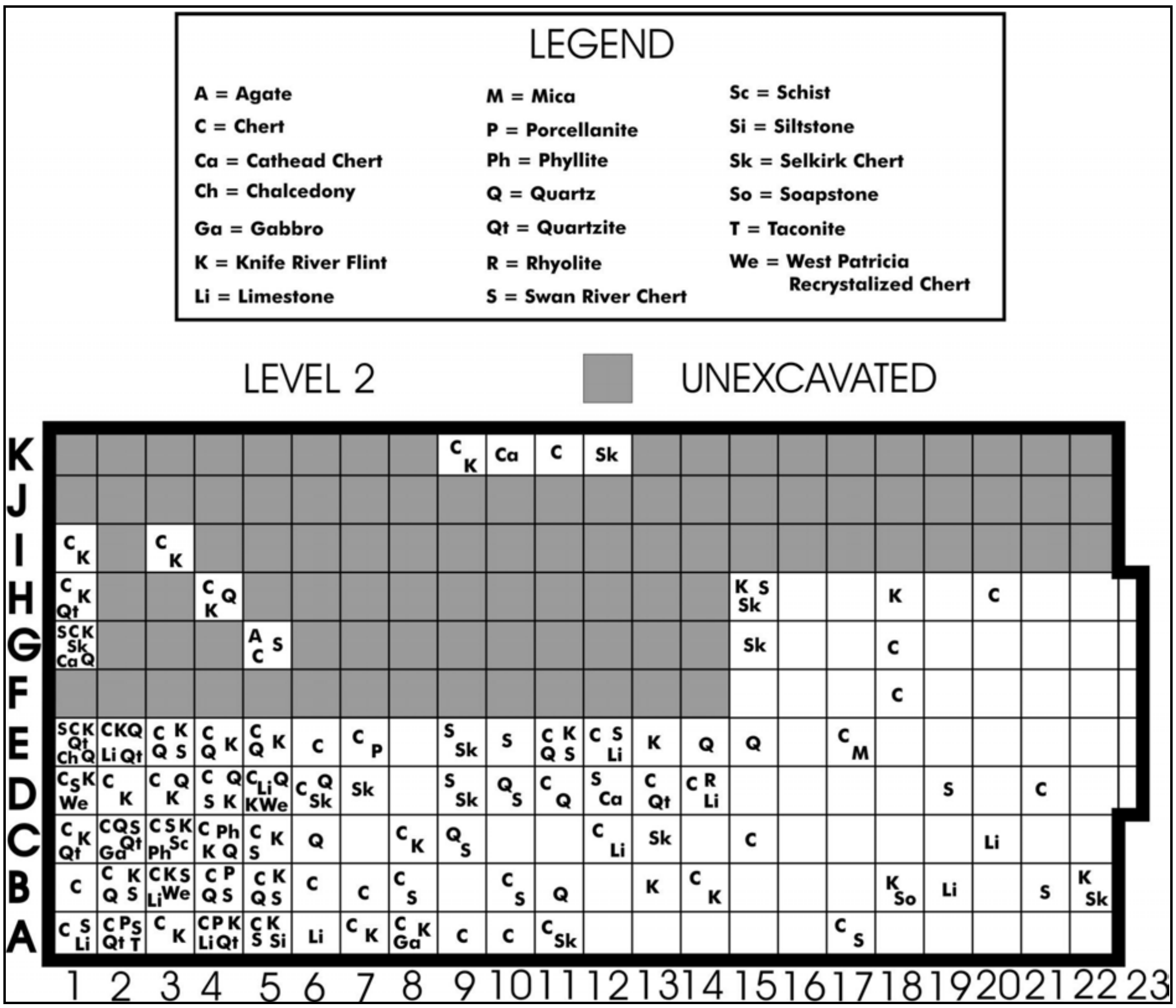


Figure 5.4-5: Distribution of Flakes by Material Type

All materials in this level are not uncommon in the area and can be obtained by trading routes—Knife River Flint and soapstone are two examples—or gathered by the occupants. Quartz, quartzite, the different chert types, and limestone would be fairly easy to obtain within a few days travelling from the site. The distribution of material types follows the general flake distribution, concentrating around the areas of Units B2 and B3 and Units E1 and E2.

One interesting recovery, from Unit E17, was six very small mica flakes (DlLg-33:08A/5776). These flakes are possibly the result of crushing for use in ceramics.

5.4.3 Natural Object Modified

Three types of modified natural objects were curated from Level 2. These include fire-cracked rock, hearthstones, and ochre.

5.4.3.1 Fire-cracked Rock

A total of 270 – exclusively granite - FCR pieces weighing 4692.9 grams were uncovered in Level 2, the majority of which is concentrated in the southwest corner of the excavation area (Figure 5.4-6). Two large pieces of FCR were found in Unit A22 and a few scattered fragments in the centre of the site. The fact that the majority of FCR recovered from this level occurs in a relatively confined area may indicate that a large food preparation area existed at or just beyond the western boundary of the excavation area. The hearth found in this area may lend credence to this possibility. Alternatively, this area could have been a chosen location to dump exhausted boiling stones or possibly the FCR was being stored in this area for future use in pot making.

5.4.3.2 Hearthstones

All hearthstones in Level 2 were limestone. Hearthstones are normally stones that line the edges of a fire to contain it from wind, etc. The Forks, in general, has had very little in the way of actual hearthstones collected from Pre-Contact encampments; as all materials must be manuported into the site. Lugging around large, inconvenient stones could well be seen as a waste of energy, especially when a shallow pit will serve the task equally well. Limestone does not make a great hearthstone as it breaks down much more quickly than igneous rock, e.g., granite, but these pieces all show typical signs of being affected by fire. Lacking another cogent term for these, sometimes large, pieces of limestone that have no apparent manufacturing marks has resulted in the use of the slightly misleading term 'hearthstone' for this type of artifact.

Ten hearthstones were uncovered in Level 2 (Figure 5.4-6), ranging in weight from 9.5 grams to 599.2 grams. The total hearthstone assemblage weighs 2028.2 grams. Other than one large artifact in Unit C20, the hearthstones were concentrated in the same area as the FCR.

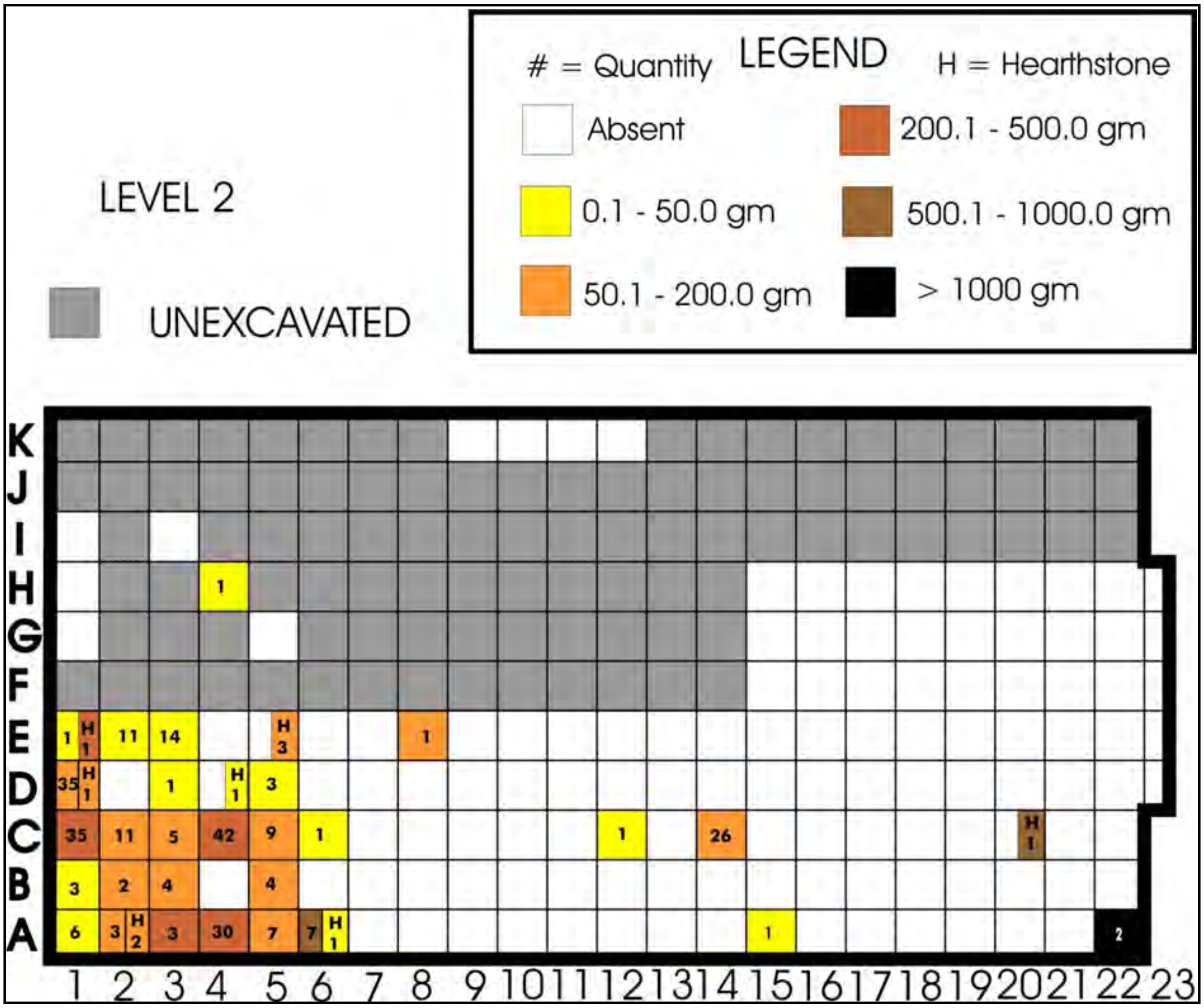


Figure 5.4-6: Distribution of Fire-cracked Rock and Hearthstones in Level 2

5.4.3.3 Ochre

Forty-four separate pieces of ochre with three colour types were recovered from Level 2 (Figure 5.4-7). The breakdown is: red with a total of 3.6 grams; orange with a total of 0.9 grams, and orange/yellow with a total of 0.1 grams for a total of 4.6 grams.

5.4.4 Natural Object Unmodified

Thirty artifacts were identified at unmodified natural objects, cobbles and spalls (Table 5.4-10).

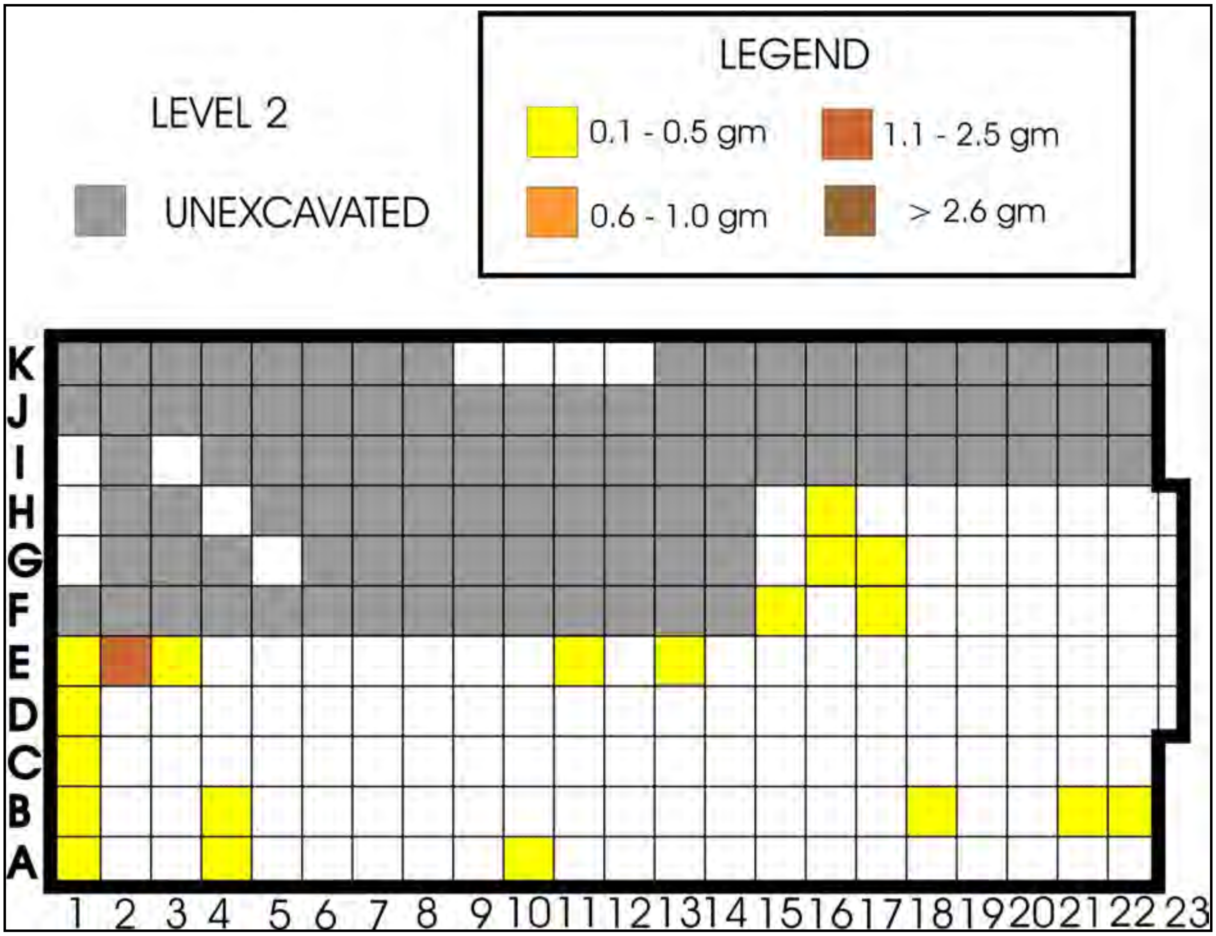


Figure 5.4-7: Distribution of Ochre in Level 2

CAT #	OBJECT	UNIT	MATERIAL	QTY	WEIGHT
5766	cobble	E17	quartzite	1	227.7
14873	cobble	B19	limestone	22	4000.0
TOTAL				23	4227.7
3570	spall	C5	schist	1	2.0
3666	spall	D1	Swan River Chert	1	97.3
4011	spall	D5	shale	1	0.4
5835	spall	A6	shale	1	3.2
5879	spall	A6	shale	1	5.8
9416	spall	E13	granite	1	41.2
24375	spall	B7	diorite	1	5.0
TOTAL				7	154.9

Table 5.4-10: Unmodified Natural Objects in Level 2

5.4.5 Summary

A total of 74 tools, 1595 flakes, 270 pieces of FCR, 10 hearthstones, 44 pieces of ochre, and 30 unmodified objects were recovered from this level. The 2023 artifacts indicate a wide variety of uses for stone tools. All of these different uses reflect the lifeways of the people. It appears that most of the activities that took place in the excavated area is concentrated around the hearths uncovered during the excavation.

The tools show that a wide variety of activities took place from grinding stones for vegetable preparation to projectile points for acquiring meat to gravers for decorating or marking bone, antler and stone. The palette, ochre bowl, sucking tube, and pipe fragments suggest that this group also had a strong spiritual component. They were successful enough in obtaining their food and other material needs that time could be spent on activities like creating a palette or pipe, both of which would be relatively delicate objects to work with and would require the attention of skilled and dedicated hands to create these objects. The ochre bowl, although a tool of opportunity, suggests that the people decorated the world around them and, perhaps, themselves as well.

5.5 Botanical Remains

Seven types of wood were identified from the samples in Level 2. The highest occurring type was ash followed by maple, elm and then poplar and willow (Table 5.5-1). Oak was marginally present and a single piece of basswood (*Tilia*) charcoal was identified. A total of 205 catalogue numbers representing 447 charcoal specimens were curated.

TAXON	CAT #'S	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	42	102	37.64
Elm (*Ulmus*)	28	45	16.61
Maple (*Acer*)	35	59	21.77
Oak (*Quercus*)	4	6	2.21
Poplar (*Populus*)	8	14	5.17
Poplar/Willow	10	15	5.54
Willow (*Salix*)	11	29	10.70
Basswood (*Tilia*)	1	1	0.37
Diffuse Ring Pattern	20	30	
Semi-ring Porous	1	1	
Hardwood	7	20	
Unidentified	58	125	
	205	447	100.01

Table 5.5-1: Frequency of Charcoal Recoveries

Graphically, the frequency of the identified taxa is depicted in Figure 5.5-1. Ash and maple are the dominant species, with elm and willow next in frequency.

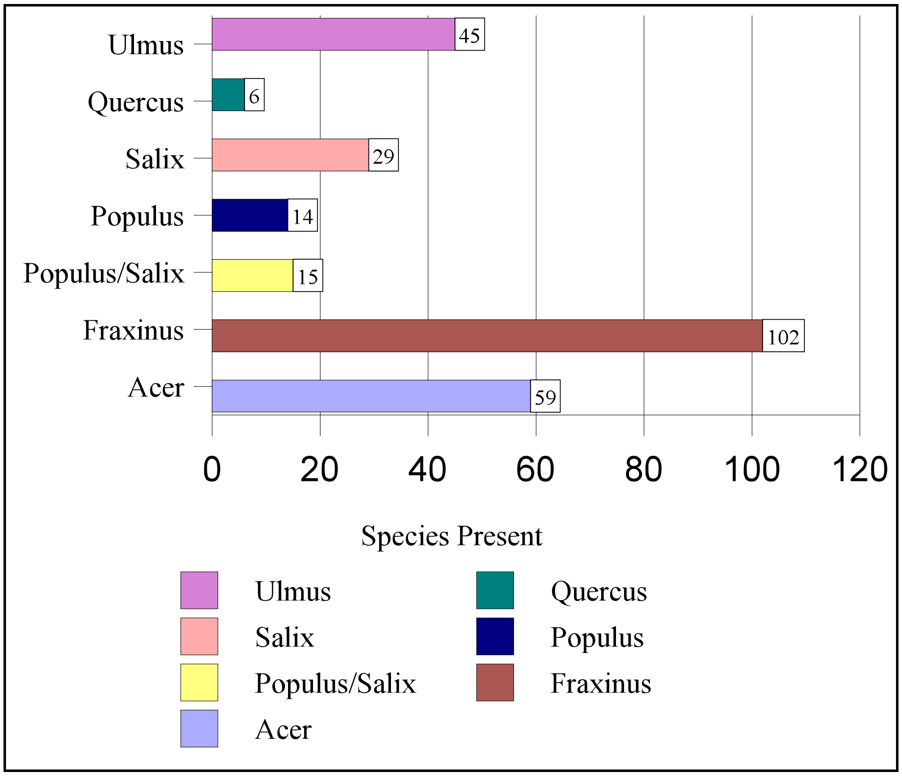


Figure 5.5-1: Frequency of Identified Taxa

Level 2 had the largest number of identified hearth features at 20. Charcoal was collected from units corresponding to 14 of these (Table 5.5-2, Figure 5.5-2). Eleven of the hearths had ash, nine had elm and maple, three had willow/poplar and two had oak. Species diversity within the hearths generally increased with the number of samples collected.

HEARTH	H-1	H-2	H-3	H-4	H-5	H-6	H-7	H-8	H-9	H-10	H-11	H-12	H-13	H-14
SAMPLES	9	1	14	3	5	5	1	2	3	9	1	1	1	1
Ash (*Fraxinus*)	2	1	7	2	1	1	-	2	1	2	-	1	1	-
Elm (*Ulmus*)	1	1	4	-	2	2	-	-	1	1	-	1	-	1
Maple (*Acer*)	3	2	9	2	-	2	1	1	-	2	1	-	-	-
Oak (*Quercus*)	2	-	-	-	-	-	-	-	-	-	-	1	-	-
Poplar/Willow	-	-	2	-	1	1	-	-	-	-	-	-	-	-
Willow (*Salix*)	-	-	8	-	-	-	-	-	-	-	-	-	-	-
Diffuse Ring	3	1	3	-	1	-	-	-	1	2	-	-	-	-
Unidentifiable	-	-	1	-	1	-	1	-	-	-	-	-	-	-
Bark	1	-	1	-	1	1	-	-	1	4	-	-	-	-
TOTAL	12	5	35	4	7	7	2	3	4	11	1	3	1	1

Table 5.5-2: Frequency of Charcoal Recoveries at Hearth Locations

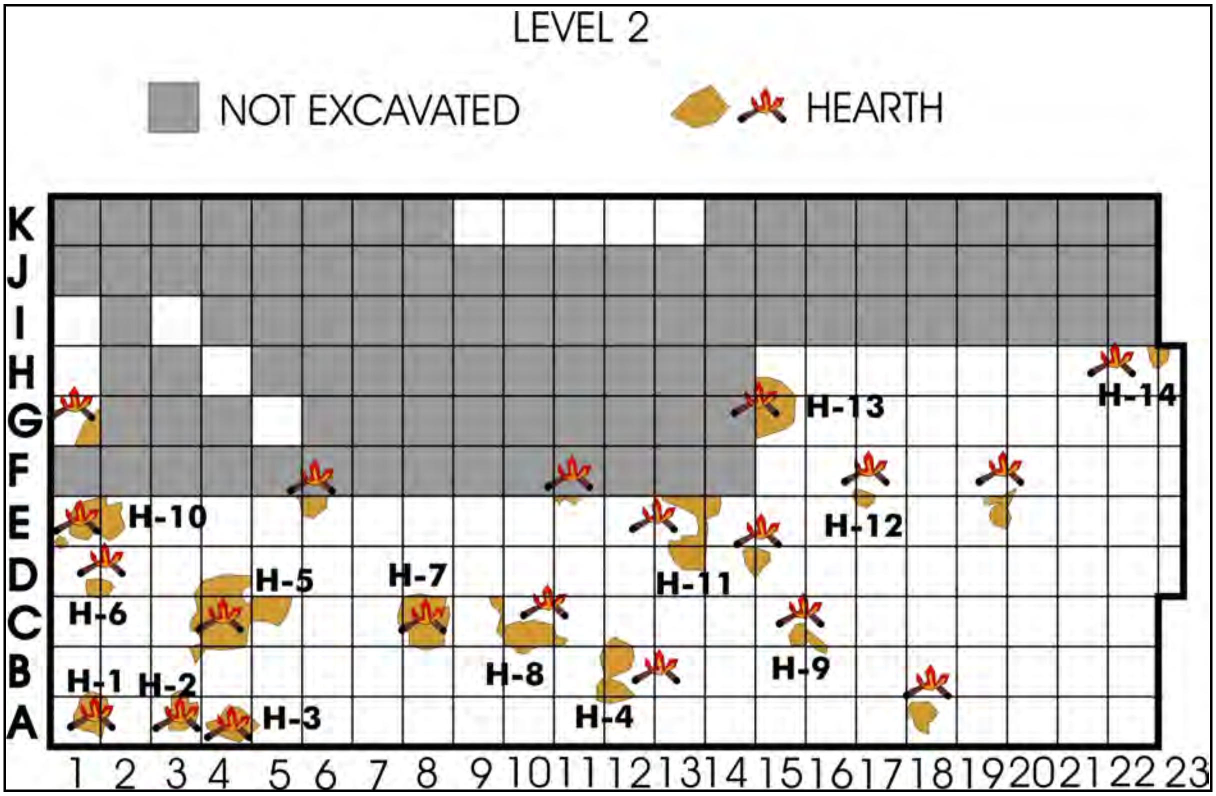


Figure 5.5-2: Designated Hearths for Charcoal Analysis

The three fragmented charred hazelnut shells were recovered from the unit associated with hearth H-5. The clay clump with the cf. *Ulmus* (elm) leaf impression occurred in this level (Plate 5.5-1).

Plate 5.5-1: Fire-hardened Clay with Impression of Elm Leaf

Two samples of an organic substance, tentatively identified as fungus, were recovered from Unit E1. A section of tree trunk, weighing more than 500 grams, was recovered from Unit E2. The presence of this wood specimen could be the result of cultural activity or natural deposition after the campsite was abandoned.

5.6 Mammal, Avian, and Reptilian Remains

Level 2 poses some interesting problems due to the manner in which it was excavated. When Level 2 was first encountered in the west side of the excavation, it was not immediately apparent that there were multiple levels present. As a result, the first five square meters of Level 2 were excavated as a whole unit before it became apparent that there were stratigraphic sub-divisions. The main reason was, that at this location within the excavation area, there were very minimal depositional riverine sediments separating these cultural horizons. This will have some impact upon the materials being examined. However, being aware that some of the recoveries may be the result of multiple overlapping levels, then an attempt can be made to avoid biased interpretations.

5.6.1 Mammal Butchering Remains

A total of 2863 unique elements, weighing 15016.1 grams, were recovered. As with Level 1, the amount of undetermined bone is rather high at 78% by quantity (Figure 5.6-1), but these also are mostly small fragments of bones where identification is simply not possible. It can be seen in Figure 5.6-2 that when total weight is considered, only 15% of the materials are undetermined.

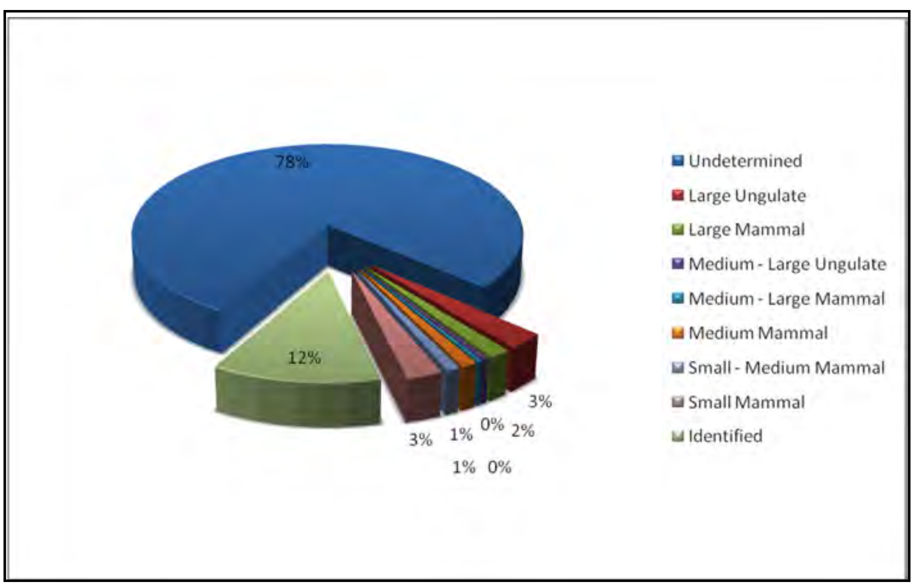


Figure 5.6-1: Frequency of Mammal Butchering Remains by Quantity

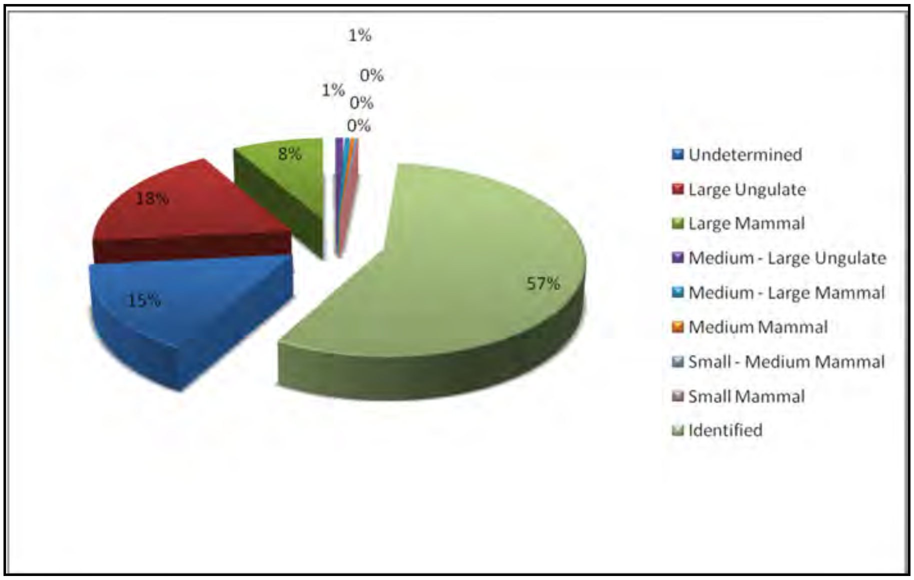


Figure 5.6-2: Frequency of Mammal Butchering Remains by Weight

Figure 5.6-3 provides the distribution of mammal remains across Level 2. Several areas of note can be seen. There are several hearths throughout the level. The distribution of mammal remains seems to suggest that there were areas that were primarily for food preparation and others that were possibly more for social gathering. There seems to be a less dense area between the large hearth at Unit C4 and another large hearth in Unit C8. This pattern is somewhat replicated by the tool and avian remains distributions (Figure 5.6-9 and Figure 5.6-10).

The first faunal concentration is located in the southwest corner of the site. There are several smaller hearths all through this area. These might indicate the focus of the food preparation with the large central hearth at Unit C4 being less about food processing and more about socialization. The same pattern seems to exist for the central portion of the excavation area. There is another concentration from 12 East to 14 East with several hearths throughout and nearby hearths at Unit C8 and Unit C11 having comparatively very little mammal remains. The next concentration is focused on the eastern edge and actually has several units with large amounts of bone. There are some hearths in this region and it is possible that this is another food production area or these units might represent a waste area or midden on the periphery of the site. The possibility of the location being a midden is somewhat suggested by the topography with the eastern end being the lowest area of level combined with the fact that the site appears to suddenly end with the majority of units past 20 East having no bone whatsoever.

Finally, there is one last area of interest in Units H1 and G1. These units show an increase in mammal remains and also have a sizable hearth present. However, it is difficult to form any broader interpretation due to the fact that it was not possible to excavate the surrounding area further.

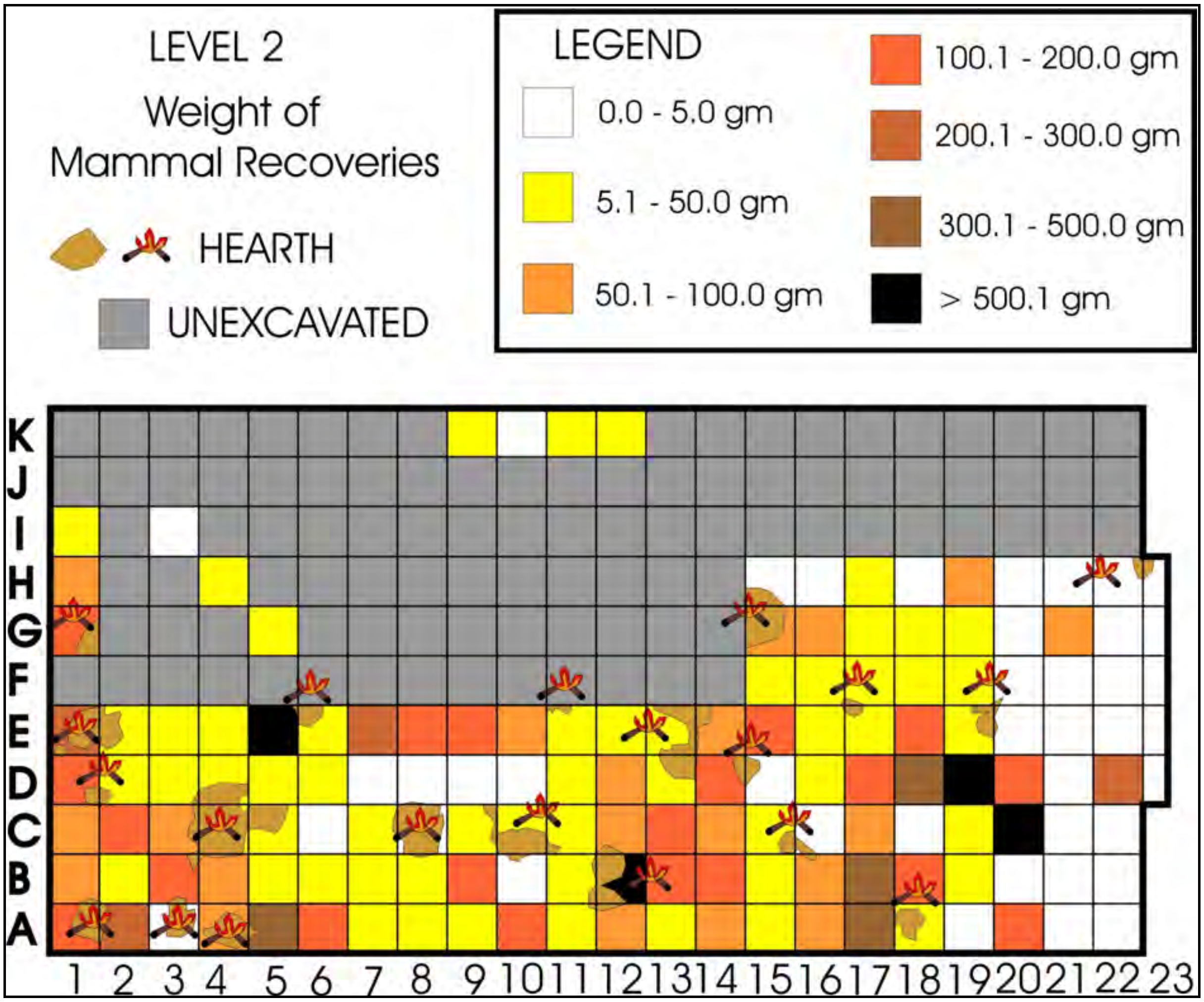


Figure 5.6-3: Distribution of Mammal Butchering Remains in Relation to Hearths

The distribution of the culturally modified mammal butchering remains (Figure 5.6-4) indicates, much like the situation with Level 1, an overlapping pattern with the distribution of mammal bone by density. The distribution of these culturally modified materials echos the same activity areas.

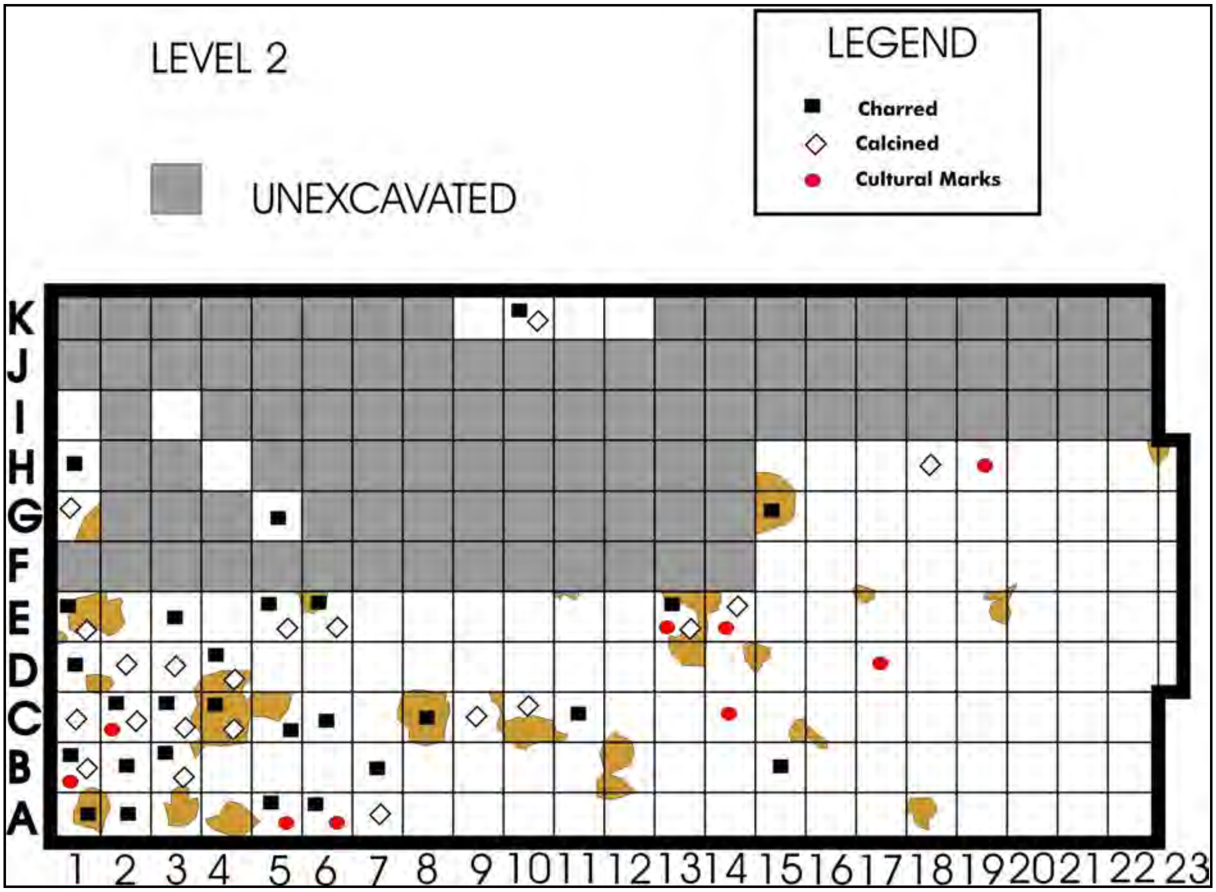


Figure 5.6-4: Distribution of Culturally Modified Mammalian Remains in Relation to Hearths

Level 2 has some of the highest amounts of large mammal of any of the levels. This likely accounts for the fact that although the number of elements is almost half of that in Level 1, the weight is just over 1000 grams less. The identified species (Figure 5.6-5) are spread across the horizon with the widest variety occurring from the concentration that ranges across Units A4 to A8. Of those taxa which could not be identified to species, the distribution indicates there are two concentrations of the larger mammals—in the central portion of the excavation area and on the western periphery (Figure 5.6-6).

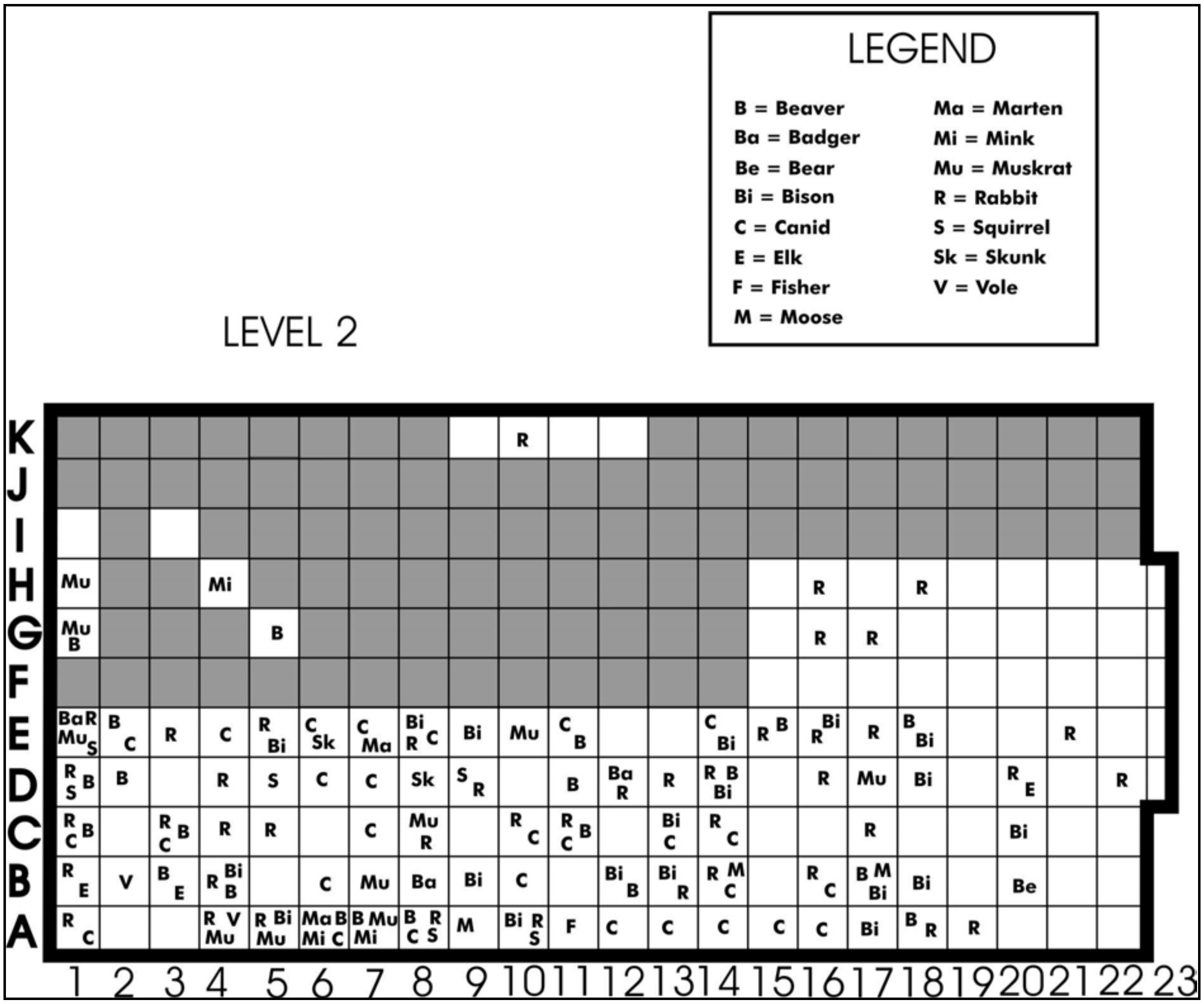


Figure 5.6-5: Distribution of Identified Species

The high proportion of large ungulates provide for much larger amounts of meat than those seen in Level 1. In terms of numbers of animals (Figure 5.6-7), rabbit is the most dominant. However, it is clear when weight is the consideration (Figure 5.6-8), the large ungulates overwhelm the other taxa with bison representing 91% and elk and moose making up a further 4%.

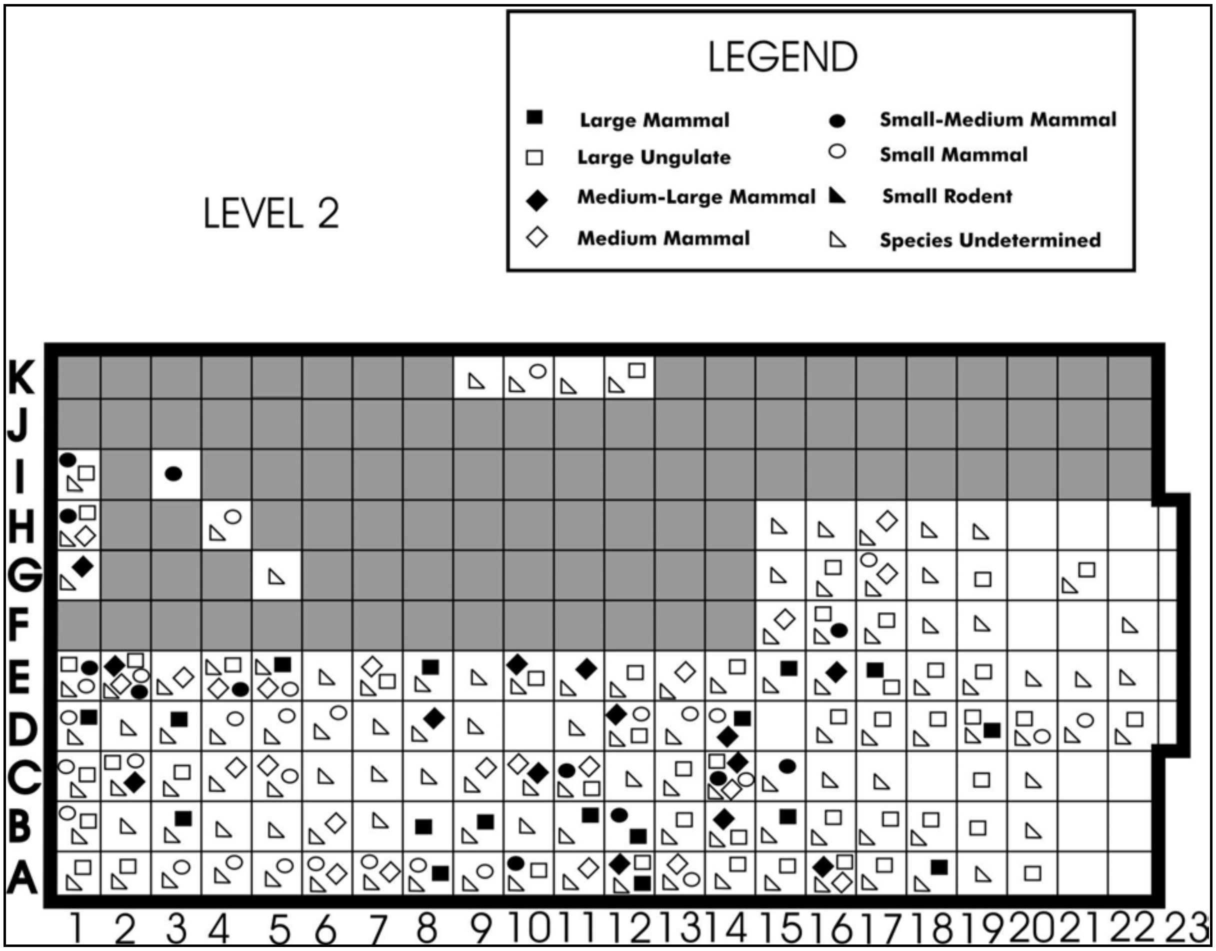


Figure 5.6-6: Distribution of Mammal Remains Which Could Not be Identified to Species

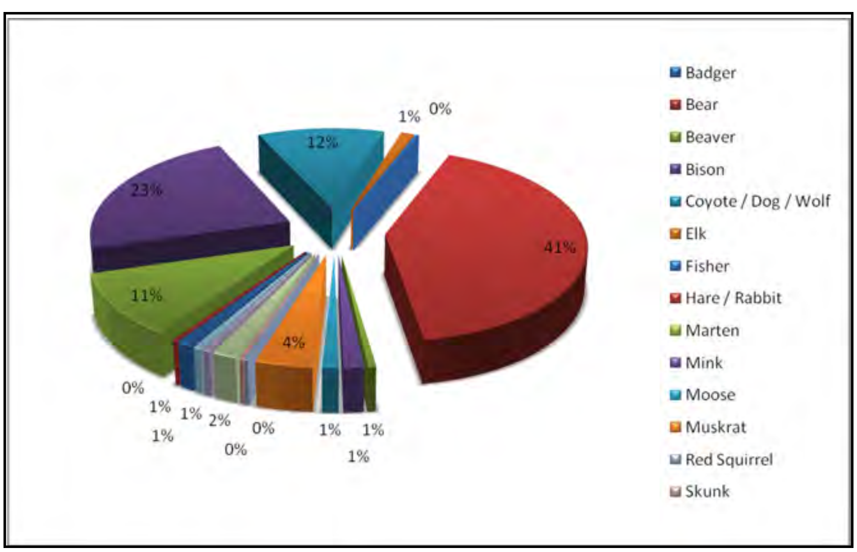


Figure 5.6-7: Frequency of Identified Species by Quantity

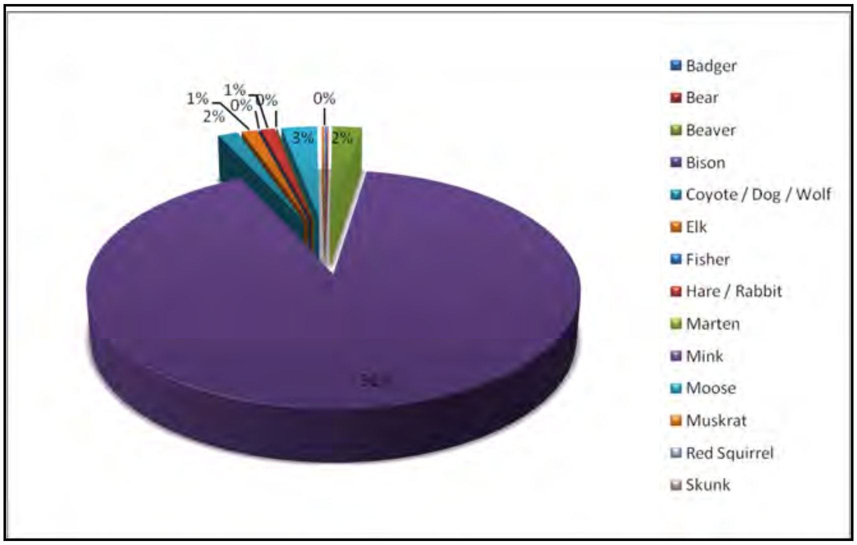


Figure 5.6-8: Frequency of Identified Species by Weight

The MNI indicate that there are at least two bison present (Table 5.6-1). This is clearly indicated by the presence of two axis vertebrae, the first of the spinal column directly behind the head. There is also evidence of at least one moose and one elk, both of which are accounted for with several leg bones each. There is even a bear element present. Only consisting of a single finger bone, it is entirely possible that this was transported to the site rather than having been a recent kill.

SPECIES	MNI
Badger (*Taxidea taxus*)	1
Bear (*Ursus* sp.)	1
Beaver (*Castor canadensis*)	3
Bison (*Bison bison*)	2
Coyote/dog/wolf (Canidae)	1
Elk (*Cervus elaphus*)	1
Fisher (*Martes pennanti*)	1
Hare/Rabbit (Lagomorpha)	7
Marten (*Martes americana*)	1
Mink (*Mustela vison*)	1
Moose (*Alces alces*)	1
Muskrat (*Ondatra zibethica*)	1
Red Squirrel (*Tamiasciurus hudsonicus*)	1
Skunk (*Mephitis mephitis*)	1
Squirrel (*Sciurus* sp.)	2
Vole (*Microtus* sp.)	1
Wolf (*Canis lupus*)	1
Total	27

Table 5.6-1: Minimum Numbers of Identified Species

Of the mid-sized animals, three beaver were identified in the assemblage as well as wolf. The wolf, however, was identified based on two teeth and there is the possibility that the ancient breeds of dogs accompanying the occupants were larger and more robust than most dogs or there was an active process of cross-breeding between domestic canids and wolves. There were several pieces of canid bone. However, the MNI still only calculated out to being a single individual.

Rabbit is the only small mammal to be present in multiples. There were at least seven individuals accounted for in the faunal assemblage for Level 2. These remains were spread throughout the site. Several smaller mammals were present: badger, fisher, marten, mink, and muskrat. Various elements of squirrels, skunk, and vole were present although evidence suggests that there was only a single one of each of these species. In all likelihood, the vole represents a taphonomic addition to the site rather than having been a food source.

5.6.2 Bone Tools

There are several bone tools present in Level 2 (Figure 5.6-9). The metrics for all tools are provided in Table 5.6-2, while the artifacts will be described in the relevant sections.

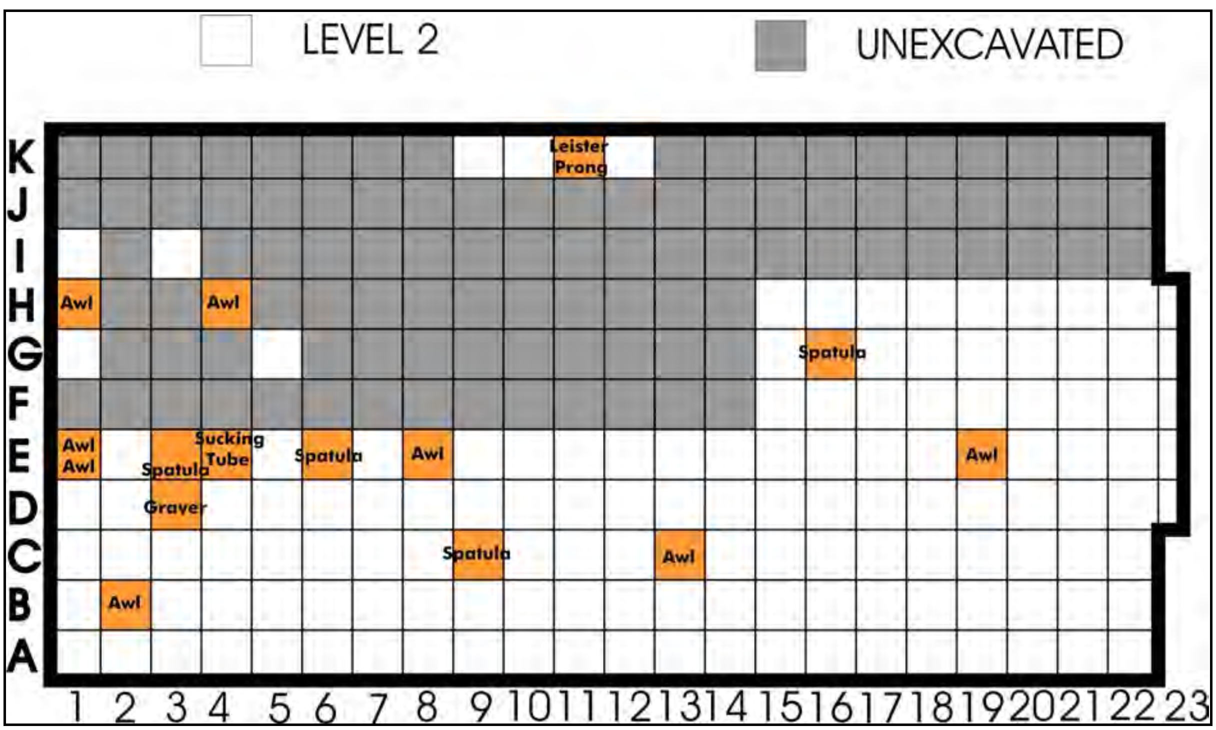


Figure 5.6-9: Distribution of Bone Tools in Level 2

CAT. #	UNIT	OBJECT	LENGTH	WIDTH	THICK	WEIGHT
2902	B2	Awl	11.7	1.4	0.7	5.2
4070	E1	Awl	4.4	1.4	0.5	5.9
4071	E1	Awl	7.4	1.4	0.4	1.2
7400	E8	Awl	11.9	1.1	0.4	4.6
9665	C13	Awl	10.1	0.6	0.4	1.6
11317	E19	Awl	7.4	1.4	0.7	3.7
13757	H1	Awl	6.5	1.8	1.3	2.9
16351	H4	Awl	2.6	0.6	0.2	0.2
4341	E3	Spatula	13.3	1.8	0.6	13.3
6776	C9	Spatula	8.2	2.0	0.8	11.7
7269	E6	Spatula	6.9	1.8	0.6	8.2
21504	G16	Spatula	11.7	1.8	0.8	19.6
3874	D3	Graver	3.3	0.5	0.3	0.8
13197	K11	Leister Prong	7.4	0.5	0.4	1.6
4407	E4	Sucking Tube	5.0	1.8	1.1	3.5

Table 5.6-2: Recovered Tools Manufactured From Mammalian Material

5.6.2.1 Awls

A total of eight awls were identified throughout Level 2 (Figure 5.6-9). There does not seem to be any concentration of awls except for two in Unit E1 (DlLg-33:08A/4070 and DlLg-33:08A/4071). The six intact specimens are depicted in Plate 5.6-1 and the reconstructed specimens in Plate 5.6-2 and 5.6-3. These awls are made from a number of different materials and in a number of different styles.

DlLg-33:08A/2902 has been formed out of a beaver ulna. DlLg-33:08A/7400 seems to have been formed from a section of mammal long bone, but the shape appears to have been obtained through breaking pieces off rather than whittling out the desired form. DlLg-33:08A/9665 was created out of a bird bone. DlLg-33:08A/11317 is crafted out of a larger mammal metapodial. DlLg-33:08A/13757 is made from a section of an unidentifiable long bone of a juvenile mammal. Both DlLg-33:08A/4070 (Plate 5.6-2) and DlLg-33:08A/4071 (Plate 5.6-3) are carved from mammal long bones.

Plate 5.6-1: Bone Awls from Level 2 (actual size)

Plate 5.6-2: Reconstructed Awl (DlLg-33:08A/4070) (2x actual size)

Plate 5.6-3: Reconstructed Awl (DlLg-33:08A/4071) (2x actual size)

This wide variety of different forms seems surprising. This diverse assemblage could be the result of the simple fact that these were the materials that were available to do the job. On the other hand, these different forms could have resulted from the need for particular types of awl for different activities or simply the preference of the manufacturer.

5.6.2.2 Spatulas

Four artifacts were identified as spatulas (Plate 5.6-4, Table 5.6-2).

Plate 5.6-4: Spatulas from Level 2 (actual size)

Although widespread, the spatulas appear to be associated with the peripheries of hearths (Figure 5.6-3, Figure 5.6-9). All of these tools are created from the long bones of mammals. DlLg-33:08A/21504 is in perfect shape showing no evidence of damage or extensive weathering. It is, however, thicker than this style of tool normally is and is tapered on one end. DlLg-33:08A/7269 is a rather worn example and the tool has broken through the middle and might have been discarded due to its old age. DlLg-33:08A/6776 is broken through the middle on an angle and appears to be similar to the more rounded end of DlLg-33:08A/21504. The thickness of the these two spatulas is also similar and it is possible that this is simply a broken copy of the same tool. DlLg-33:08A/4341 is a perfect example of the spatula form, a thin blade of shaped bone almost in the form of a butter knife. This tool could easily have been employed as a marrow extractor. However, as was discussed in Chapter 3, it is not clear as to the exact nature of these tools despite the fact that objects of this general shape and size appear in many archaeological sites.

5.6.2.3 Miscellaneous Bone Tools

Three other distinct artifacts were recovered from Level 2 (Figure 5.6-9, Table 5.6-2). The first is a beaver tooth graver (DlLg-33:08A/3874). This tooth has been modified to create an edge typical of beaver tooth gravers (Plate 5.6-5).

Plate 5.6-5: Beaver Tooth Graver (DlLg-33:08A/3874), Outer and Inner Surfaces

The second object is a carved needle-like specimen of mammal bone which has been identified as a leister prong—DlLg-33:08A/13197 (Plate 5.6-6). This specimen was recovered from Unit K11 and is basically a bone needle, 7.4 cm in length and approximately 0.5 cm in diameter. It is pointed at both ends. There is no clear evidence of hafting but it seems possible that this artifact was related to fishing. Objects of this design are common both as the prongs of a leister, a type of fishing spear similar to a trident, or as the barb on a fishing hook.

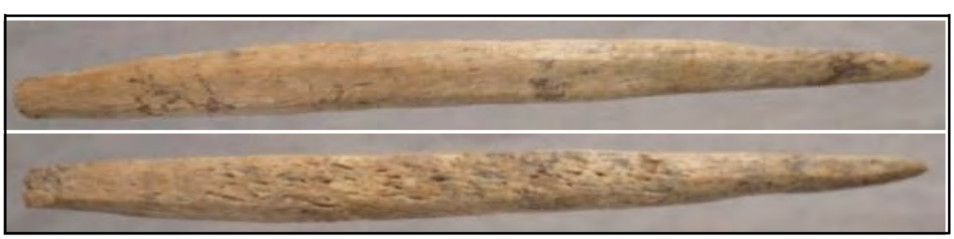


Plate 5.6-6: Dorsal and Ventral Sides of Leister Prong (DlLg-33:08A/13197) (1.5x actual size)

The final specimen is a short tube of bird long bone—DlLg-33:08A/4407. This is obviously from a larger bird due to the size. There is the possibility that this is a sucking tube. The cross-section of the opening of the specimen is depicted in Plate 5.6-7 while the longitudinal view is shown in Plate 5.6-8. This artifact measures 5.0 cm in length, 1.8 cm in width, and 1.1 cm in thickness. It weighs 3.5 grams. This type of artifact would have been used in ritual practices where they were often employed in healing rituals to remove negative elements from the body. There are, however, no markings or designs that might confirm this as an object of ritual importance.

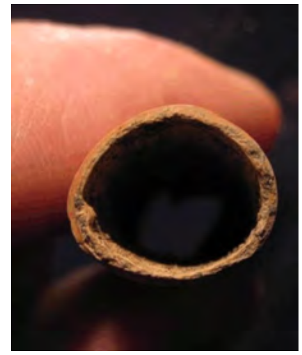


Plate 5.6-7: Sucking Tube Opening

Plate 5.6-8: Longitudinal View of DlLg-33:08A/4407 (2x actual size)

5.6.3 Avian Butchering Remains

The bird remains align well with that of the mammal remains with rings around hearths in Unit C4 and Units C8 and C10. The majority of the bird remains was recovered in the western portion of the site (Figure 5.6-10) with forty of the sixty-six avian remains located in the 25 western excavation units. At this point, it must be reiterated that all of the various sub-levels of Level 2 were excavated as a single occupational horizon. Currently, this does not change the interpretation, but it is curious that the bird remains are still in alignment despite the possibility of there being periods of time between the occupations as suggested by the separation of the horizons in the eastern area by layers of sterile riverine sediments.

There are two bird species identified within Level 2, snow goose and mallard duck. The remainder are simply fragments were it is only possible to state that they are small, medium, and large birds. It is entirely possible that some of the unspeciated elements are from duck or goose, but the fragmentation of the bones has prevented a definitive identification.

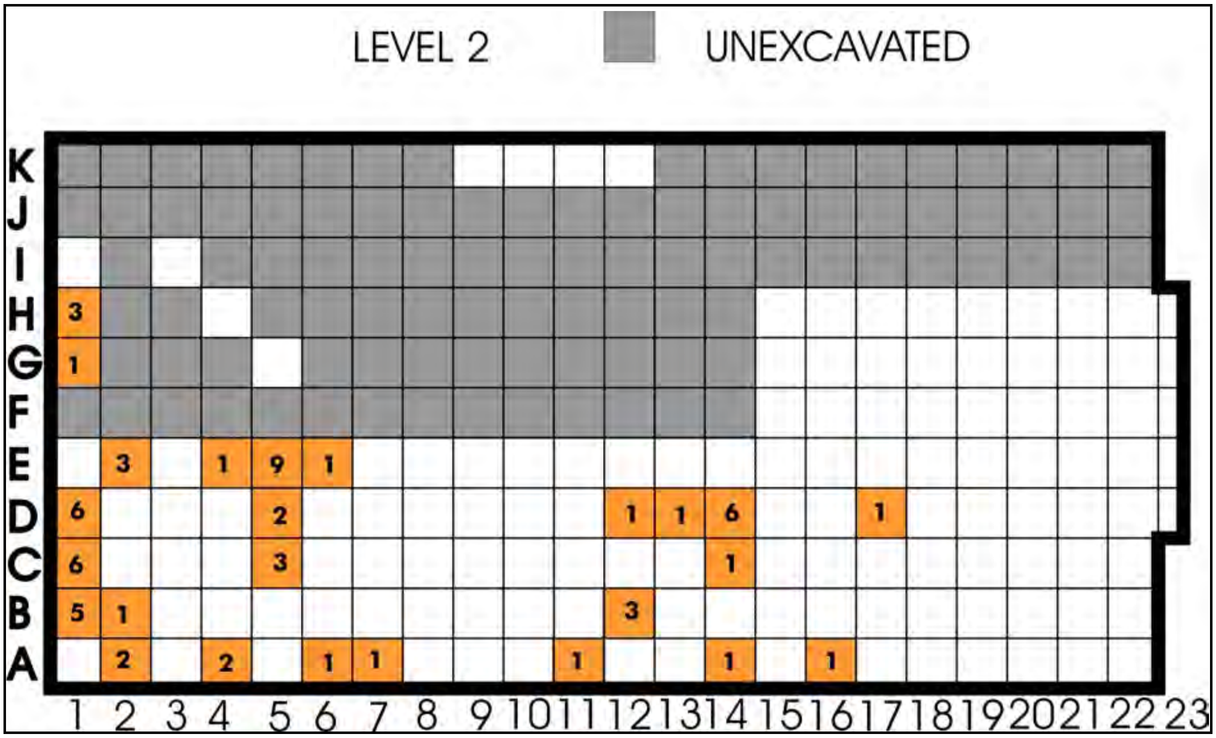


Figure 5.6-10: Distribution of Avian Butchering Remains

5.6.4 Reptilian Remains

The remains of a garter snake, consisting of one rib and three vertebra, were recovered from Unit E1. These minute elements weigh a total of 0.3 grams. It is most likely that this represents a single snake from a later period entering a rodent burrow which extended into the occupation horizon. While the snake died within the occupation level, it is considered to be intrusive. It is possible that the snake was contemporary with the occupation, however, the semi-intact nature of the remains makes this unlikely.

5.6.5 Amphibian Remains

DlLg-33:08A/4240 is a partial frog skeleton, from Unit E2, and DlLg-33:08A/8985, from Unit C14, is a single long bone from a frog. As the two units these specimens derived from are widely separated, it appears that two individuals are represented. Their presence could be explained as burrowing into the soil and dying during hibernation or falling into a ground squirrel burrow which intersected the cultural level.

5.6.6 Summary

Level 2 shows the greatest presence of some of the large mammals as well as a variety of different medium and small mammals. The presence of greater quantities of mammal and bird remains suggests that this horizon represents a larger camp population than many of the other levels rather than a real increased dependence on mammals as a major food source. Alternatively, the duration of the occupation was longer than that of other levels. It still seems clear that these animals were secondary to the fish resource, but the inhabitants might have wanted greater variety and had more hunters available to collect this resource. The large number of tools and the possibility of socialization areas seem to add to this hypothesis.

Based upon the comparative limited use of mammal and avian remains against those of the fish resource, the occupation of this camp occurred during the summer and fall months. This is further supported by the lack of foetal remains in the assemblage.

5.7 Fish Remains

5.7.1 Artifact Recoveries

There are 133542 artifacts (3732 catalogued assemblages) in Level 2 which have been identified as fish remains. Each of those 37320 catalogued assemblage of artifacts represents a record in the database from which to determine a quantitative analysis. Of the 133542 artifacts, 9950 were catalogued as “Unidentifiable Bone” (N=2772, 2.08%) or “Undetermined Bone” (N=7178, 5.38%), leaving 123592 artifacts (92.55%) being identified as to their element.

However, 118767 of those 123592 specimens (i.e., 88.94 of all artifacts, and 96.10% of the selected artifacts from this level) were either scales (N=114155), rib/ray/spine (N=2546), or vertebra (N=2066) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

5.7.2 Species Determination

The remaining 4825 specimens (i.e., 3.61% of all artifacts from this level, and 3.90% of the selected artifacts from this level) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 5.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

5.7.3 Analysis

There are eight different taxa present in the sample, demonstrating a great diversity in the number of species being harvested. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 5.7-2. The results are further illustrated in Figure 5.7-1.

There are some notable differences between the two results. *Aplodinotus grunniens* (freshwater drum) is the second greatest NISP and accounts for a good portion of the identified specimens and is the highest percentage by a significant margin in the numbers of individuals. The NISP counts do indicate that the Ictaluridae sp. (catfish) account for over half of the specimens identified to species.

Mention has been made in the Level 1 summary of fish remains about possible biases for this case, including the familiarity by excavators of the catfish skeleton which may favour its recovery, causing partiality in their collection in the field; the ease of identifying these elements during laboratory examination; and the durability of the bone itself offering better preservation than that of other species. Allowing for these factors, it would be expected that catfish would be well-represented in the MNI, which they are. *Hiodon* sp. (goldeye/mooneye) are especially prominent in the MNI count but very low NISP, illustrating just how different the two results can be. Catostomidae spp. (suckers) are present in significant amounts in both the NISP and the MNI. *Sander* sp. (sauger/walleye), Percidae (perches), *Acipenser fulvescens* (sturgeon), and *Esox lucius* (pike) are each represented by mostly single individuals and have very low NISP counts.

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Fish	Total
Angular	2					1				3
Angular; Articular; Dentary; Retroarticular	2									2
Angular; Articular; Retroarticular	10									10
Angular; Dentary; Retroarticular	4									4
Angular; Retroarticular	107			1		11			51	170
Articular	8								8	16
Basioccipital	24								10	34
Basioccipital; Parasphenoid									1	1
Basipterygium	4									4
Ceratohyal	45	5			2	23			39	114
Ceratohyal; Epihyal	2									2
Cleithrum	159	66	2			4			221	452
Coracoid	140	1				1			121	263
Cranium									3	3
Dentary	113	5		5	9	3		5	94	234
Dentary, Articular	1									1
Dentary, Articular, Angular									5	5
Dentary; Tooth				1				1	3	5
Ectopterygoid									1	1
Epibranchial	3								5	8
Epihyal	16								19	35
Exoccipital	1								5	6
Frontal	26								32	58
Hyomandibular	68	60		1	1	2			67	199
Hyomandibular; Preoperculum	1									1
Hyomandibular; Preoperculum; Quadrate	1								2	3
Hypohyal	13								9	22
Interoperculum	14								14	28
Lacrimal	4									4
Lateral Ethmoid	7								15	22
Maxilla	8	64	1			22			22	117
Metapterygoid	19								12	31
Operculum	68	45	2	2	51	3			116	287
Otolith	19					177			93	289
Palatine	28	1							21	50
Parasphenoid	24		4						25	53
Pharyngeal Arch		11								11
Pharyngeal Bone		5				1			3	9

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Fish	Total
Pharyngeal Plate						22			1	23
Pharyngeal Plate, Lower						21			10	31
Pharyngeal Plate, Upper						43			34	77
Pharyngeal Tooth									7	7
Posttemporal									12	12
Premaxilla	28	1		1		65			17	112
Preoperculum	59					1			57	117
Preoperculum; Quadrate	15								11	26
Prootic	5								3	8
Pterotic	5								6	11
Pterygoid	1									1
Quadrate	27	8	4	7					38	84
Ray									3	3
Ray, Branchiostegal	7								43	50
Rib	1								23	24
Rib / Ray / Spine						1			2545	2546
Sample						2				2
Scale									114155	114155
Scapula	2								8	10
Scute							146			146
Skull	1									1
Sphenotic	7								10	17
Spine	10					2			11	23
Spine, Dorsal	68					211			214	493
Spine, Dorsal; Pterygiophore									1	1
Spine, First Dorsal									1	1
Spine, Modified First	6								4	10
Spine, Pectoral	233					47			192	472
Spine, Pterygiophore	9					95			78	182
Spine, Second Dorsal	67					30			45	142
Spine, Second Pterygiophore	4					9			4	17
Suboperculum		1							8	9
Supracleithrum	43								20	63
Supraethmoid	28								16	44
Supraoccipital	7								4	11
Supraoperculum			1						1	2
Tooth									1	1
Undetermined Bone	2	1				4			7171	7178
Unidentifiable Bone									2772	2772
Urohyal	17								17	34
Vertebra	38								2028	2066
Vomer									1	1
TOTAL	1631	274	14	18	63	801	146	6	130589	133542

Table 5.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	1631	55.23	64	33.33
Catostomidae (2)	274	9.28	20	10.42
Percidae (3)	14	0.47	1	0.52
Sander (4)	18	0.61	2	1.04
Hiodon (5)	63	2.13	26	13.54
Aplodinotus (6)	801	27.12	77	40.1
Acipenser (7)	146	4.94	1	0.52
Esox lucius (8)	6	0.2	1	0.52
TOTAL	2953	99.98	192	99.99

Elements Used for MNI Determination

1. Angular; Retroarticular (Left)
2. Maxilla (Right)
3. Quadrate (Right)
4. Quadrate (Right)
5. Operculum (Right)
6. Otolith (Right)
7. Scute
8. Dentary; Tooth (Left)

Table 5.7-2: Species Determination

The distribution of the fish remains by species is shown in Figure 5.7-2.

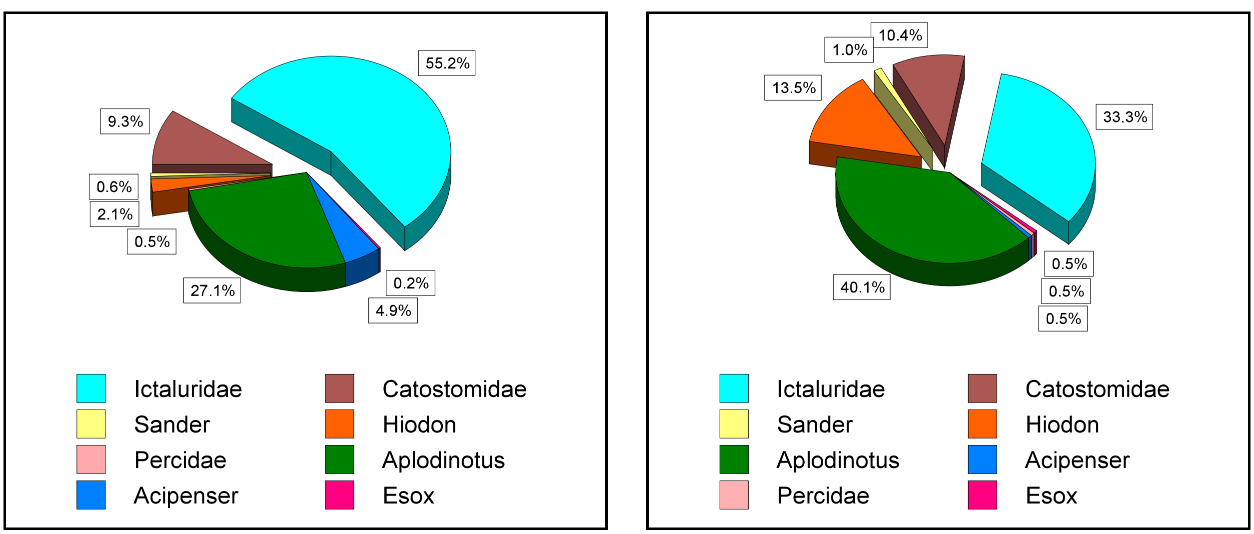


Figure 5.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

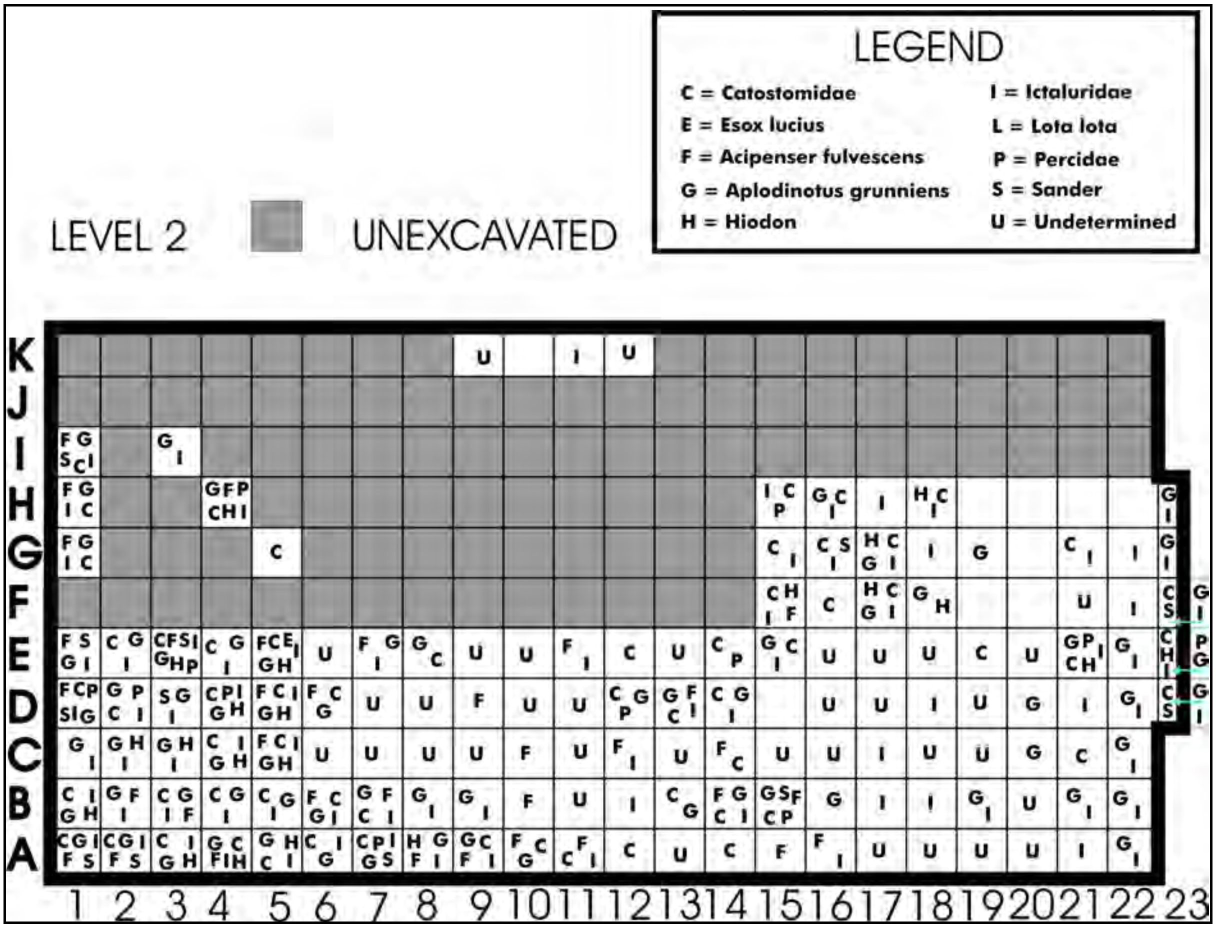


Figure 5.7-2: Distribution of Fish Remains by Species in Level 2

Fish remains were found in almost every unit excavated with a few exceptions. There is no evidence of fish remains in much of the northeast area of the site, including several excavation units in the F19 to H22 region. There are also two isolated units, D15 and K10, which have no fish remains recovered from them. Although there are many units that have no species determination, there is an apparent dense concentration of different species in the western end of the site, spanning much of that area as well as having the greatest diversity of species. It may extend northwards to the dense clusters showing up in the G1 to I1 line, and the nearby Unit H4, or that northwest excavated zone may be a separate deposited cluster of its own. Interestingly, the middle of the site shows a bit of cluster going north-south across the site, extending into the northwest corner of the additional units excavated there; while the extreme east end is just beginning to show more diversity again in the partial units excavated there.

The different species are widely scattered across the site. This may suggest that certain species, namely the perches and sauger/walleye which are found in each of the three cluster areas of the main excavation, are under represented in the MNI counts. Strangely, sturgeon are scattered across the site as well, not in any localized deposit and so there may be more individuals than originally estimated. Pike only show up in one unit, E5, which would seem likely since they are represented by only a single individual in the MNI calculations. Catfish, freshwater drum, and suckers are found across the entire site, which is to be expected given their high numbers in the NISP and MNI results. Goldeye/mooneye appear in each of the three or four cluster areas found over the site and, given their MNI count, do not appear to be centrally deposited but rather processed alongside other species in any of the particular activity areas.

There are a great many hearth features located in this level and they are distributed across the site and not just in any one area. Their spatial patterning does roughly correspond to the clusters found in the distribution of the different species, suggesting that the fish were mainly processed in the same activity area as the hearths.

5.7.4 Interpretation

The fish remains from Level 2 for the entire site weighed a total of 8149 grams. Figure 5.7-3 illustrates the density per unit (by weight in grams) of the fish remains.

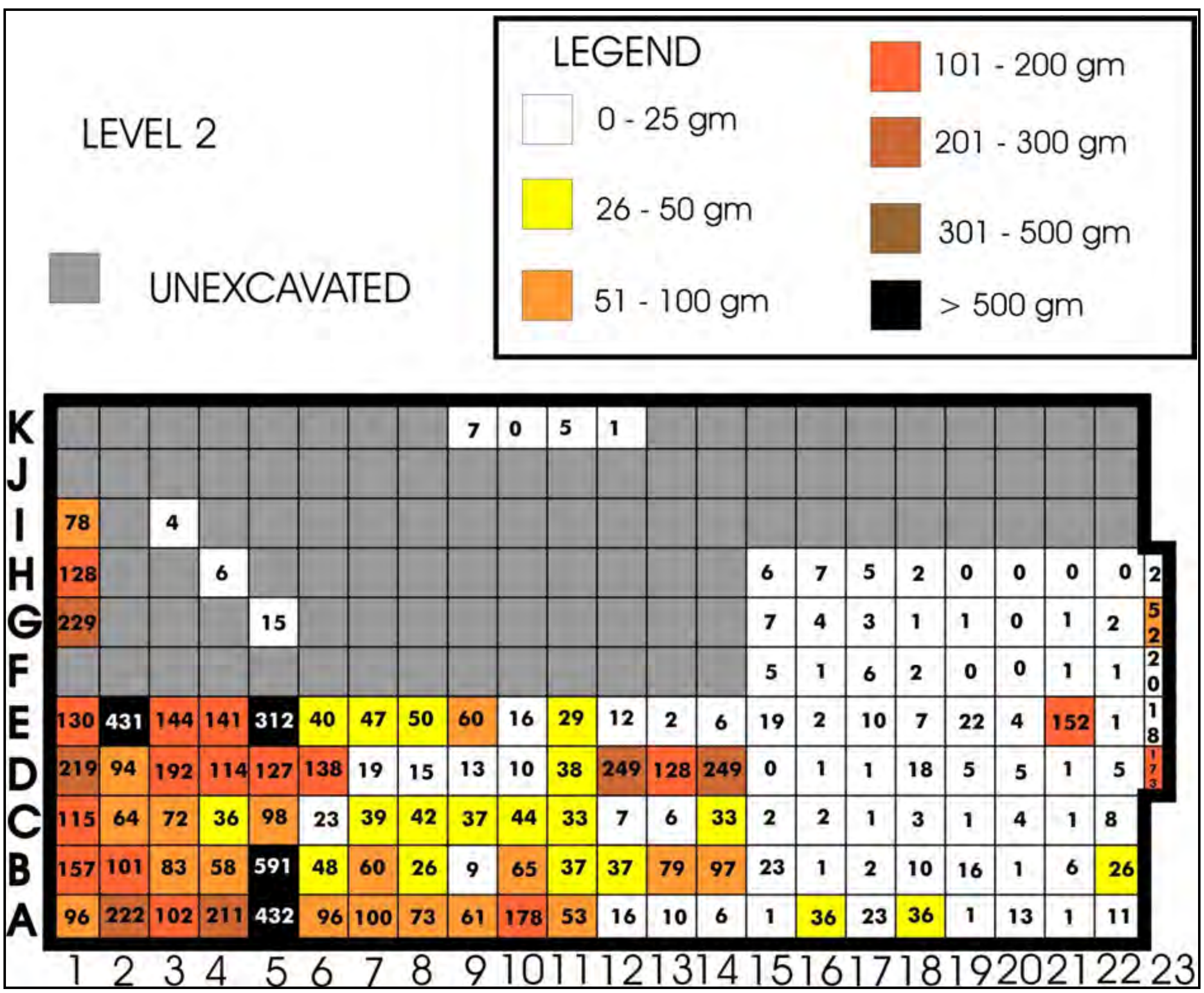


Figure 5.7-3: Distribution of Fish Remains by Weight

The random collection of scale samples from different units must be considered as a factor affecting the outcome of the given weights for certain units. The most important changes occur in Units A5 and B5 which, when the weight of the scale assemblages are subtracted out, results in a comparative weight of 142 and 29 grams, respectively. This compares more favourably with the surrounding units. Several other units have a similar reduction in actual weight, yet Units E2 and E5 remain unchanged and have a dense concentration of fish bone.

The pattern of distribution displayed by the density seems to indicate that the greatest amount of material was deposited in the western end of the excavation area. That deposit extends eastwards to about Row 15 where less material was recovered. The clustering displayed in the distribution by different species in the extreme east end as well as the northeast corner of that zone (Figure 5.7-2) suggests intensive utilization. However, the quantities and weights of recoveries (Figure 5.7-3) does not indicate that these locations were significant activity areas for fish processing. This may indicate that the fish remains in these two zones may be separate catches processed at different times than the primary area on the west side.

No cut marks, which may have indicated any butchering techniques or other processing practices, were recorded on any specimens. No post-depositional marks such as carnivore chewing were recognized on any specimen. Six hundred and eleven (611) artifacts were found to be burnt, charred, or calcined by fire, representing only 0.46% of the total number of fish remains. The total weight of the burnt, charred, or calcined fish bone was 92 grams (1.13% of the total weight of fish remains from the entire site). This suggests that, overall, the fish remains were not subjected to direct heat treatment. The majority of these were considered to be charred with some calcined bone (both by weight and artifact quantities) perhaps indicating more of the altered bone was subject to intense heat if it was burned at all. The results vary somewhat when comparing weight and quantities per unit, but notably, Units A1/A2 contain much of the burned bone. However, the burned bone distributed across the site can be associated with the locations of the many hearth features.

5.8 Shellfish

In Level 2, 873 artifacts representing butchering remains, naturally deposited specimens, and worked shell were recovered.

5.8.1 Butchering Remains

Of the 693 butchering remains in Level 2, 220 valves were identifiable to species (Table 5.8-1). The remainder could only be identified to the Family level—Unionidae.

The Level 2 distribution map, of butchering remain recoveries, indicates that these specimens are more widespread across the site than in Level 1 (Figure 5.8-1).

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	28	12.73	192.6	13.01
Cylindrical Floater (*Anodontoides ferussacianus*)	2	0.90	2.3	0.16
Fat Mucket (*Lampsilis siliquoidea*)	142	64.55	777.5	52.53
Pink Heel-Splitter (*Potamilusalatus*)	35	15.91	358.5	24.22
Maple-Leaf (*Quadrula quadrula*)	2	0.90	34.6	2.34
Pig-Toe (*Fusconaia flava*)	2	0.90	3.3	0.22
Three-Ridge (*Amblema plicata*)	9	4.09	111.2	7.51
	220	99.98	1480.0	99.99

Table 5.8-1: Frequency of Identified Butchering Remains by Taxon

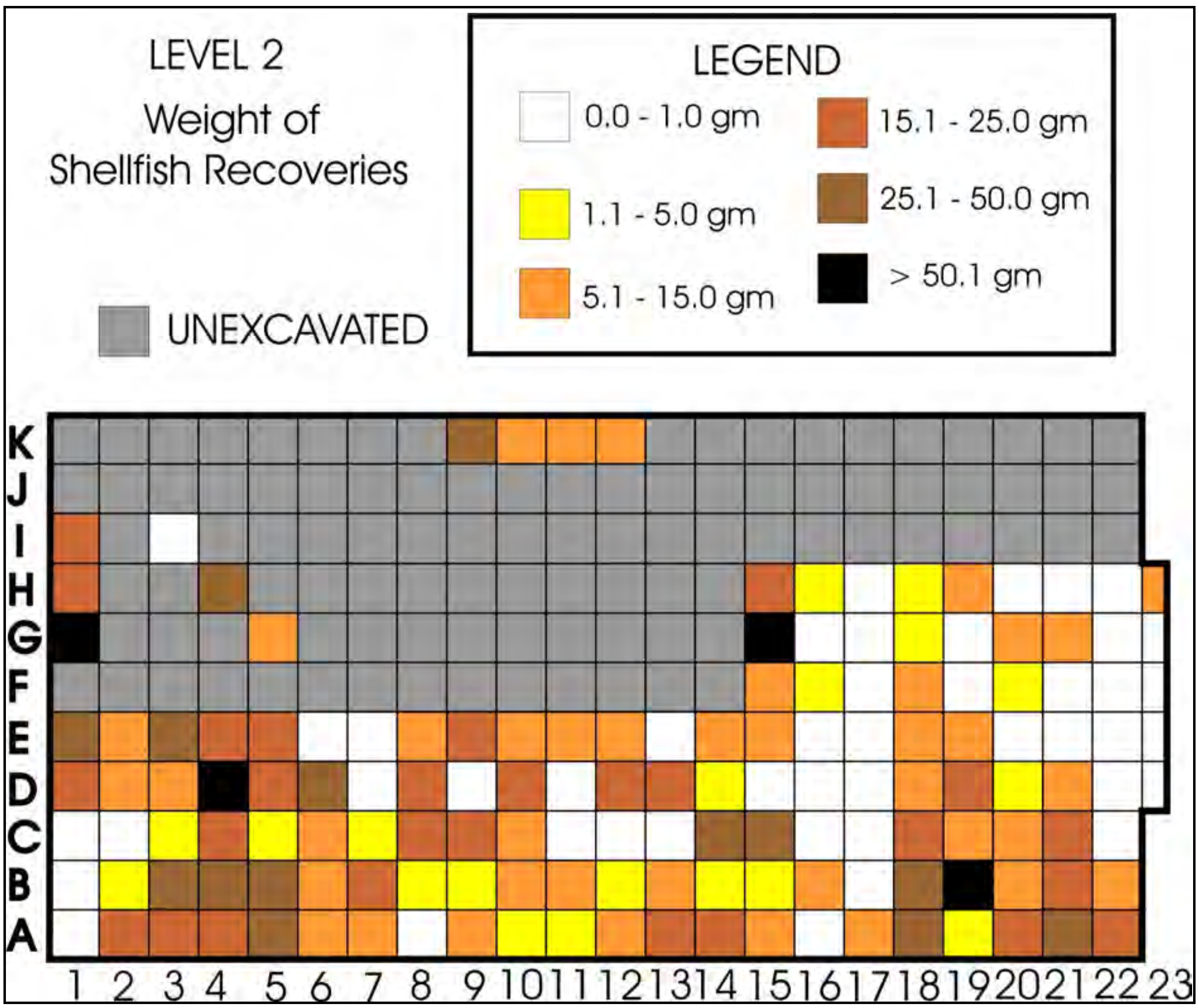


Figure 5.8-1: Density of Shellfish Recoveries in Level 2

There are two primary concentrations: the western section from Unit A2 to D7 and the eastern end from Unit A18 to D21. The eastern concentration is adjacent to multiple hearths (Figure 5.2-1), while the western concentration is associated with a hearth in Unit A18. Two other dense units are also associated with hearths (Unit G1 and Unit G15/H15). A less dense concentration occurs in the four units in the K line.

All seven species were present in Level 2 (Table 5.8-1). The distribution of the identified specimens is illustrated in Figure 5.8-2. Cylindrical Floater *(Anodontoides ferussacianus)* is only found in this level at Unit D5, adjacent to a hearth. Another uncommon species, Pig-Toe (*Fusconaia flava*), had a minimal presence with a single valve found in Unit B2 and Unit C18.The values in each unit represent the number of valves of each taxon. The concentration of identified species replicated the pattern of weight densities.

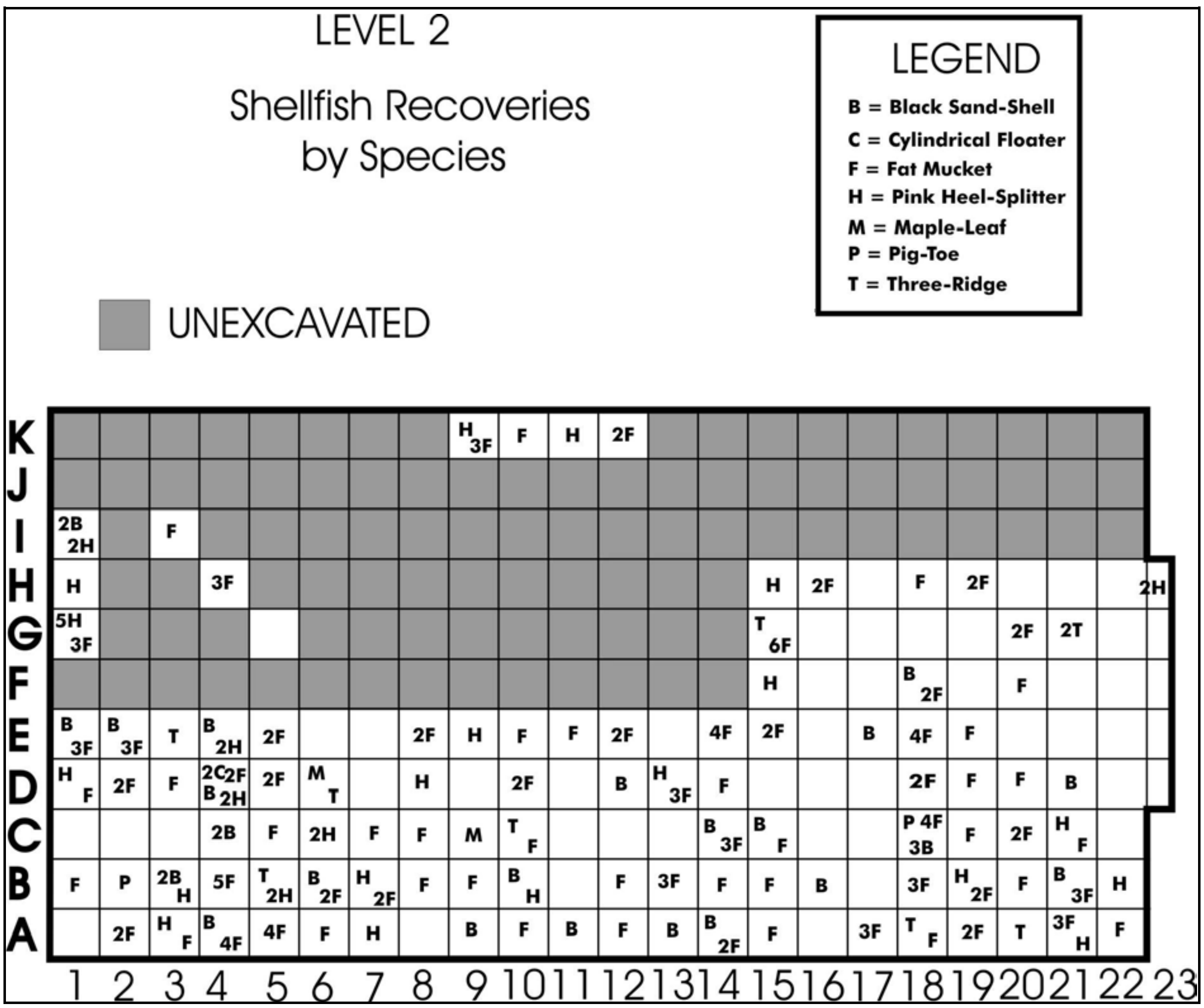


Figure 5.8-2: Frequency of Shellfish Recoveries by Species

Seventy-one valves were charred (Table 5.8-2). Only two specimens were identifiable to species, Black Sand-Shell and Fat Mucket. All of the charred specimens, except the single Unionidae specimen in H4, were recovered in close proximity to identified hearths (Figure 5.2-1). Again, it would appear that the processing of the clams for food preparation in Level 2, as in Level 1, occurred in areas immediately adjacent to where they were cooked.

CAT. NO.	UNIT	QTY	SPECIES
2896	B1	1	Unionidae
3088	B3	4	Unionidae
3417	C3	1	Unionidae
3433	C3	4	Unionidae
3945	D4	1	Black Sand-Shell
6405	B7	1	Unionidae
12410	D13	2	Unionidae
13483	G1	1	Fat Mucket
16373	H4	1	Unionidae
23415	E1	55	Unionidae
TOTAL		71	

Table 5.8-2: Charred Shellfish Specimens from Level 2

The Minimum Number of Individuals (MNI) was calculated and is presented in Figure 5.8-3.

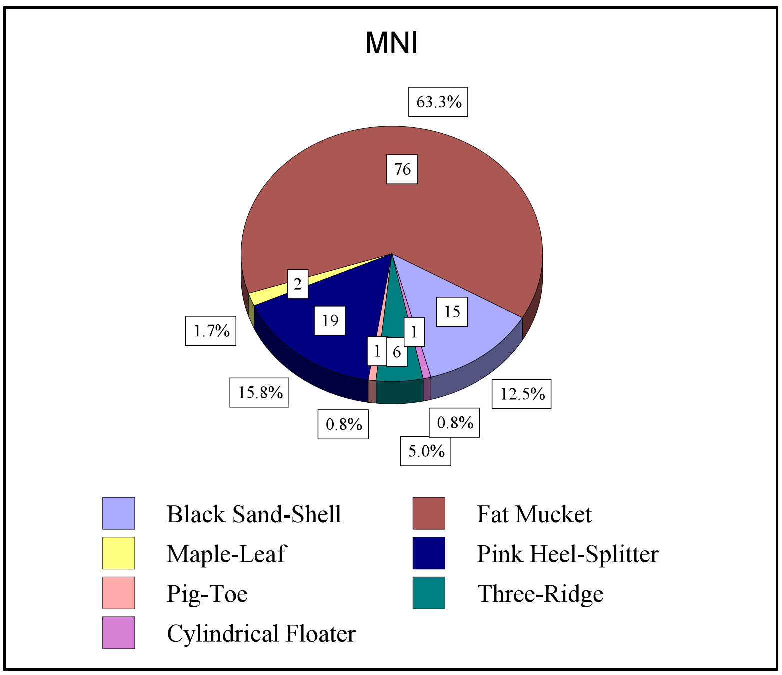


Figure 5.8-3: Frequency of Identified Taxa of Shellfish

Fat Mucket overwhelms all other taxa, comprising 63.3% of the assemblage. Pink Heel-Splitter and Black Sand-Shell are the next most frequent as in Level 1, although the frequencies are reversed from Level 1—Pink Heel-Splitter is slightly more common.

Hematite staining, observed in Level 1, was minimally present in Level 2. Only one specimen had this discolouration—DlLg-33:08A/3416 is a Unionidae valve consisting of four fragments.

5.8.2 Natural Shellfish

The 179 naturally deposited specimens, illustrated in Figure 5.8-4, are listed in Table 5.8-3. Again, the majority of the recoveries are concentrated in the western end of the site. This may be a function of the riverine sedimentation pattern discussed in Chapter 2. Level 2 in the western portion of the site appears to be a collapsed stratigraphy where several discrete occupation horizons manifest themselves as a single level.

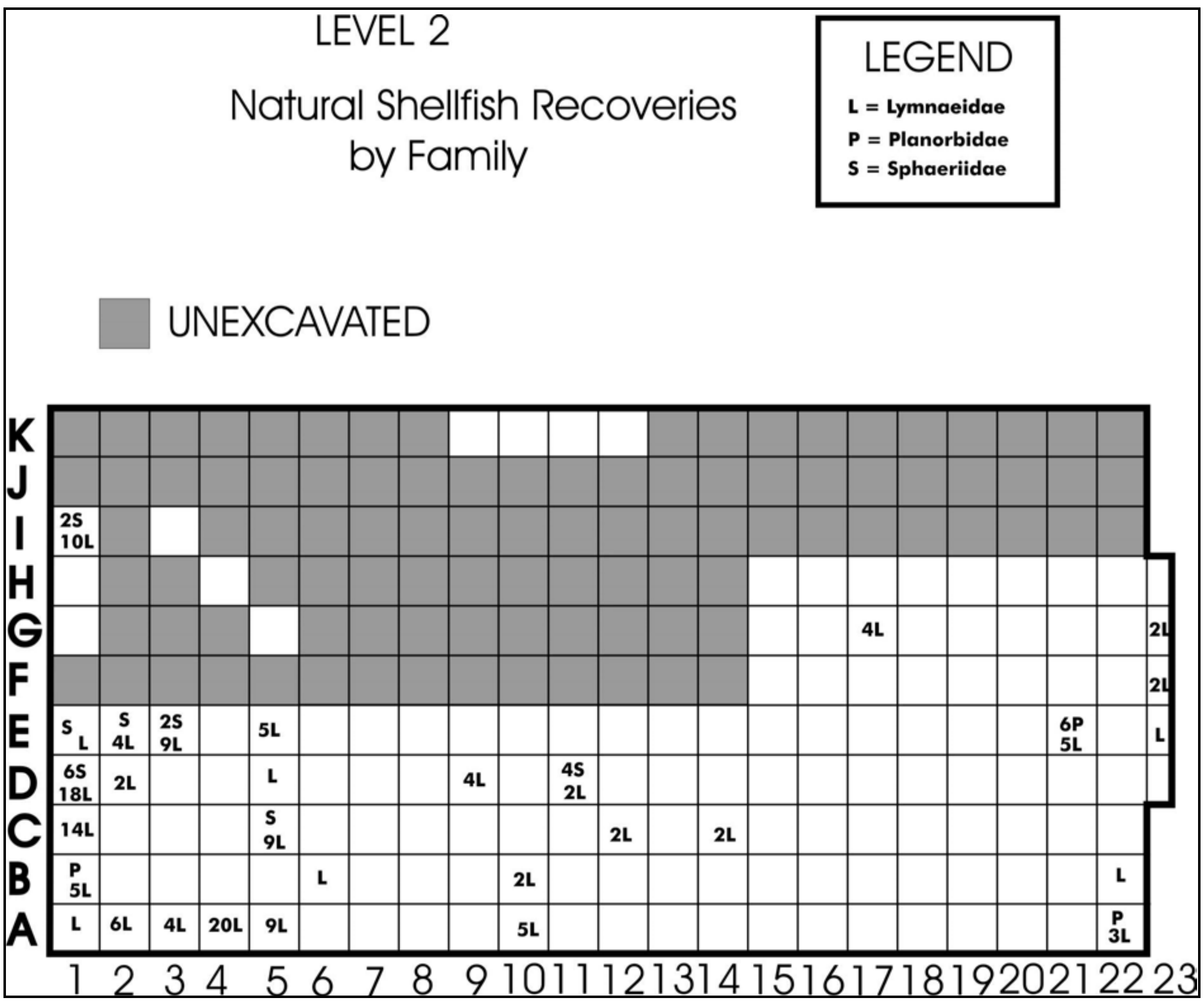


Figure 5.8-4: Location of Recovered Natural Shellfish in Level 2

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	154	86.03
Ramshorn Snails (Planorbidae)	8	4.47
Pea Clams (Sphaeriidae)	17	9.50
TOTAL	179	100.00

Table 5.8-3: Frequency of Naturally Deposited Shellfish

5.8.3 Worked Shell

One worked shell specimens was recovered (Plate 5.8-1). DlLg-33:08A/3944 is a diamond-shaped section of thin Unionidae shell. It was recovered from Unit D4 in Level 2. The measurements are: length 16.8 mm, width 13.1 mm, and thickness 0.7 mm. It weighs 0.1 grams. The edges show evidence of incising and snapping, similar to the technique of cutting window glass. No attempt at perforating has been made and it is unknown if this artifact was intended to be shaped as a bead or pendant to be attached to an article of clothing or used as an adornment. Alternatively, it may have had use as a gaming piece, although the small size and fragility would possibly preclude this option.

Plate 5.8-1: Shell Bead (3x Actual Size)

5.8.4 Summary

Level 2 has the highest number, 873, of recovered shell artifacts, 693 of which were butchering remains. The density of the recoveries is 5.86/m^2, higher than the 3.21/m^2 of Level 1. The number of identifiable species in Level 2 (220) was more than double that in Level 1, while the total number of recovered shell artifacts was less than double. The identifiable species in Level 2 constituted 31.75% of the butchering remains and 25.20% of the total number of shell. All seven species were identified within the 220 identifiable artifacts, including the rarer Pig-Toe (2) and Cylindrical Floater (2) species. As noted earlier, the identified species were more scattered across the level than those in Level 1, but again the major concentrations are associated with hearths.

The number of natural shellfish in Level 2 (179) was higher than that in Level 1. In Level 2, Lymnaeidae (pond snails) accounted for 86.03% of the total, while in Level 1, Planorbidae (ramshorn snails) were the higher percentage—55.45%. Both are Gastropods. The Sphaeriidae were present in both levels, but in smaller numbers, five in Level 1 and seventeen in Level 2. This could be a function of screening in the field or a function of flood conditions, water levels, or harvesting of aquatic plants during the time of occupation of these levels.

A single worked fragment of shell was recovered in Level 2. Although tentatively considered to be a bead blank or pendant blank, it may well have had another function, i.e., a gaming piece. No other artifact similar to this has been recovered during the many archaeological projects overseen by Quaternary Consultants Ltd. at The Forks from 1988 to the present (S. Kroker/P. Goundry pers. comm.).

5.9 Miscellaneous Recoveries

Certain types of recoveries do not readily fall into the previous classes of artifacts. They range from various types of soil samples to esoteric artifacts.

5.9.1 Soil Samples

One litre soil samples were collected from each excavation unit within the horizon as well as a similar sample from any features in that unit. Thus, some units had more than one sample collected. A total of 176 soil matrix samples were curated. In addition to the soil matrix samples, samples were taken when circumstances warranted. These include 17 hearth samples, one ash samples, one clay sample, three sand samples, and two caliche samples. Thirty-fours samples were taken of hearth clay and 39 samples of heat-modified clay were recovered.

5.9.2 Coprolites

The presence of domesticated dogs is inferred from the presence of numerous coprolites. Twenty samples were collected.

5.9.3 Copper

A small clump of soil, containing an apparent green metallic stain, was recovered from Unit E9. DlLg-33:08A/7435 has the same appearance as the tested copper artifact, DlLg-33:08A/14083, from Level 1.

5.9.4 Insect

DlLg-33:08A/4120 is a very small object which appears to be chitinous. As such, it is not readily identifiable due to the minuscule nature of the specimen. But it is speculated that it could be a portion of an insect body or a worm casing.

5.9.5 Replica Cast

A second instance of the rare archaeological find of a human footprint was uncovered in Unit G20 of Level 2, by S. Halwas. A clay-filled depression was observed in a dense matrix of fish scale. This depression was also carefully troweled, displaying the mark of human foot (Plate 5.2-2). A cast was made of this footprint, DlLg-33:08A/21617 (Plate 5.2-3).

5.10 Level 2 Summary

There is a problem in the interpretation of Level 2 which arises from the stratigraphy, or lack thereof, in the western portion of the excavation area. As there is no separation between the various sub-levels of the Level 2 Complex, the recoveries could derive from any or all of the five levels. Levels 2C and 2D are unlikely contributors to the western assemblage, but the concentration of ceramics, lithics, and faunal remains could have their source in the occupations represented by Levels 2, 2A, and 2B. Alternatively, the western portion of the excavation area was an extremely active area during the occupation of Level 2 and had been largely avoided by the people during the earlier campsites.

The pattern of hearths in the western portion of Level 2 is no more concentrated than that of the rest of the area, although the large size of two of the hearths, Unit C4 and Unit E1, could result from sequential, superimposed campfires. In addition, the manifestations of hearths from lower levels, without intervening sedimentation deposits would appear to be those of the uppermost Level 2.

In lieu of definitive evidence clearly demarcating the composition of the cultural deposits in the western portion of the excavation area, the interpretation will treat all recoveries *as if* they derive from the last occupation, i.e., Level 2. The analysis of the ceramic recoveries, in part, show some temporal/typological separation between the various sub-levels (Chapter 13), but this cannot be done with other classes of artifacts as they do not change form as rapidly.

With this caveat in mind, the ceramic recoveries of 27 different vessels appear to represent a largely homogenous cultural group (Rainy River ceramic producers) with only two vessels of an extra-local style being present. The lithic assemblage has a very dense concentration of tools in the western 25 square metres with a preponderance of food procurement, food processing, and hide processing tools. The remainder of the lithic tools are scattered sparsely across the remainder of the excavation area. Most of the bone tools (spatulas and awls) also occur in the western portion of the site, usually associated with the hearths in that area. The concentration of mammalian butchering remains is not as pronounced in the western area, although the fish remains tend to display a higher density in that portion of the site. Again, an ambiguous situation. The shellfish recoveries mirrored the pattern of the mammal remains.

A total of 74 lithic tools were recovered representing several different activities. The eight projectile points are either Plains Side-notched, Prairie Side-notched, or Triangular. It is notable that most of the tools are made of non-local material, led by Knife River Flint and with strong representation of Swan River Chert, Denbeigh Point Chert, agate, and chalcedony. The local Selkirk Chert is barely represented. The same pattern largely follows for lithic detritus, although no Denbeigh Point Chert occurred in the flake assemblage suggesting that the tools from this material were manufactured elsewhere and carried to the site.

Several lithic artifacts appear to have a spiritual context. The most notable are a pipe and a sucking tube made of soapstone. Other items that could be used for decorative purposes or have religious connotations are an ochre bowl as well as two palettes. A worked shell artifact was recovered which could be a preform for a bead or a pendant or could be a gaming piece.

The charcoal analysis indicated a standard riverine gallery forest in terms of the wood utilized at the campsite. Ash was the most common followed by maple and elm. The residue analysis on a rim sherd again showed a mix of forest and prairie biota. The utilized plant foods were sunflower (prairie), beeweed (prairie), poverty weed (prairie), oak acorns (riverine forest), pine nuts (imported from the Boreal forest), beans (cultivated), and corn (cultivated). The protein portion of the diet identified in the residue analysis consisted of pronghorn antelope (prairie) and white-tailed deer (parkland).

The faunal recoveries indicated a wide variety of harvested mammals which would provide considerable meat. Two bison along with elk and moose were represented in the faunal record. This would provide food for a large number of people or, conversely, a small number of people for a longer time. This would have been augmented with beaver, rabbit, squirrel, and muskrat among other mammal species. The fish remains again show a large quantity of available meat with approximately equal number of drum and catfish. The total amount of fish meat would have been less than mammal but may have been more reliably obtained. A similar situation occurs with the shellfish which had at least 220 discrete clams. In summary, the diet would have been varied and nutritious.

It would appear that the occupants of the site that left behind the material which formed cultural Level 2 arrived at the location for a specific purpose. Most of their materials seemed to have been brought with them and there was little reliance on local lithic sources. The most probable reason for establishing a campsite adjacent to the rivers would be for procuring sufficient food for preservation for winter. No definitive evidence indicating seasonality was found, although both identified bird species (snow goose and mallard) are migratory and could indicate a fall occupation. The arrival at this location could also coincide with last-of-season harvesting of horticultural plots in which beans, squash, and perhaps corn had been grown in intermittently tended gardens.

6.0 LEVEL 2A

6.1 Introduction

Level 2A was encountered in most of the units that were excavated (Figure 6.1-1). It was recorded in 94 units. These units are throughout the eastern portion of the block area on the south, half of the isolated units in the north, the exploratory trench at the north edge, and the expanded elevator shaft area in the east. The layer ranged from very sparse to quite dense, reflecting activity areas.

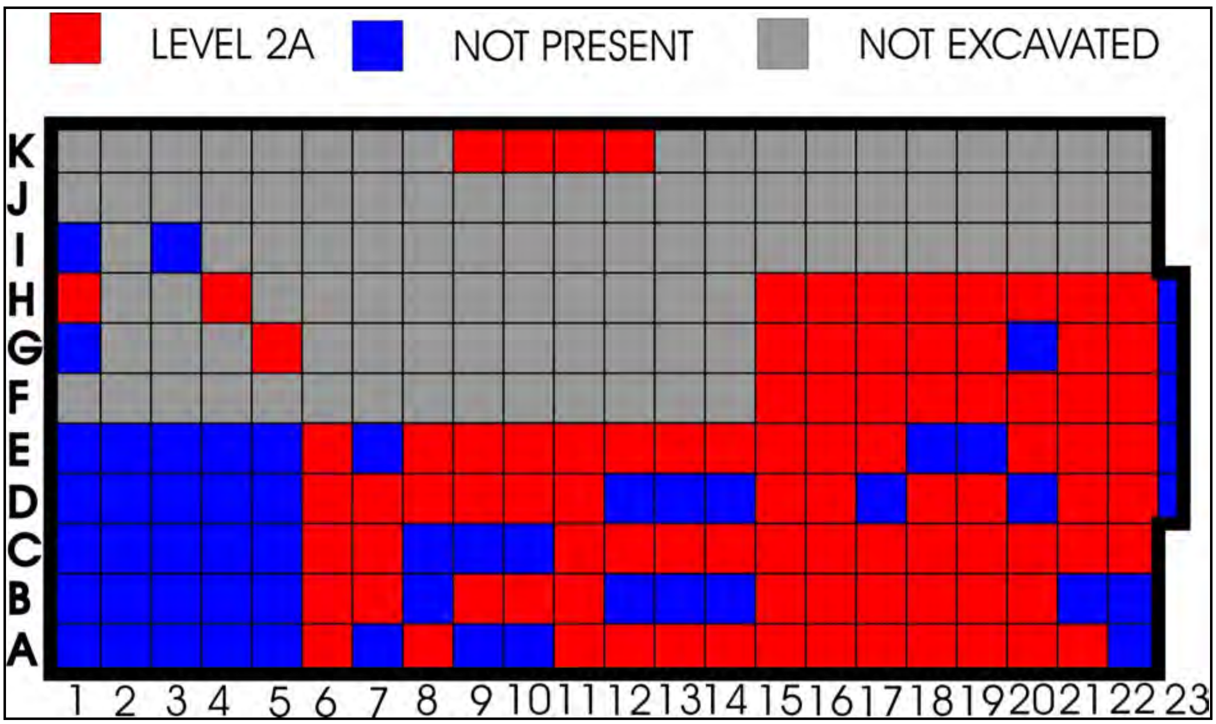


Figure 6.1-1: Map Showing Presence of Level 2A

6.2 Features

The primary feature that was recorded during the excavations was that of hearths (Figure 6.2-1). There are seven hearths. Only two of the hearths, located primarily in Units B7 and G15, could be considered large. The size of three hearths could not be determined as they were on the periphery of an excavated unit—A19, K10, and K12.

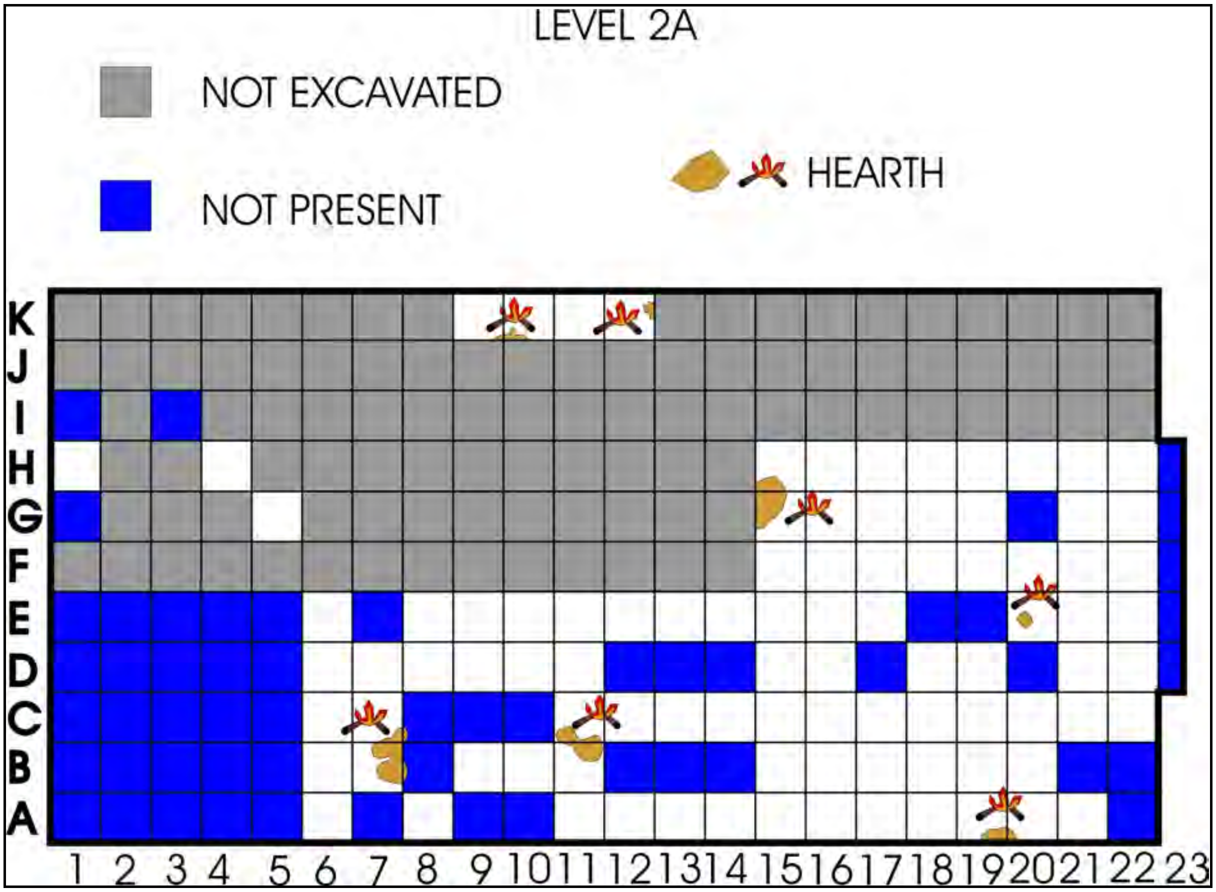


Figure 6.2-1: Distribution of Hearths in Level 2A

6.3 Ceramic Artifacts

6.3.1 Artifact Distribution

Level 2A produced 22.7% of the total ceramic recoveries from the Level 2 Complex. The total weight for the level was 2804.3 grams and the total quantity was 899 sherds from the 94 units where Level 2A was defined. In 27 of the 94 units, there were no recoveries of vessel ceramics (Figure 6.3-1). These zero recovery units were sprinkled across the identified Level 2A. Eight appear above the slope and the remaining 19 are scattered below on the east end of the excavation area. The northeast corner has the greatest degree of absence.

The highest density for the level was outside the main excavation block on the K-line. Unit K11 recoveries tipped the scale at 411.6 grams from 142 sherds. Within the main excavation area, Unit E16 held the highest quantity and weight, 104 sherds totalling 275.0 grams. No pattern of density clusters are particularly discernable but the area of greatest density occurs below the slope in a roughly north to south orientation. One unit, E16, appears to be a continuation of a high density deposit from Level 2, in Units E15 and E16. Of particular interest are Vessel 35 and Vessel 62 which also occur on lower levels in this same location. There were no ceramic recoveries in Unit E15 on this level and, as curiously the inverse happens on Level 2B, this seems indicative of taphonomic influence.

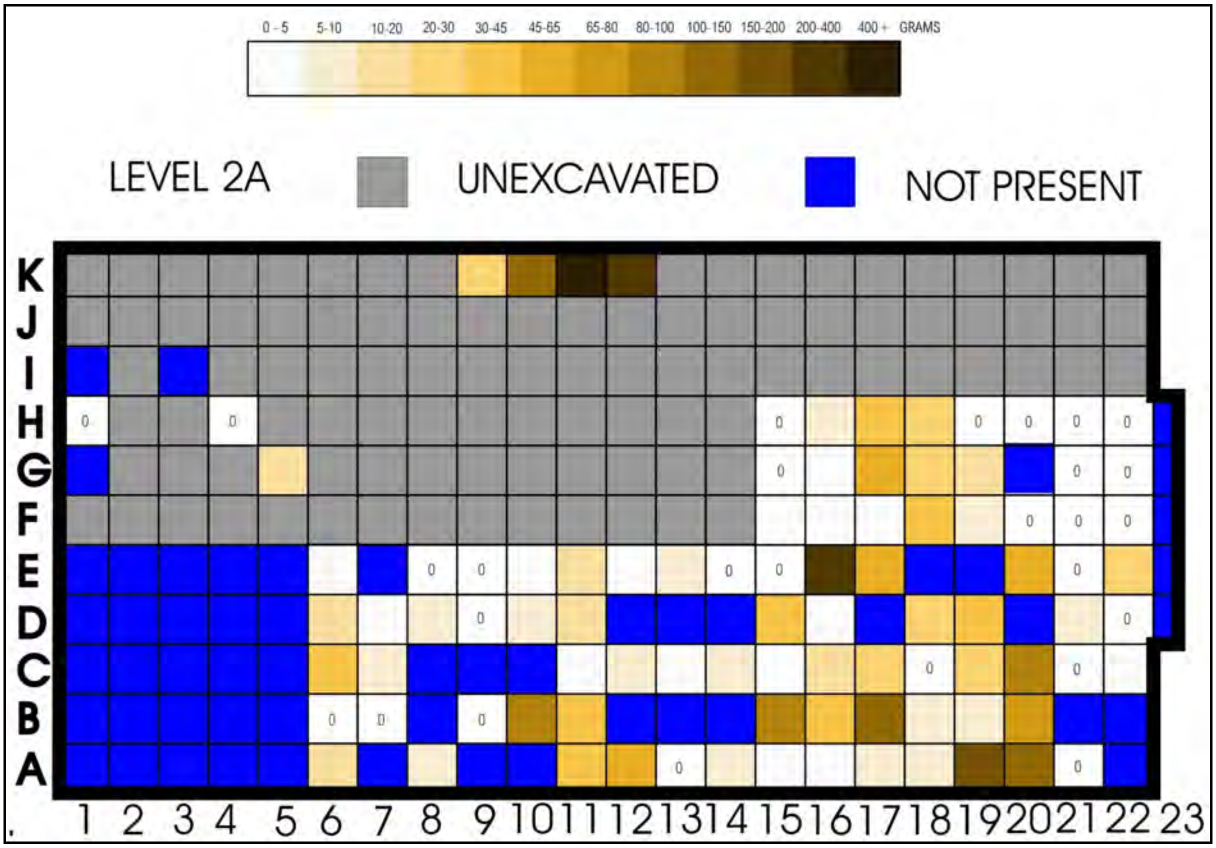


Figure 6.3-1: Distribution of Ceramic Recoveries from Level 2A

Identified vessel fragments were associated primarily in the regions of highest density. When the locations of identified hearths are factored in, there is a possible relationship as there is a slight increase in density recorded in the general areas of the hearths.

6.3.2 Artifact Recoveries

Level 2A vessel related ceramic recoveries are split between rim and body sherds and sherdlets, 37.6% and 62.4 % respectively. One hundred and fifty-four rim sherds, weighing a total of 1052.0 grams produce and average sherd weight of 6.8 grams, slightly less than that of Level 2 There were no non-vessel ceramics recovered in Level 2A.

6.3.2.1 Identified Vessels

Twelve vessels were identified as originating in this occupational layer (Figure 6.3-2). However, seventeen vessels are present, some of which originated in stratigraphically higher levels.

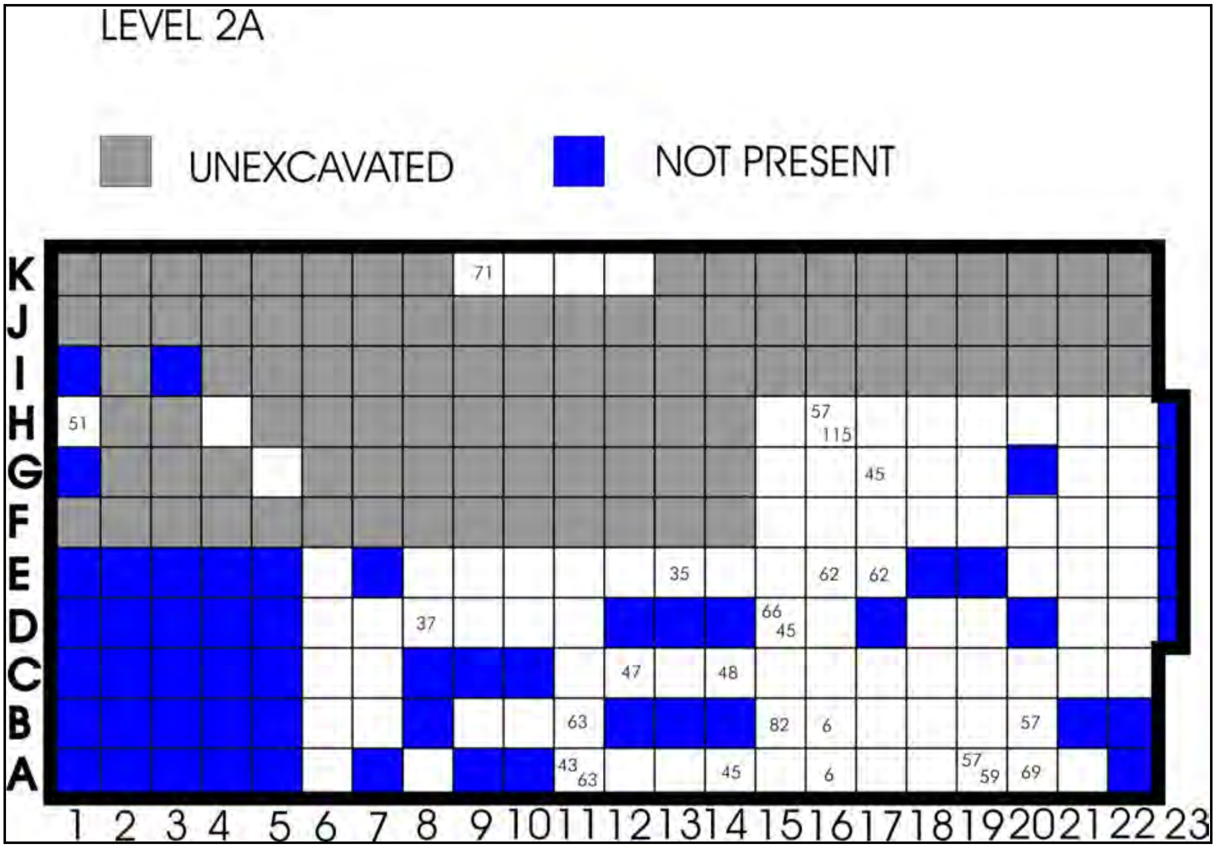


Figure 6.3-2: Distribution of Identified Vessels in Level 2A

Vessel 6

This vessel originated in Level 2 and is described in that chapter. Sherds were recovered in Units A16 and B16.

Vessel 35

This vessel was not able to be assigned to a specific cultural horizon. It is described in Level 2 (Section 5.3.3.1). It was located in Unit E13.

Vessel 37

This is a Little Owl type vessel recovered from Unit D8. It is larger than those identified in the earlier Level 3. The light tan colour and confident decoration of this vessel make it stand out. The body is very well consolidated and dense with fine to very coarse grit temper. The chevron runs in the opposite direction to most.

Vessel 43

This vessel was first encountered in Level 2. In this level (Level 2A), it occurred in Unit A11. This pot is considered to have originated in Level 2B where it is described.

Vessel 45

This vessel was not able to be assigned to a specific cultural horizon. It is described in Level 2 (Section 5.3.3.1). The specimens were recovered from Unit A14, Unit D15, and Unit G17.

Vessel 47

This vessel was identified from artifacts located in Unit C12. Because of its similarity to Vessel 116 and the chevron motif, Vessel 47 is placed with the Little Owl type, although somewhat reluctantly. The large proportions and the poor consolidation are atypical.

Vessel 48

Although this vessel, located in Unit C14, is placed in the Rainy River Pseudo-chevron type for this report, it shows proportional differences and the elements which comprise the pseudo-chevron do not physically connect. It also has criss-crossing CWOI on the rim, a motif which appears in Level 2A and later. The possible significance of these two tendencies is what makes this vessel of interest in the assemblage.

Vessel 51

An incomplete profile limits the interpretive value of this vessel which was recovered from Unit H1. It has a double row of small stamps just above the neck juncture on a smoothed neck. This attribute is shared with another incomplete profile vessel, Vessel 96 from Level 2. These two are unique in the assemblage with that combination.

Vessel 57

This Rainy River Pseudo-chevron pot, occurring in Units A19, B20, and H16, illustrates a relationship to the DDC decorative approach, identified from the earlier Coalescent materials in Level 3. The punctates are large and the bosses are well defined. The punctate tool was twisted to create symmetrical circular impressions. The neck profile is straight to slightly incurved with a slight outward lean. Neck thickness increases toward the rim. This vessel shares the distinctive rounding of the upper exterior neck with Vessels 58, Vessel 38, Vessel 29, and Vessel 12 (all from Level 2). On Vessel 57, it appears the act of rounding the exterior upper neck and exterior lip may be the mechanism for the general in-curve, which might otherwise remain straight.

Vessel 59

This vessel, from Unit A19, is a pinch pot, estimated at approximately 10 cm in diameter and around 5 cm in height. There is no decoration on this pot. Vessel 59 appears to have fine temper, though this grit may be incidental. It is one of two finger moulded pots identified, the other (Vessel 26 from Level 1) is much smaller.

Vessel 62

This vessel, described in Level 2 (Section 5.3.3.1), could not be ascribed to a specific level. It was recovered from Units E16 and E17.

Vessel 63

This pot, which occurred in Units A11 and B11, is not defined here. In fact, it is left with undetermined affiliation. Only two sherds have been identified, though there is likely more to be found from the lower part of the vessel. This vessel has a short, straight, vertical neck with oblique CWOI on the smoothed rim. Sprang weave impression is left unmodified up to the exterior lip. The shoulder appears to be gentle transition to the body. It is a quite small pot with an estimated aperture of only 7 cm.

Vessel 66

This pot, which occurred in Unit D15, brings up a lot of questions. With a Blackduck profile and stamping and criss-crossing CWOI on the rim, and with combing, it defies a lot of our current rules defining what is Blackduck and what is Rainy River. This vessel might be where the two meet. It also has oblique CWOI on the horizontal CWOI band instead of punctates or round stamps. This particular trait can be seen on a small burial vessel taken from the Christensen Mound in central Minnesota (Wilford, Johnson and Vicinus 1969:Pl.13f).

Vessel 69

Very like Vessel 57, Vessel 69 is a Rainy River Pseudo-chevron pot with some DDC influence. Although this vessel's neck profile is slightly flaring, as opposed to the in-curve of Vessel 57. It also has a few distinguishing characteristics that are unusual. The mid-neck has been perforated prior to being fully dried by pushing a small diameter stick/rod (smaller than the punctate tool) all the way through. Vessel 69 also shows a crack repair where clay was added to the exterior, after decoration, to reinforce the flaw. The vessel was located in Unit A20.

Vessel 71

This pot, recovered from Unit K9, has been placed in the Rainy River Pseudo-chevron type, because the motif is well defined. But it has hallmarks of Coalescent vessels like the Kroker Mid-neck, with absence of horizontal CWOI. This pot appears to have had a steeply sloped shoulder, reminiscent of the Soft Shoulder type. In overall appearance, it is most similar to Vessel 79 from Level 2C.

Vessel 82

The artifact representing this vessel is a small fragment of upper neck and rim with CWOI angles and spacing much like that of Vessel 43 of Level 2B. Vessel 82 has a much thinner upper neck and pronounced widening of the rim. Unless physical refits not already explored establish a connection between the two, this will have to remain separated, though intuitively it may be considered the same pot. Vessel 82 was recovered from Unit B15.

Vessel 115

This short-necked vessel is described as a Little Owl type vessel with Rainy River Pseudo-chevron influence. It occurred in Unit H16.

6.3.2.2 Body Sherds

There were 745 body sherds/sherdlets, totaling 1752.3 grams, recovered from this horizon.

6.3.3 Manufacturing Characteristics

The same general range of qualities would characterize the recoveries from Level 2A as Level 2. The sprang weave impressed sherds tend to be thinner with better consolidation, although there are exceptions The same generalization could be made for the textile impressed sherds, they are usually thicker and thus are less well compacted and consolidated. There are thinner examples that show very good compaction and appear to be well fired as well. The colour range is the same for both, the thinner sherds are generally the same colour through and through but the thicker sherds show a black interior and lighter exterior surfaces. The interior and exterior surface colouration is usually different. This is interpreted as having more to do with use than with manufacture, however. The colour range is brown, tan, buff, to grey and dark grey to black.

6.3.3.1 Surface Treatment

There is a change in the surface treatment in this level with 59.1% sprang and 31.9% textile impressed, as compared to 33.5% and 50.0% respectively on Level 2. The proportion of obliterated textile goes down to 5.2 %, while vertical cord impressed and smooth finish are 1.1% and 1.3% respectively. Only 1.4% was catalogued without surface treatment. Examples of variation in surface impression (twining weave, sprang, and vertical cord) from Level 2A are depicted in Plate 6.3-1. Textile weaves are not typically isolated during cataloguing in the field. Generally, weave variations are only decipherable when the impressions afford the necessary clarity. Level 2A provided some excellent impressions. Further research is required to learn how and why certain weaves were used or not used. This is particularly relevant in this assemblage where preferences shift (Table 6.3-1).

LEVEL 2A	94 units	WT / grams	QTY	%
SPRANG		1648.6	452	58.8
TEXTILE IMPRESSED		882.5	367	31.5
OBLITERATED		166.4	41	5.9
VERTICAL CORD		31.4	2	1.1
SMOOTH		36.7	19	1.3
No Recorded Surface		38.7	18	1.4
TOTAL		2804.3	899	100.0

Table 6.3-1: Types of Surface Treatment Recorded in Level 2A

DlLg-33:08A/16397 appears to have the warp and prominent weft typical of a twining weave. The vertical cord impression on DlLg-33:08A/12956 is not a textile, but an impression of cord on the surface which is created by either impressing lengths of cord into the surface or by using a cylindrical rod wrapped with cord and rolling it, with pressure, making a continuous and even pattern of parallel cord impressions. In the case of this sherd, the former appears to be the manner of application as the cord impressions are not particularly parallel or consistent.

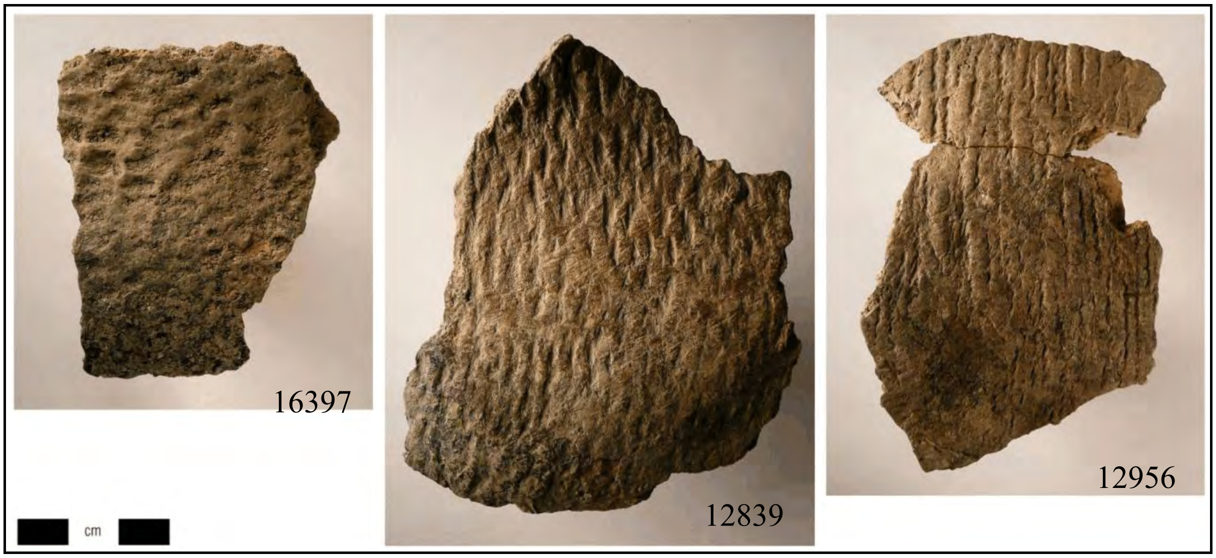


Plate 6.3-1: Examples of Twining Weave, Sprang, and Vertical Cord Surface Impressions

6.3.3.2 Modifications

Vessel 69 shows two modifications, it was perforated through the neck before firing and it also exhibits a patched crack which runs up from the shoulder through the neck. The crack likely occurred during drying and clay was applied on the exterior only. The perforation was produced by a small diameter tool, pushed through from the exterior, in line with the punctates. The same tool was not used for the punctates and the perforation.

6.3.3.3 Residue

Though technically not a residue, it is worth noting that a shell paste was identified on some of the ceramics. Although it may have been directly related to the ceramics, it was also identified in the general occupational deposits, often within or near hearth. In Unit K12, of Level 2A, a concentration of pottery was excavated with shell paste still on many of the sherds.

6.4 Lithic Artifacts

The Level 2A assemblage contains a total of 20 tools, 126 flakes, nine fragments of fire-cracked rock, and six pieces of ochre, a total of 161 artifacts. The total assemblage weighs 1695.60 grams.

6.4.1 Lithic Tools

There are a total of 20 tools (Table 6.4-1), weighing a total of 447.60 grams. The materials of these tools are tabulated in Table 6.4-2 and their distribution is portrayed in Figure 6.4-1.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	4	20 00
Projectile Point Preform	1	5.00
Scraper	3	15.00
Knife	1	5.00
Retouched Flake	2	10.00
Utilized Flake	4	20.00
Chitho	1	5.00
Whetstone	1	5.00
Anvilstone	1	5.00
Pipe	2	10.00
TOTALS	20	100.00

Table 6.4-1: Lithic Tool Types in Level 2A

The tools will be described by type on an individual basis. The measurements (the metrics) of these artifacts will be illustrated in tables following each tool type or within the artifact description for smaller groupings.

LITHIC MATERIAL TYPE	QUANTITY	%
Chert (Undifferentiated)	5	25.00
Swan River Chert	5	25.00
Quartzite	2	10.00
Soapstone	2	10.00
Knife River Flint	1	5.00
Porcellanite	1	5.00
Agate	1	5.00
Granite	1	5.00
Schist	1	5.00
Diorite	1	5.00
TOTALS	20	100.00

Table 6.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 2A

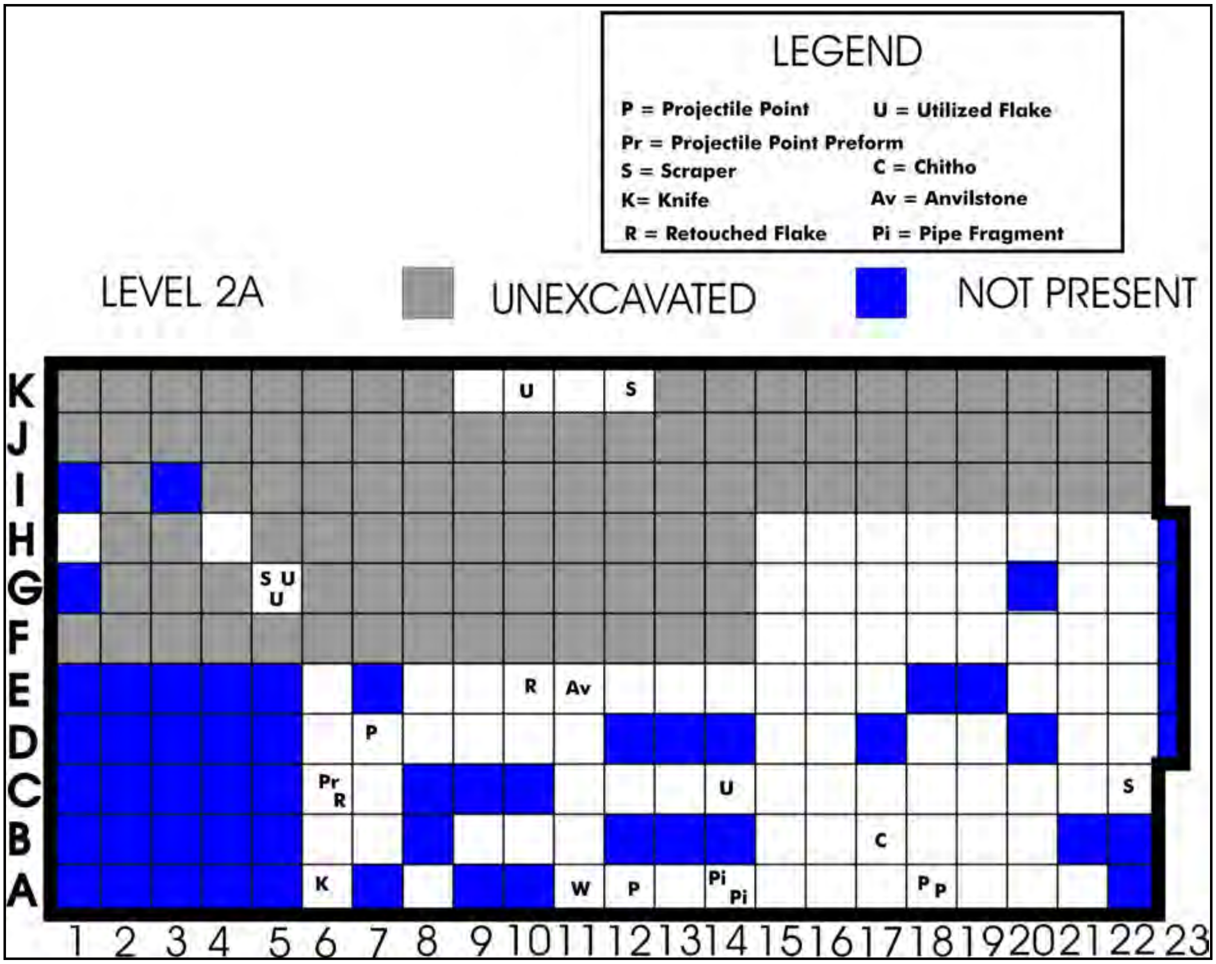


Figure 6.4-1: Distribution of Lithic Tools in Level 2A

6.4.1.1 Projectile Points

Four projectile points and one projectile point preform were recovered from Level 2A. The measurements are listed in Table 6.4-3. The artifacts are illustrated at twice actual size.

Plate 6.4-1: Dorsal and Ventral Faces of DlLg-33:08A/6989

DlLg-33:08A/6989 is a Plains Side-Notched projectile point recovered from Unit D7. The flaking on the dorsal face of this KRF projectile point crosses from the right edge to three-quarters of the way across the face; a few of the flake scars from the left edge also move three-quarters of the way across the point. It may well be that the shaping flakes did cross all the way over the face, however subsequent sharpening flake removal may have obscured this. The base has been thinned with one large flake scar (5.8 mm) off the dorsal face and seven smaller flake scars on the ventral face (1.1 mm to 3.5 mm). The base itself appears to have been ground or is the only area of cortication on this point.

The large basal flake scar on the dorsal face has very small flake scars at the base that are consistent with edge grinding.

Plate 6.4-2: Obverse and Reverse Faces of DlLg-33:08A/8433

A broken projectile point made from chert was recovered from Unit A12. DlLg-33:08A/8433 is broken diagonally 17.1 mm from its tip on the short side and 28.5 mm on the long side which is also the total length of this point. Both sides are deeply flaked, with high-shouldered, spaced flake scars that create a serrated edge on both faces of the point. Three flake scars from the tip into the body of the point terminate in step fractures. The average flake per mm on this point is 3 per mm. The tip has a slightly lop-sided shape, suggesting this tool was broken either in manufacture or in a resharpening process.

Plate 6.4-3: Dorsal and Ventral Faces of DlLg-33:08A/10687

A Prairie Side-Notched projectile point, DlLg-33:08A/10687, made of Swan River Chert occurred in Unit A18. This point is originally clearly a Prairie Side-Notched; however it is very roughly manufactured and very thick for its length. The base is stepped and uneven and one notch appears to be accidentally formed as opposed to the other notch, which is carefully flaked. There is a large protrusion approximately half way up the dorsal face and the tip of the point is very uneven. Furthermore, the left side of the point has been clearly reduced 3.2 mm from the shoulder of the point. The flake scars on this side are (coincidentally) 3.2 mm long and fairly uniform in spacing, although step-fracturing occurs with nearly every flake scar along that edge. The working edge angle is 50^{o}. This point may have been manufactured poorly and then reused as a hafted tool. There is no discernable use wear along that edge and due to the step-fracturing along the edge, there is no detectable polish.

DlLg-33:08A/10688 is a broken quartzite Triangular projectile point from Unit A18. This point has been snapped of at the tip; 8.1 mm width at the tip and 19.2 mm at the shoulders. The thickness is uniform across the point and the flaking is very uniform. Several flake scars truncate in step and the hinge fractures suggesting over-pressurized pressure flaking. Two flake scars on the ventral face at base of the point appear to be attempts to rid the face of some step fracturing coming in from the opposing face. On the dorsal face as well, a large flake scar at the base ends in a step-fracture.

Plate 6.4-4: Dorsal and Ventral Faces of
DlLg-33:08A/10688

6.4.1.2 Projectile Point Preform

DlLg-33:08A/6680 is a chert Side-Notched projectile point preform which occurred in Unit C6. This preform has some flake scars on each edge, with most of the knapping scars being on the base of the point. Four flakes have been removed from the ventral face at the base and the right hand corner of the base gives the appearance of being broken which may have contributed to this preform's abandonment, assuming it was not simply lost. On the left notch, three flake scars are visible as the result of knapping in the notch. No flakes were removed from the right hand notch on the ventral face and only one flake has been taken off both edges on the ventral face.

Plate 6.4-5: Both Sides of
DlLg-33:08A/6680

On the dorsal face, six flakes have been removed from the base, one of which (at the left corner) is the break mentioned in the ventral face's description. Six flake scars are visible in the left notch. Along the edge, seven flake scars remain. Both the left edge and notch on are on a very steep angle compared to the rest of the preform, 59º, which may have been a contributing factor in this artifact's abandonment. The opposite edge has only three flakes removed from the tip and no other reduction or sharpening is notable. The notch on this edge has been reduced by five flake scars, three of which end in hinge fractures. The dorsal face has a high central ridge that has what appears to be polish on it; there are also two other spots on this face that have polish as well. It is not possible to discern what would have caused this. Polish can occur post-depositionally and this could be the cause of the areas of polish. The shoulder measurements versus the base width measurements suggest that this point may have been from the Prairie Side-notched tradition. The measurements are listed in Table 6.4-3.

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
6989	18.40	11.50	3.25	11.50	8.25	3.90	3.10	50	90	n/a
8433	25.70	10.00	3.30	n/a	n/a	n/a	n/a	n/a	n/a	41
10687	23.40	15.40	4.70	13.95	7.95	2.50	6.60	60	85	n/a
10688	24.40	19.20	4.10	18.90	n/a	n/a	n/a	n/a	n/a	n/a
6680	21.07	10.62	3.11	10.62	n/a	n/a	n/a	n/a	n/a	55

Table 6.4-3: Measurements of Projectile Points from Level 2A

6.4.1.3 Scrapers

Three scrapers were present in Level 2A. Their attributes are listed in Table 6.4-4 and they are illustrated at two times actual size.

DlLg-33:08A/13352 is a Swan River Chert end scraper from Unit K12. This complete tool has some use wear polish on its underside. Extensive step fracturing along the working edge has most likely been the reason for this tool's abandonment. Two places on the ventral face have been knapped, presumably to flatten the tool's underside and make scraping an easier activity. The polish on the ventral side combined with the step-fracturing leads to the conjecture that this tool was used on bone or wood—the polish as a result of abrasion with another hard surface and the step fractures from pressure along that surface. There are no clear hafting marks. There is evidence of two flake types on this tool; large reduction flakes (3.22 mm) which are surprisingly uniform at that size and sharpening flakes whose scars run from 1.6 mm to 1.9 mm. This scraper is covered with hematite.

Plate 6.4-6: DlLg-33:08A/13352

Plate 6.4-7: DlLg-33:08A/ 13615

A chert end scraper, DlLg-33:08A/13615, occurred in Unit G5. This scraper is unusually small and is the result of a plunging flake. In the field laboratory, this artifact was classified as an awl due to the proximal pointed end which is opposite the distal scraper end. This scraper has a high working angle or a normal working angle, depending upon the point of measurement. Due to the plunge of the dorsal end, the practical angle is around 70^{o}, but the angle as normally measured (dorsal/ventral angle at working edge) would come out as approximately 50^{o}. There are two areas of flaking along the sides of the scraper that are indicative of hafting marks. They are placed directly across from each other and both measure 5.5 mm. Both are slightly more inset into the tool's sides than the rest of the flaking along those edges. There are two spots on the tool that may be cortex; one is right above the working edge, 7.95 mm long and 5.4 mm wide, and the other is at the proximal end of the tool, 2.6 mm long and 3.35 mm wide. This second cortex area runs across the ventral face at the proximal end. There is a hairline fracture 7.2 mm below the working edge that runs across the ventral face and this may have been the reason for the tool's abandonment. This scraper is remarkably similar to GjLp-17/m50, a Sonota scraper (McKinley 2002:Figure 24) in that both are the results of plunging flakes, made out of very similar material and made with particular symmetry. However, DlLg-33:08A/13615 is substantially larger than GjLp-17/m50, the Sonota Scraper. This is not to suggest any particular connection between the two tools. The Sonota Complex occurred a thousand years prior to the people who used the living floor that is Level 2A. All end scrapers will look essentially the same, a broad flat working edge flaring out from a heavy, short base, which is itself mounted onto a handle. There are surficial similarities between these two scrapers in that both are made with attention to detail, both are made from a plunging flake, both have similar working edge angles, and both are made from the same material. Overall, DlLg-33:08A/13615 is an extremely well made small tool.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
13352	end	22.00	16.60	8.70	15.90	4.50	90
13615	end	25.20	8.10	4.95	7.50	0.90	50-70
18029	end	21.17	23.79	10.14	n/a	n/a	n/a

Table 6.4-4: Measurements of Scrapers from Level 2A

DlLg-33:08A/18029 is the base of a broken Swan River Chert end scraper from Unit C22. This flake is relatively thick and the overall shape of the tool suggests that this may be the haftable base of a hafted end scraper. The ventral face of the tool is extremely flat, the angle of the sides are consistent with the method of manufacture for other end scrapers and the base has a shaft-like projection 4.23 mm long. The dorsal face is almost entirely cortex. There is some use wear at the base of the scraper, as if this end was briefly used after the end scraper broke. However, this could have resulted from pressures applied when the tool was complete and attached to a shaft. Swan River Chert often has a natural gloss to it and many areas of this tool have gloss that could either be the result of use wear or a natural phenomenon. Several areas that have gloss on them are not in areas consistent with use wear. The knapped edge of the base of this broken tool is made up of eleven flake scars, ranging in size from 1.08 mm to 5.58 mm, all removed from the dorsal face. All flaking on this tool is unifacial.

6.4.1.4 Knife

DlLg-33:08A/5958 is a knife made from Swan River Chert. It was located in Unit A6. The knapping on this tool is delicate and strong. There are areas with step fracturing on both faces and the quality of material may have impeded some flaking attempts. There are three areas of minor use wear polish. The two edges differ widely in form, one being a strong curve and the opposite edge being straighter at the base and curving inward only near the tip. The base of the knife consists of four flake scars, ranging from 1.3 mm to 3.9 mm, running a maximum of 4.9 mm into the body of the tool. From the base along the strong curve to the tip of the knife, there are seven flake scars, one of which runs 6.4 mm into the body of the knife. These flake scars range in width from 3.5 mm to 5.8 mm. Moving from the tip to the base along the flatter edge, seven flake scars are visible, with at least five earlier shaping scars that appear to cross the face from edge to edge. These are obscured on both edges by the subsequent sharpening scars and because of this the measurements on this knife reflect only the sharpening scars. The seven flake scars along the flatter edge range in width from 4.2 mm to 4.8 mm. The base has three flake scars clearly visible, moving a maximum of 8.5 mm into the body of the knife. These three scars are almost exactly 3.9 mm each. From the base to the tip along the flatter edge, there are six flake scars, running a maximum of 9.5 mm into the body of the knife. They range in width from 1.8 mm to 4.8 mm. From the tip along the curved edge to the base there are eight flake scars, running a maximum of 5.1 mm into the body of the knife. These flake scars range in width from 2.1 mm to 6.5 mm. The measurements are delineated in Table 6.4-5.

Plate 6.4-8: Both Sides of DlLg-33:08A/5958

CAT. #	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
5958	knife	28.00	15.50	5.28	L 23.90 R 22.27	L 2.90 R 2.00	L 49 R 38
6679	retouch fl.	23.25	17.80	3.80	L 18.90 E 17.80	L 1.10 E 0.00	L 47 E 44
7547	retouch fl.	24.90	17.00	11.10	11.90	0.70	53
9000	utilized fl.	22.80	16.90	2.00	18.60	-1.10	33
13114	utilized fl.	52.00	12.50	4.51	48.50	2.50	27
13616	utilized fl.	20.35	16.90	6.10	L 19.00 R 20.00	L 3.60 R 1.84	L 44 R 43
13618	utilized fl.	28.40	15.20	4.80	15.90	-1.10	26
14358	chitho	115.60	68.20	13.20	undeterm	undeterm	undeterm

Table 6.4-5: Measurements of Flaked Lithic Tools (Excluding Scrapers) from Level 2A

6.4.1.5 Retouched Flakes

Two retouched flakes were recovered and their attributes are listed in Table 6.4-5. DlLg-33:08A/6679 is a porcellanite retouched flake recovered from Unit C6. This tool has beautifully small and even flaking across two complete edges. The distal edge is a flat, even edge, with no less than nineteen flake scars in 15.7 mm, which is 1.2 flakes per mm. The left edge has flaking scars on the ventral face, with nine flake scars in 19 mm, which is 2.1 flakes per mm. Once again, this is very fine flaking. There is some use wear in polish and in flake scars along both edges. There is cortex on the dorsal face, on the left edge. The bulb of percussion is visible as is the striking platform. This tool has either been heat-treated or has been in or close to a fire as it has a smoked appearance.

A Swan River Chert retouched flake, DlLg-33:08A/7547, recovered from Unit E10, is somewhat unusual in that it is 17.0 mm wide but 11.0 mm thick at the back edge, and slopes to 0.7 mm at the working edge. The working edge has been broken and only a portion of the edge remains. There are five evenly spaced unifacial flake scars ranging from 2.1 mm to 2.95 mm in width along the working edge. The ventral face is extremely flat and may well be a tool of opportunity.

6.4.1.6 Utilized Flakes

Four utilized flakes were recovered in Level 2A. The measurements for these tools are listed in Table 6.4-5. DlLg-33:08A/9000 is a quartzite utilized flake from Unit C14. There is an edge of cortex on the left edge. No flaking is discernable on this flake. There is very light polish on the ventral face, indicating that it was very lightly used prior to abandonment.

A broken chert utilized flake, DlLg-33:08A/13114, occurred in Unit K10. This artifact is an edged plunging flake, with a shape that is typical for the type. The working edge is practically the length of the blade itself. It broke near the tip of the tool and that is most likely the reason it was abandoned. The tip of the tool was discovered in close enough context that they were curated as one object so it is likely that the tool was abandoned upon breakage and not utilized any further. Polish on the working edge is roughly 0.7 mm wide. The average utilization flake scar is from 0.3 mm to 1.2 mm.

An agate utilized flake, DlLg-33:08A/13616, occurred in Unit G5. This flake is definitely a decortication flake as the entire dorsal face is cortex. There is use wear along the ventral face's working edge. There are some areas with flake scars remaining from tool use.

DlLg-33:08A/13618 is a chert utilized flake recovered from Unit G5. This tool has slight use wear polish on the working edge, which is on the left edge. No knapping scars can be discerned. The distal end of the tool may have seen some use as a scraper as the corner opposite the working edge has a slight polish. There is a large step fracture that runs from that corner to the working edge.

6.4.1.7 Chitho

DlLg-33:08A/14358 is a diorite chitho located in Unit B17. This artifact is in a semi-circular form and very flat across the faces. The edge of the tool, where a hand would hold it during use, is flat and smooth. The working edges are bifacially flaked and have use wear and some polish along the working edge. The opposing faces bear some description as well, as one face has been stained quite darkly and perhaps was in direct contact with charcoal while the opposite face has ash still adhering to the surface, as well as some of the matrix. This tool could be considered useful for future residue analysis. The attributes of this chitho are outlined in Table 6.4-5.

6.4.1.8 Whetstone


Plate 6.4-9: DlLg-33:08A/8316 (actual size)

DlLg-33:08A/8316, located in Unit A11, is a schist whetstone. This oblong tool was most likely originally a ground stone chopper that was reused as a whetstone after being broken. There are abrasions on what surface has survived rather extensive damage. However, the deeply abraded and worn working edges speak more to chopping or grinding use than sharpening. Determining a working angle for the original tool is problematic; the tool is very thin and flat, ranging from 95.0 mm mid-tool to 61.0 mm at the working edge. This means the working edge angle is approximately 90º. Very little of the working surface remains on this tool. This specimen measures 102.20 mm in length, 32.20 mm in width, and 0.94 mm in thickness with a weight of 32.0 grams.

6.4.1.9 Anvilstone

DlLg-33:08A/9124 is designated as an anvilstone. Located in Unit E11, this granite hammer/anvilstone is another multipurpose tool. Both ends of this generally rounded cobble have light pecking marks. The working edge has deep grinding marks not inconsistent with platform preparation. There are striking marks on one face of the tool that are consistent with bipolar percussion. The opposite face has long, staggered zigzag scratches across the surface. The origin of these marks are uncertain; they could perhaps be sharpening marks or brief platform preparation marks. The measurements for this tool are length 79.66 mm, width 56.63 mm, and thickness 36.92 mm. It weighs 249.82 grams.

6.4.1.10 Pipe

DlLg-33:08A/8607 is a small fragment of a soapstone pipe. It was recovered from Unit A14. This artifact has some vestigial decoration/inscribing along one broken edge consisting of two parallel grooves across the edge of the piece, 1.5 mm in size and V-shaped. There is also an engraved line running below the grooves, 0.6 mm wide and 0.6 mm below the lip of the pipe. Several scratches, moving from one broken edge toward the lip, appear to be accidental or post-depositional in nature.

The lip of the pipe has been ground to a V-shape. The grinding stops on each side of the inscribed grooves. Unlike DlLg-33:08A/8608 which has V-shaped grooves along the broken edges leaving the lip untouched, here it is the lip that has been carved into. As well, the surviving lip of DlLg-33:08A/8607 is V-shaped, while the lip of DlLg-33:08A/8608 is flat. This pipe fragment weighs only 0.44 grams and has a length of 13.4 mm, a width of 11.2 mm, and a thickness of 0.95 mm.

Plate 6.4-10: Pipe Fragments, DlLg-33:08A/8607 and 8608, at twice actual size

There is some residue on the inside of the general curve that may be consistent with tobacco (or other burned floral material) residue. It should be noted that one end of the artifact's length has evidence of being broken in a manner similar to that of the manufacture of bone tools—heavy engraving resulting in a thin inner wall that is snapped off.

DlLg-33:08A/8608, also from Unit A14, consists of three soapstone fragments that are the precise variety of soapstone as DlLg-33:08A/8607. However, these are much thicker, averaging 2.5 mm, suggesting that they come from a different object than DlLg-33:08A/8607. All three fragments are long and thin and have very similar inscribing resulting in V-shaped grooves that run 1.7 mm into the surface. Two fragments are refittable, although their V-shaped grooves do not similarly refit. This suggests that the carving of these grooves may have been conducted after the pipe was broken.

All three fragments are clearly portions of a pipe; they have a smooth and possibly decorated outer face with a smooth, flat lip. The edge opposite the lip (near what would have been the base of the original bowl) has been carved into at a steep angle such that this carving became the breaking point for the base of the pipe. Whether or not this break caused the pipe as a whole to fracture is unknown.

Two of the three fragments have grooves facing each other such that they could be used as decorative objects, tied up with a strip of hide and worn as a pendant for example. One fragment has its grooves nearest the lip of the bowl and the other has its grooves near the carved end of the bowl. The third fragment has two grooves side by side on the same edge. This fragment's grooves are the shallowest among the three fragments. The fragment with its grooves nearest the former base of the bowl has two grooved lines on the outer face both near the same broken edge. Both disappear into the break and most likely moved beyond it. These are decorative marks. Neither of the other pieces have such markings.

The inner faces of all three fragments are heavily encrusted with residue. It is likely that residue analysis could yield up some interesting information.

6.4.2 Detritus

Detritus is a term used by archaeologists to define waste material that results from the creation of a stone tool. If a knapper notes a useful flake that is struck off of a tool or a core and either utilizes, reshapes, or sharpens that flake, it ceases to be detritus and becomes a tool which is defined on the basis of how it is shaped. When a core is used until it is exhausted, or if it is lost or abandoned, it is also considered detritus, even though it has gone through a manufacturing process. Basically, anything used as a tool is a tool, but anything used to make a tool is not necessarily a tool.

6.4.2.1 Flakes

Flakes are the byproducts of the tool manufacturing process and represent different stages of the process. Flakes can be categorized as to the phase of manufacturing which they represent. The Level 2A assemblage has representations of four of the five categories (Table 6.4-6, Figure 6.4-2).

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	9	26.9
Secondary decortication	16	35.2
Secondary shaping	43	85.2
Thinning/sharpening	58	14.3
TOTAL	126	161.6

Table 6.4-6: Frequency of Types of Recovered Flakes in Level 2A

The flake distribution by quantity indicates that the majority of flaking activity in this level was that of thinning/sharpening. However, viewing the distribution by weight reveals a different picture. Thinning/sharpening accounts for only 9% of the assemblage by weight but accounts for 46.4% by quantity. As well, secondary shaping accounts for 33.6% of the assemblage by quantity and 51.9% by weight. Primary and secondary decortication flakes are usually to remove the cortex as well as to begin the shaping of the tool. Secondary shaping is a process in which the tool becomes defined. Tertiary shaping refines the rough but recognizable form created by secondary shaping. Thinning/sharpening is a process that sharpens the edges of the tool or reduces an edge dulled by use and then resharpens the edge. So secondary shaping is the part of the process where a majority of the larger flakes will come from. This accords with the frequencies displayed in Figure 6.4-2.

The flake distribution pattern in Level 2A is depicted in Figure 6.4-3.

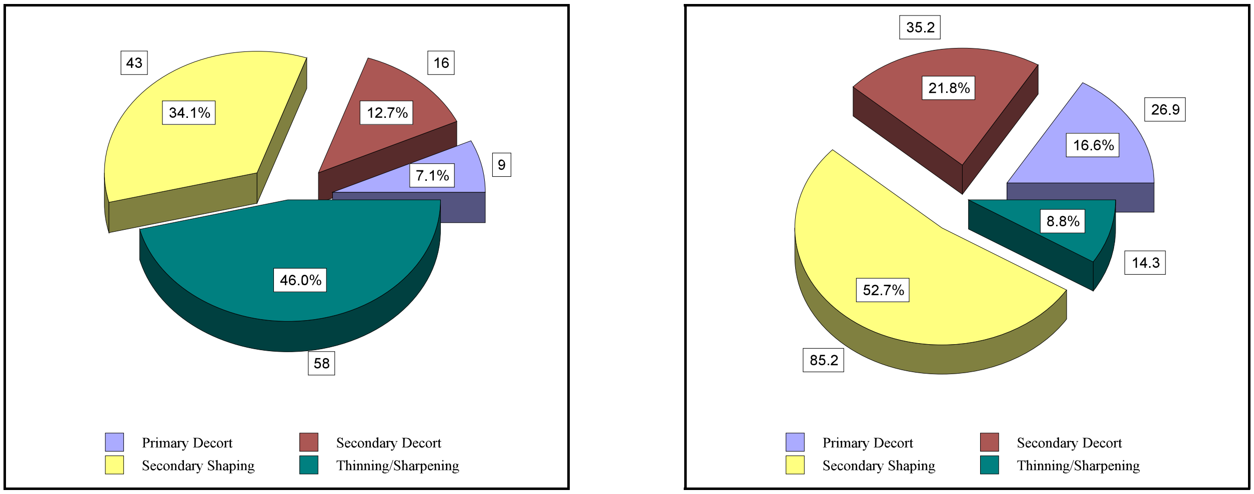


Figure 6.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

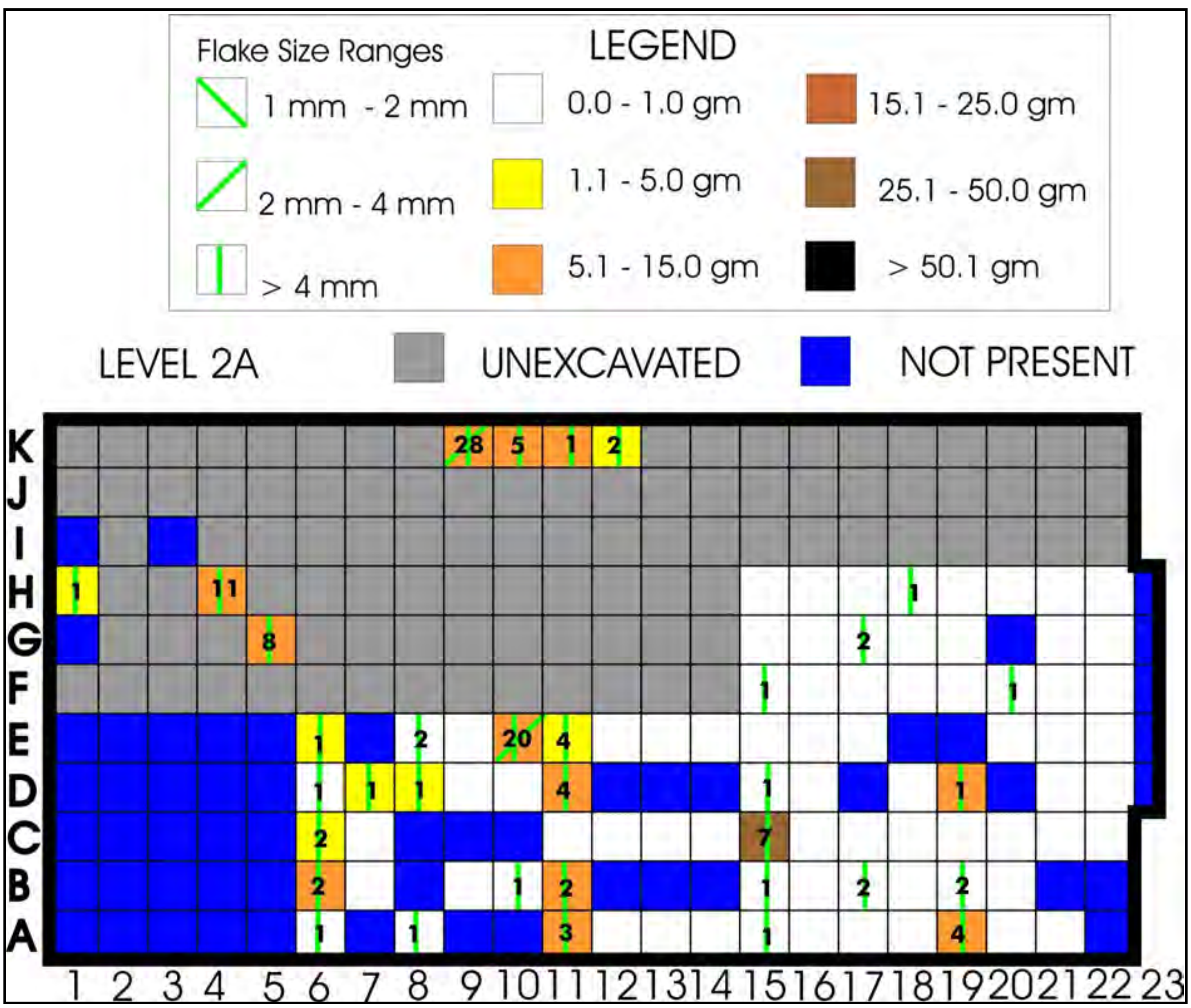


Figure 6.4-3: Distribution of Flakes in Level 2A

There are twelve different types of material in the flake assemblage (Table 6.4-7). They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes. Undifferentiated chert is by far the most numerous and the largest facet of the assemblage by weight (Figure 6.4-4). There are no exotic materials in Level 2A. All types listed are either available within a few days of travel or would have been very easily traded for. The distribution of material types across the excavation area (Figure 6.4-5) generally replicates the frequency distribution pattern.

MATERIAL	QTY	%	WT	%
Black Chert	1	0.79	0.1	0.06
Gabbro	1	0.79	0.1	0.06
Phyllite	1	0.79	0.2	0.12
Rhyolite	1	0.79	0.6	0.37
Soapstone	1	0.79	0.1	0.06
Quartzite	1	0.79	1.4	0.87
Selkirk Chert	3	2.38	0.8	0.49
Swan River Chert	9	7.14	5.1	3.16
Limestone	10	7.94	31.4	19.43
Knife River Flint	12	9.52	13.3	8.23
Quartz	16	12.70	8.7	5.38
Chert (Undifferentiated)	70	55.56	99.8	61.76
	126	99.98	161.6	99.99

Table 6.4-7: Frequency of Level 2A Flakes by Material Type

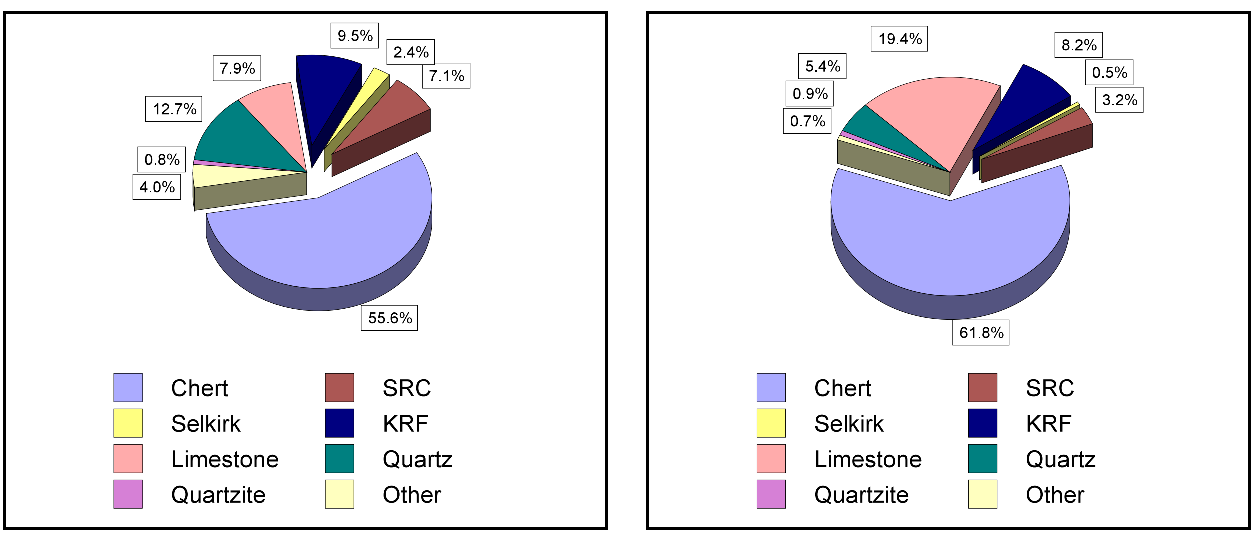


Figure 6.4-4: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

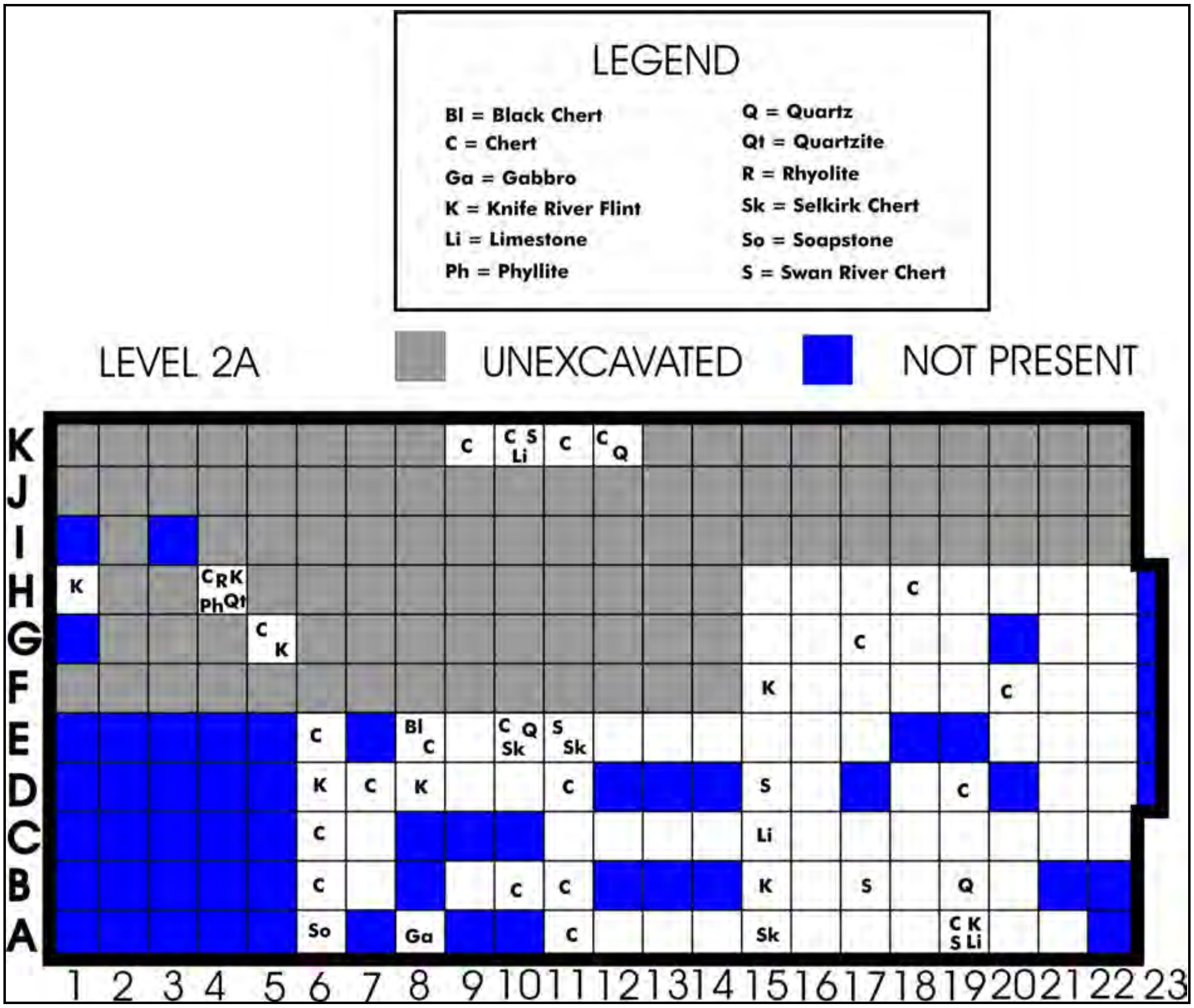


Figure 6.4-5: Distribution of Flakes by Material Type

6.4.3 Natural Object Modified

Two types of modified natural objects were recovered from Level 2A: fire-cracked rock (FCR) and ochre. The FCR (Table 6.4-8) is all granite. The distribution of these artifacts is shown in Figure 6.4-6. Nine pieces of FCR were recovered and these are generally are associated with the hearths unearthed in the excavation of this level. Ochre is the second modified natural object type found in this level, but with only six pieces of material uncovered there is not enough for a distribution pattern to have any coherent meaning.

CAT. #	UNIT	QTY	WT
7292	E6	1	77.4
8448	A12	1	29.9
8449	A12	1	10.6
8699	A15	1	51.4
9001	C14	1	160.6
16156	B18	3	82.9
22043	G17	1	1.3
TOTAL		9	414.1

Table 6.4-8: Fire-cracked Rock in Level 2A

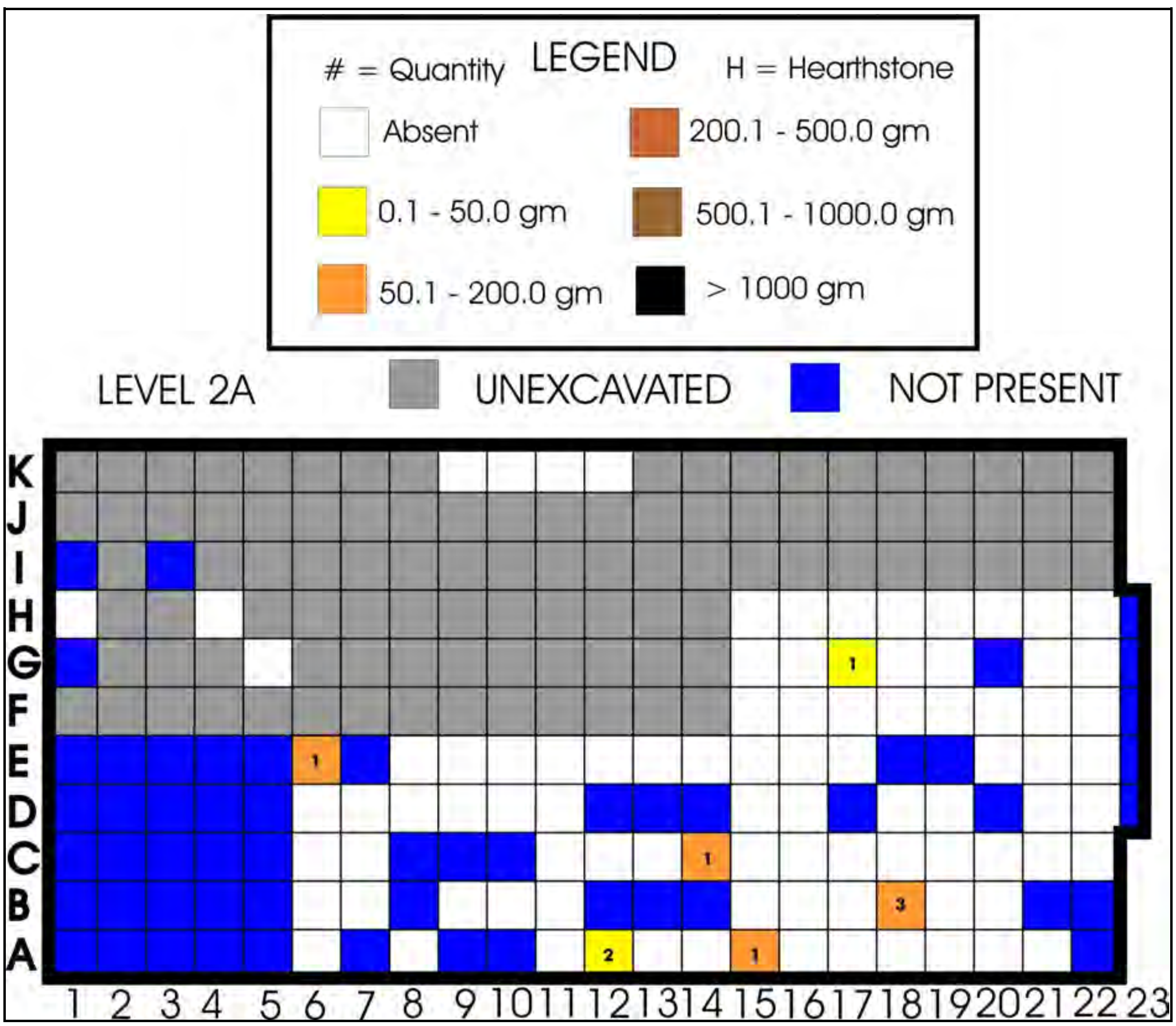


Figure 6.4-6: Distribution of Fire-cracked Rock in Level 2A

The second modified natural object is ochre. The ochre from Level 2A (Table 6.4-9) was found in only five units.

CAT. #	UNIT	QTY	WT
6563	B10	1	2.8
7364	E8	1	0.4
9432	E13	1	0.1
13032	K9	1	0.1
20173	F17	2	0.1
TOTAL		6	3.5

Table 6.4-9: Ochre Recovered from Level 2A

6.4.4 Natural Objects Unmodified

Unmodified natural objects can include cobbles, spalls, and pebbles. Nine artifacts were identified as unmodified natural objects (Table 6.4-10).

CAT #	OBJECT	UNIT	MATERIAL	QTY	WEIGHT
17811	pebble	H1	Swan River Chert	2	2.5
TOTAL				2	2.5
13023	spall	K9	schist	4	0.1
13031	spall	K9	quartzite	1	665.2
13619	spall	G5	granite	2	3.5
TOTAL				7	668.8

Table 6.4-10: Unmodified Natural Objects in Level 2A

Four extremely small pieces of schist from Unit K9, DlLg-33:08A/13023, are most probably either one spall that broke into four smaller pieces or four spalls that fell together. No attempt was made to prove refit due to their diminutive size. Metrics were also not attempted due to their size as well as the friability of the material. It is not possible to state that the act that caused their spalling off the larger object they came from is cultural, but as almost all lithic material found at the site would have had to have been manuported, these spalls remain within the lithic assemblage.

6.4.5 Summary

Level 2A does not have a large lithic assemblage in comparison with Levels 1 and 2, but as there are less units that have any trace of Level 2A, this is not surprising. There are many possible reasons for this relatively small amount of materials: the excavated area could have been on the periphery of an encampment; the encampment could have been a small group encampment; the occupation period was for a shorter duration; there were many fewer people using this site in comparison with the upper levels; or the necessary tools had been formed at another site entirely or another area within The Forks in general.

Generally speaking, the tools recovered from this level are associated with hearths. The presence of a whetstone and an anvilstone is unique in this excavation although the tools themselves have been encountered previously in numerous excavations around the geographical area. Ground stone technology does require a great deal more manufacturing time than does flaking technology.

Recoveries in Level 2A are a good cross-section of a neolithic tool kit: projectile points, scrapers, utilized and retouched flakes, as well as an anvilstone and chitho. These tools were utilized in food acquirement and preparation as well as clothing manufacture and possibly ritual activity.

6.5 Botanical Remains

A total of 57 catalogue numbers representing 182 charcoal specimens had been collected from Level 2A. Six species were identified from the samples in Level 2A. The highest occurring types were maple and ash, followed by elm and then poplar (Table 6.5-1). No oak was present.

TAXON	CAT #'S	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	10	27	31.75
Elm (*Ulmus*)	7	17	20.00
Maple (*Acer*)	10	20	23.53
Oak (*Quercus*)	-	-	-
Poplar (*Populus*)	5	11	12.94
Poplar/Willow	4	8	2.41
Willow (*Salix*)	1	2	2.35
Diffuse Ring Pattern	5	8	
Semi-ring Porous	-	-	
Hardwood	-	-	
Unidentified	20	97	
	52	174	

Table 6.5-1: Frequency of Charcoal Recoveries

Graphically, the frequency of the identified taxa is depicted in Figure 6.5-1. Ash and maple are the dominant species, with elm and poplar next in frequency.

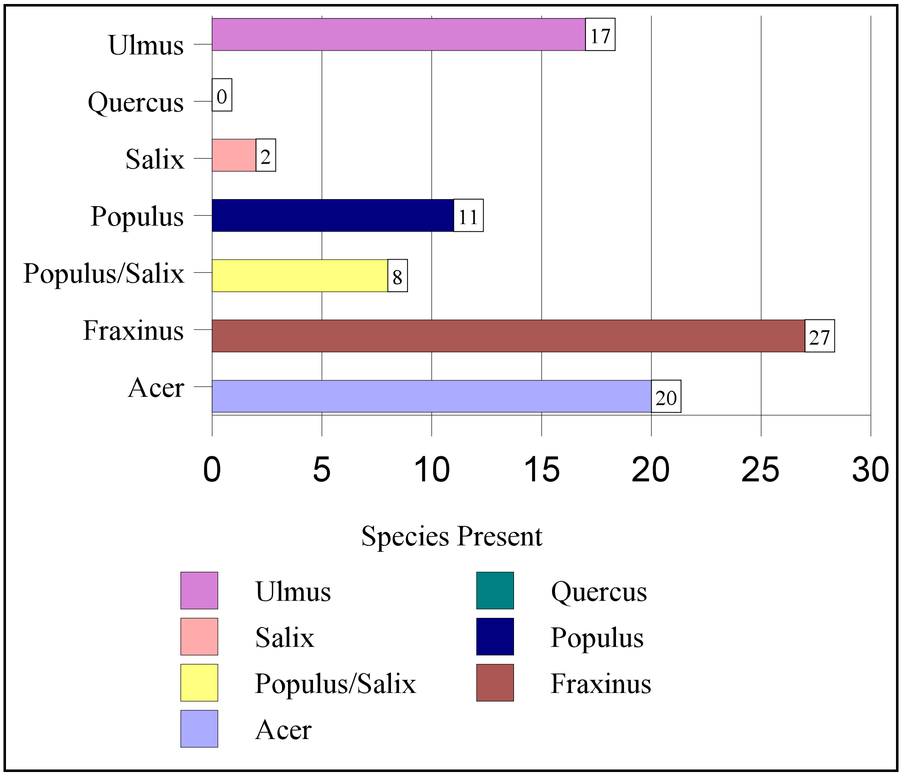


Figure 6.5-1: Frequency of Identified Taxa

Eight hearths had been identified in Level 2A (Figure 6.2-1). Floral samples were obtained from only one of the hearth units (Unit DC11) and they consisted of only maple wood and two fragments of bark. Three other bark specimens were recovered from Units B15, E22, and H1. The bark from Unit B15 was identified as birch (*Betula* sp.).

6.6 Mammal, Avian, and Reptilian Remains

6.6.1 Mammal Butchering Remains

In total for Level 2A, there were 574 elements weighing 1124.3 grams. Sixty-seven percent of the remains were not identifiable, 21% were identified to species, and the remaining 12% were made up by the general animal types (Figure 6.6-1).

The breakdown of identified taxa shows that, by weight, the unidentifiable material shrinks to about one-quarter of the assemblage (Figure 6.6-2). The weight of the larger bone elements tends to reflect the available meat. Thus, large ungulates and large mammals yield nearly 50% of the available mammal food resource.

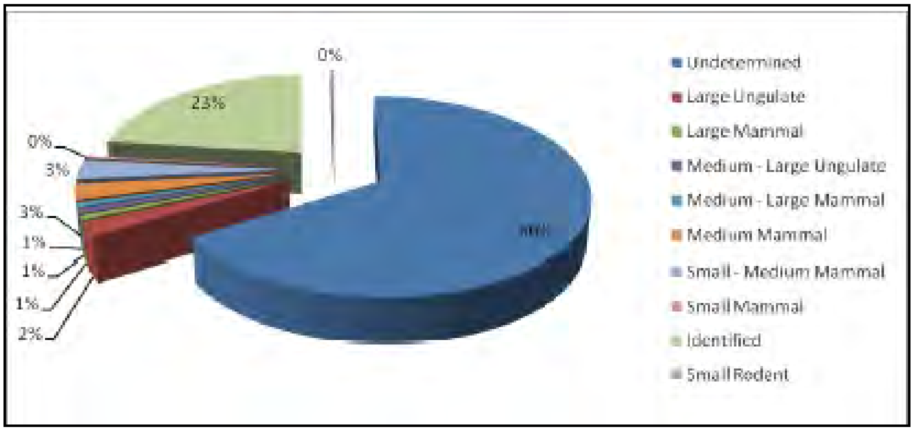


Figure 6.6-1: Frequency of Mammal Butchering Remains by Quantity

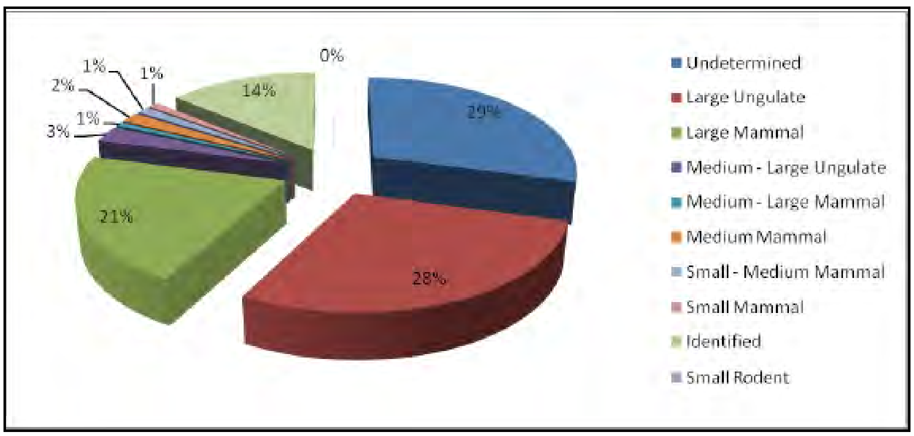


Figure 6.6-2: Frequency of Mammal Butchering Remains by Weight

It can be seen in Figure 6.6-3 that there are some units within Level 2A that have a higher amount of bone by weight (Units B10, A11, C16, and D18). The vast majority of the level does not have weights that exceed 50 grams and many have less than 5 grams. This is also interesting when seen alongside the hearths that were present within the level. Units A11 and B10 are in close proximity to the hearth on the border of Unit B11 and Unit C11, suggesting some possible relationship. However, Unit C16 and Unit D18 have no hearths in their vicinity. There is nothing of note within these units in terms of elements present. The units contain some large ungulate bones that contribute significantly to the total weight.

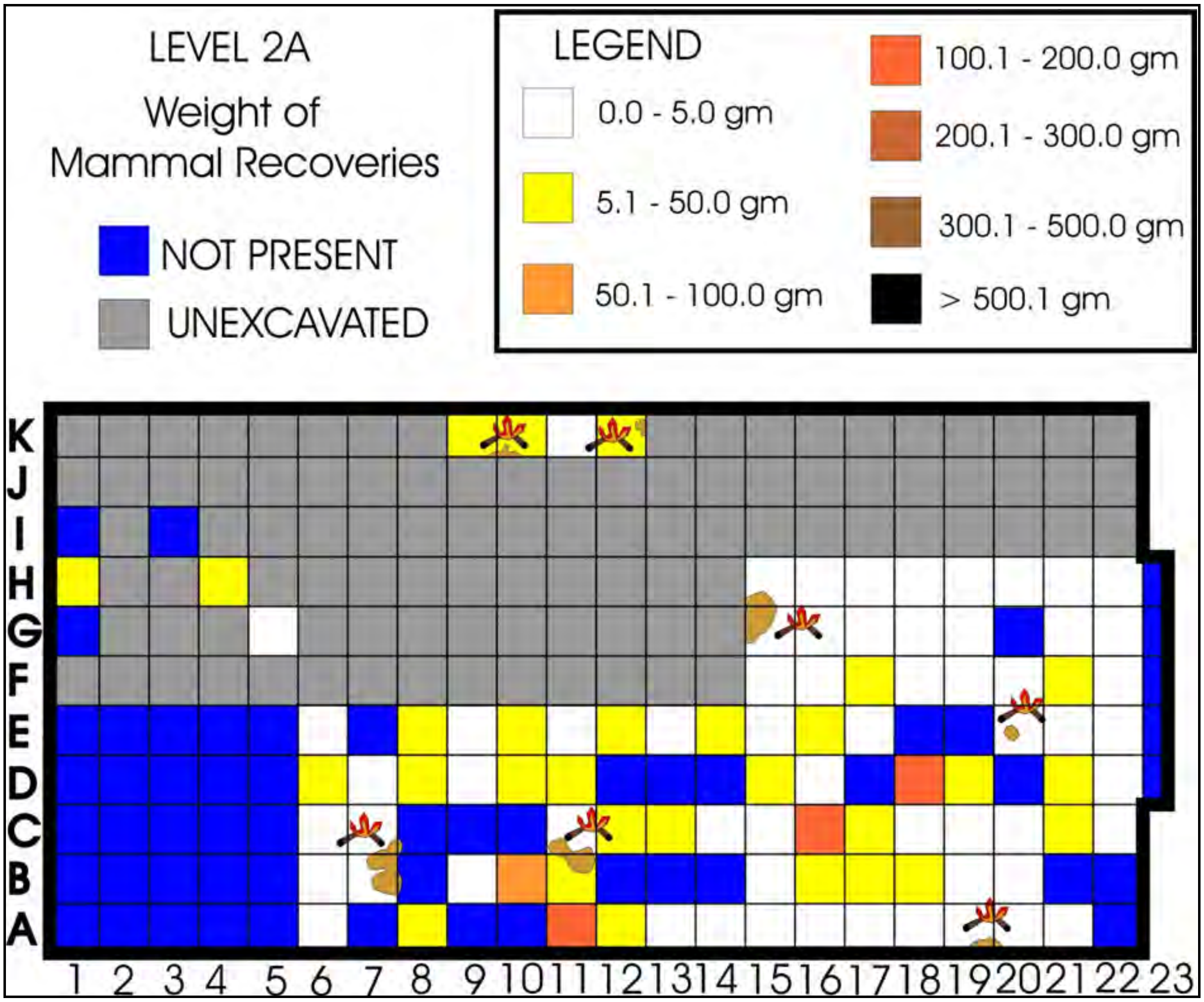


Figure 6.6-3: Distribution of Mammal Butchering Remains in Relation to Hearths

Figure 6.6-4 displays the distribution of charred and calcined mammal bone elements. It also shows the location of bone which has evidence of butchering. Compared to the previous levels, the overlap of culturally modified bone with the density distribution is not as apparent because of the patchy nature of this level. However, it does suggest that food processing occurred at the hearths in Units B7 and C11.

The taxonomic distribution map, Figure 6.6-5, indicates a concentration in the central portion of the excavation area. Other than rabbit and beaver, all of the identified species occurred in this area. The four units on the K line were relatively sparse. The density of material recovered from Unit H1 suggests that there had been a concentration to the west of the excavation area.

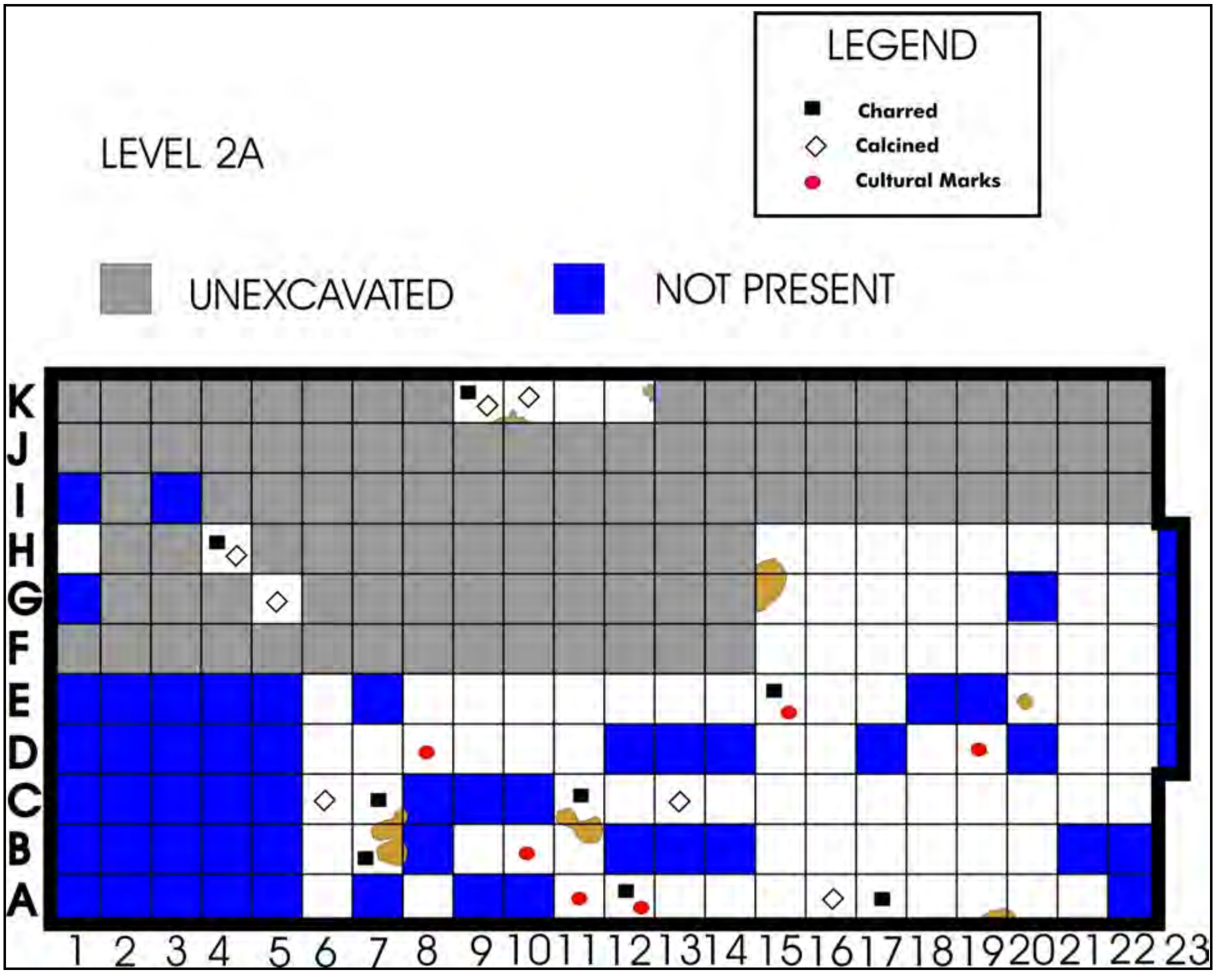


Figure 6.6-4: Distribution of Modified Mammal Butchering Remains in Relation to Hearths

Of all the larger mammals, bison is the only one identified in this assemblage (Table 6.6-1). The materials present might, however, account for as little as a single animal. This is also the case for almost all of the other mammals present: badger, beaver, canid, marten, muskrat, and squirrel. A coyote and a wolf were individually identified, beyond the generalized category of canid. There were only sufficient materials to account for a single animal of each species, as well.

Rabbit is the most prevalent, being responsible for 64% of the identified materials and representing at least 5 separate individuals. As discussed in some of the previous mammal sections, none of these animals alone, even including the bison with its large mass, would have been sufficient to sustain a sizable population for a whole season. It seems likely that these animals were a support to the fish resource that dominated the subsistence of this community.

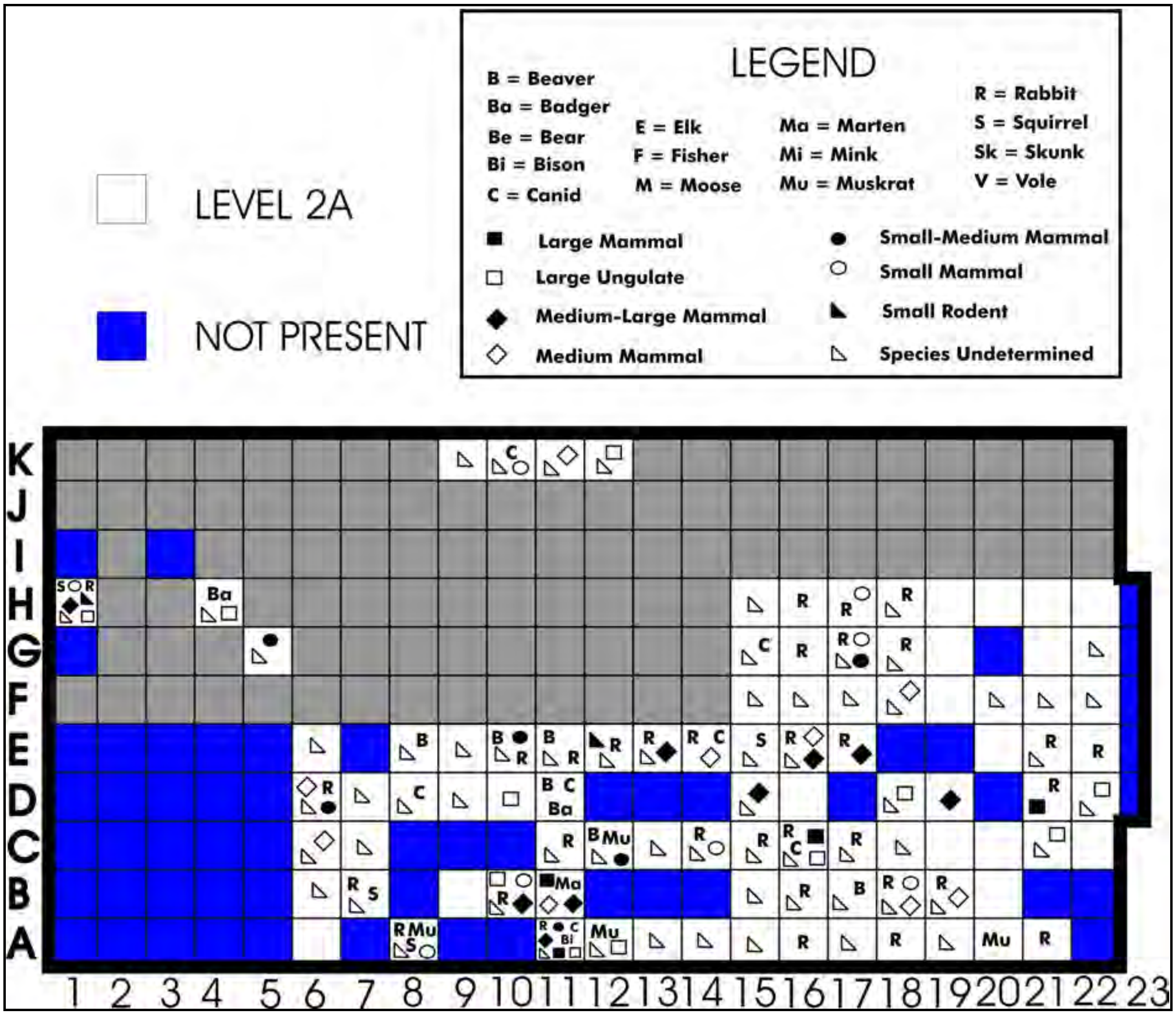


Figure 6.6-5: Distribution of Identified Taxa in Level 2A

SPECIES	MNI
Badger (*Taxidea taxus*)	1
Beaver (*Castor canadensis*)	1
Bison (*Bison bison*)	1
Coyote (*Canis latrans*)	1
Coyote/dog/wolf (Canidae)	1
Hare/Rabbit (Lagomorpha)	5
Marten (*Martes americana*)	1
Muskrat (*Ondatra zibethica*)	1
Squirrel (*Sciurus* sp.)	1
Wolf (*Canis lupus*)	1
Total	14

Table 6.6-1: Minimum Numbers of Identified Species

When the quantity of elements identified to species is considered, rabbit makes up nearly two-thirds of the assemblage (Figure 6.6-6).

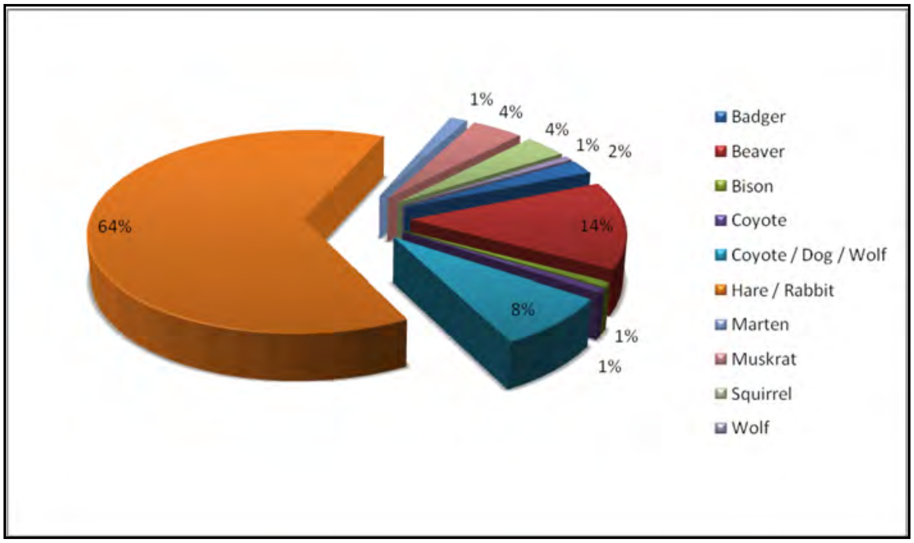


Figure 6.6-6: Frequency of Identified Elements by Species

When the weight of the identified elements is considered, beaver surpasses the rabbit contribution (Figure 6.6-7).

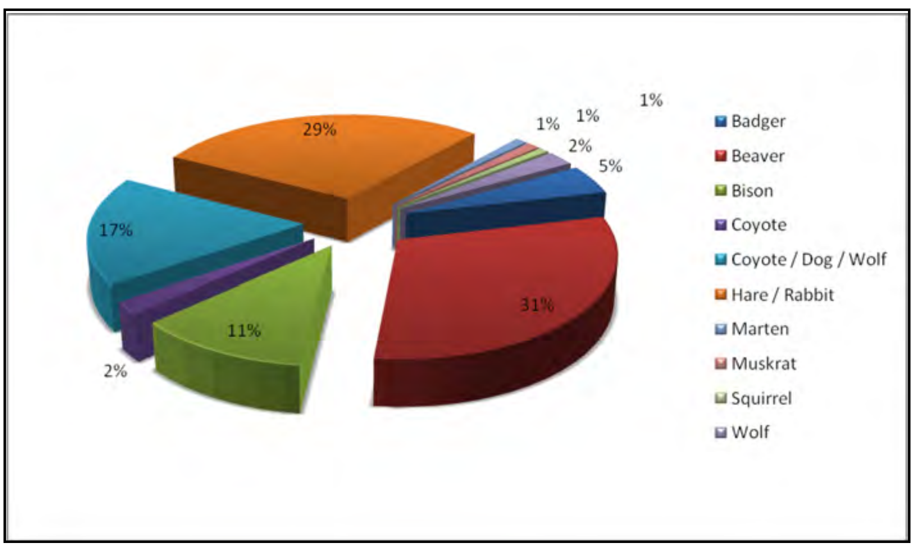


Figure 6.6-7: Proportion of Weight of Mammal Assemblage by Species

6.6.2 Bone Tools

There are only two tools that were located within Level 2A, a pair of awls—DlLg-33:08A/7461 (from Unit E9) and DlLg-33:08A/13094 (from Unit K10). It is noteworthy that both of these awls are made from bird bone rather than mammal bone as is typical of the rest of the levels. Both are nice examples (Plate 6.6-1), but DlLg-33:08A/13094, in particular, is a very high quality tool. Both are intact but there is a piece of the tip of DlLg-33:08A/7461 missing. While the species of bird the tools were made from is not discernible, both are from one of the long bones of a larger bird, possibly swan, goose, or eagle.

DlLg-33:08A/7461 is the smaller of the two awls with a length of 8.6 cm, a width of 1.0 cm, and a thickness of 0.3 cm. It weighs 2.3 grams. DlLg-33:08A/13094 has a length of 13.2 cm, a width of 1.3 cm, and a thickness of 0.4 cm. It weighs 3.2 grams.

Plate 6.6-1: Awls Made from Bird Long Bone (actual size)

6.6.3 Avian Butchering Remains

There were not a large number of bird remains recovered from Level 2A (Figure 6.6-8). Only 16 elements, weighing 13.8 grams, were identified. There does not appear to be any concentration or focus of the bird remains other than the fact that they are predominantly located through the middle of the site. Unit K9 has a higher number, but these are in fact five very small fragments weighing approximately 0.1 grams plus a single humerus of a small bird.

6.6.4 Summary

Based upon the mammal and avian materials recovered from Level 2A, it is clear that mammal remains had a role in the subsistence of the camp. However, much like the preceding levels, there is not enough food represented in the assemblage to maintain any sizable camp for a long time. Based upon the mammal and avian materials present, no areas of discreet activity can be located or even postulated. Rather, the analysis of other artifacts will be required to determine areas of particular note.

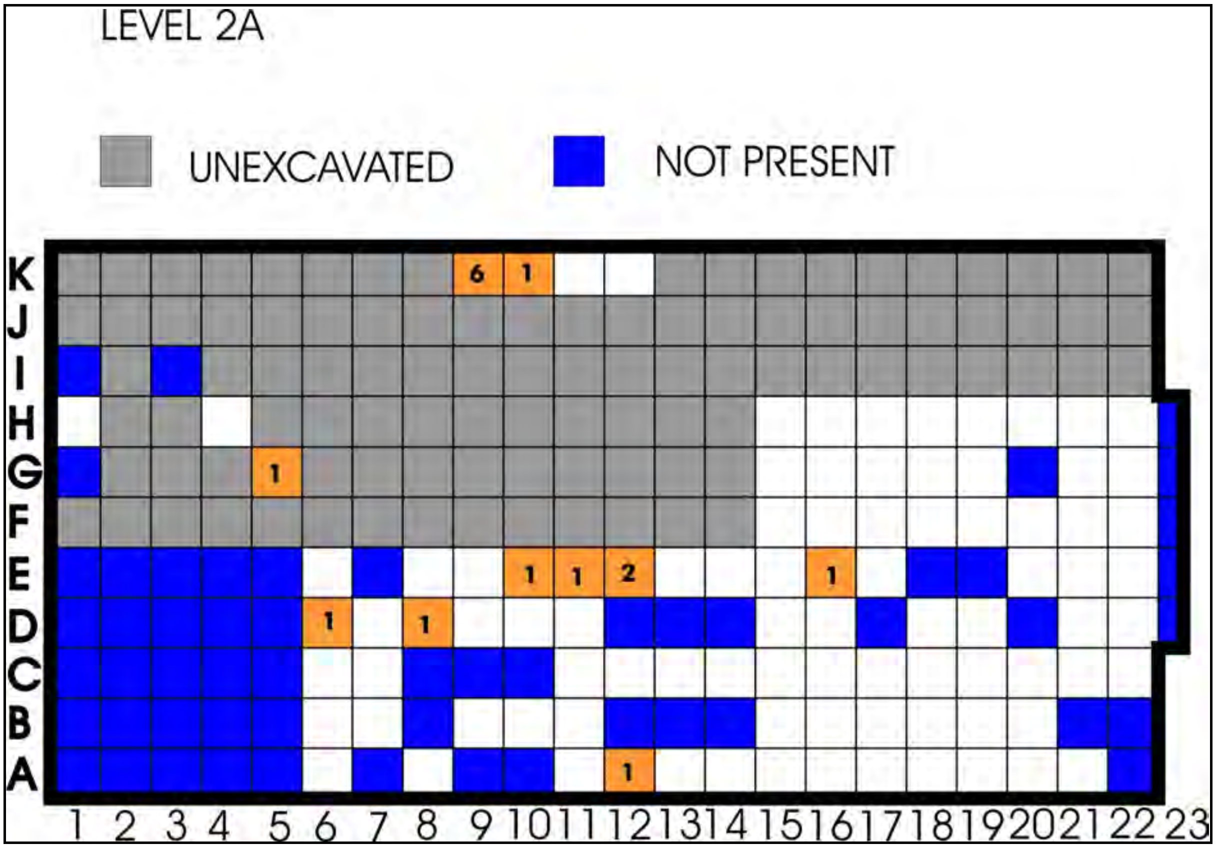


Figure 6.6-8: Distribution of Avian Butchering Remains

6.7 Fish Remains

6.7.1 Artifact Recoveries

There are 49839 artifacts (1595 catalogued assemblages) in Level 2A which have been identified as fish remains. Each of those 1593 catalogued assemblage of artifacts represents a record in the database from which to determine a quantitative analysis. Of the 49839 artifacts, 2416 were catalogued as "Unidentifiable Bone" (N=1491) or "Undetermined Bone" (N=925), leaving 47423 artifacts (95.15%) being identified as to their element.

However, 45442 of those specimens (i.e., 91.18% of all fish artifacts, and 95.82% of the identified elements from this level) were either scales (N=43780), rib/ray/spine (N=866), or vertebra (N=796) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

6.7.2 Species Determination

The remaining 1981 specimens (3.97% of all the artifacts and 4.18% of the identified elements) can be considered as diagnostic objects and, as such, form the basis for the interpretation of this level. Table 6.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

Most objects are recorded as to their skeletal element, but there is one object identified as an awl. DlLg-33:08A/9341 is clearly a bone tool. It can positively be identified as a culturally-modified freshwater drum pterygiophore spine. It could be included in the general count of freshwater drum pterygiophore spines for those objects, but its function is clearly much different than a product of butchering remains, and thus it is categorized as an implement in clothing manufacture because of its cultural use.

6.7.3 Analysis

There are seven different taxa present in the sample. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 6.7-2. The results are further illustrated in Figure 6.7-1.

The most significant species with respect to MNI frequencies is *Aplodinotus grunniens* (freshwater drum) followed by Ictaluridae spp. (catfishes) and Catostomidae spp. (suckers) with similar counts each, while *Hiodon* sp. (goldeye/mooneye), Percidae (perches), *Sander* sp. (sauger/walleye), and *Acipenser fulvescens* (sturgeon) are represented in very low numbers.

The NISP counts do suggest that some species may have a greater significance, such as the catfishes and, as to be expected given their MNI percentage, the frequency of freshwater drum. More suckers were identified than the remaining species, including the perches, sauger/walleye, and sturgeon, which is reflected in the MNI counts for those species.

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Angular	2								2
Angular; Articular; Dentary; Retroarticular	6								6
Angular; Articular; Retroarticular	1								1
Angular; Dentary; Retroarticular	7								7
Angular; Retroarticular	45							7	52
Articular	3							2	5
Awl						1			1
Basioccipital	17								17
Basipterygium	1								1
Ceratohyal	29					9			38
Ceratohyal; Epihyal	2								2
Cleithrum	210	53						8	271
Coracoid	114							6	120
Dentary	96	1		1	5	1		2	106
Dentary; Tooth					1				1
Epibranchial	2								2

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Epihyal	21								21
Exoccipital	1								1
Fin								1	1
Frontal	24							3	27
Hyomandibular	37	27	1					5	70
Hyomandibular; Preoperculum	1								1
Hyomandibular; Preoperculum; Quadrate	6								6
Hypohyal	17							1	18
Interoperculum	16								16
Lacrimal	7							1	8
Lateral Ethmoid	10								10
Maxilla	7	39	3					9	58
Metapterygoid	17							1	18
Operculum	40	46						10	96
Otolith	1					78			79
Palatine	22								22
Parasphenoid	17		2					1	20
Pharyngeal Arch	1	4							5
Pharyngeal Plate		2				6			8
Pharyngeal Plate, Lower						11			11
Pharyngeal Plate, Upper	3					14		3	20
Pharyngeal Plate, Upper; Pharyngeal Tooth						2			2
Pharyngeal Tooth						3			3
Posttemporal								1	1
Premaxilla	20	1		1		29		9	60
Preoperculum	37								37
Preoperculum; Quadrate	14								14
Prootic	3								3
Pterotic	2								2
Quadrate	21	2		5				1	29
Ray, Branchiostegal	11							12	23
Rib / Ray / Spine								866	866
Scale								43780	43780
Scapula								2	2
Scute							34		34
Sphenotic	10							1	11
Spine, Dorsal	46					157		14	217
Spine, Dorsal; Pterygiophore						1			1
Spine, Modified First	2					1			3
Spine, Pectoral	181					18			199
Spine, Pterygiophore	9					68		4	81
Spine, Second Dorsal	35					1		3	39
Spine, Second Pterygiophore	3								3
Suboperculum	1							2	3
Supracleithrum	17							1	18
Supraethmoid	25	1						1	27
Supraoccipital	7								7
Tooth								1	1
Undetermined Bone	1							924	925
Unidentifiable Bone								1491	1491
Urohyal	6							2	8
Vertebra	4	1						796	801
TOTAL	1238	177	6	7	6	400	34	47971	49839

Table 6.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	1238	66.27	20	24.10
Catostomidae (2)	177	9.48	21	25.30
Percidae (3)	6	0.32	1	1.20
Sander (4)	7	0.37	3	3.61
Hiodon (5)	6	0.32	2	2.41
Aplodinotus (6)	400	21.41	35	42.17
Acipenser (7)	34	1.82	1	1.20
TOTAL	1868	99.99	83	99.99

Elements Used for MNI Determination

1. Angular; Retroarticular (Left)
2. Maxilla (Left)
3. Hyomandibular (Incomplete)
4. Quadrate (Left)
5. Dentary, Dentary; Tooth (Right)
6. Otolith (Right)
7. Scute

Table 6.7-2: Species Determination

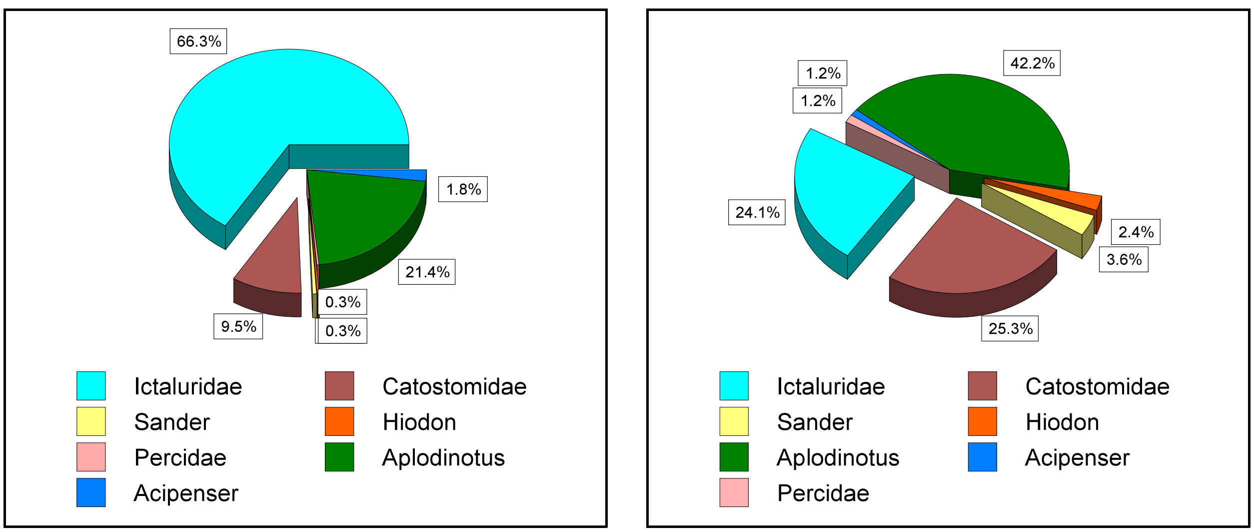


Figure 6.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The distribution of the fish remains by species is shown in Figure 6.7-2. Several units do not contain any fish remains that have been identified as such, namely Unit A6 in the southwest corner of the excavation grid, as well as two groups of units in the northeastern area, specifically in the Unit D/E16-19 locale and another larger absence in the Unit F/G/H19-22 locale. This seems unusual since fish remains were identified elsewhere throughout all other units. This anomaly cannot be accounted for at the present time. For instance, in Unit B6 immediately adjacent to Unit A6, which is devoid of any fish remains, there is a major cluster of five different fish species. Other units that have significant clusters include Units E9, E10, E20, and G5. Unit E20 has a hearth directly associated with it, whereas the two other clusters in Unit B6, and Units E9 and E10 are in the vicinity of hearths. The last cluster in Unit G5 has no hearths near it.

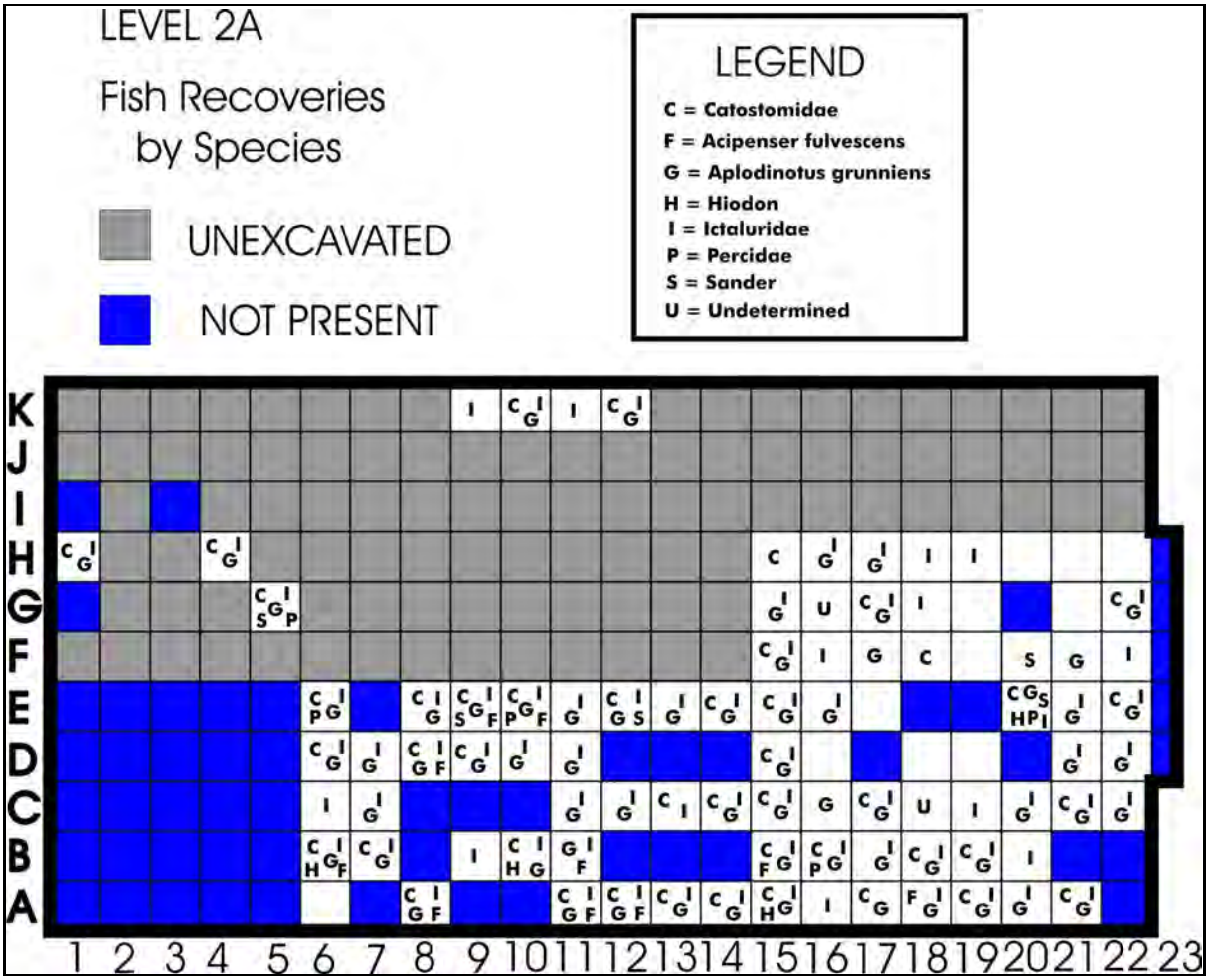


Figure 6.7-2: Distribution of Fish Remains by Species in Level 2A

Sturgeon remains appear to be located primarily in the southern most units along the A and B lines to about 18 East, with another small cluster appearing in the Units D8 to E10 area. These could be related to the hearths in the immediate units, which the sturgeon remains seem to surround. Goldeye/mooneye also seem to be located near the hearth features. They are scattered across one end of the site to the other, but can be found in four individual concentrations in Units B6, B10, A15, and E20. With the exception of the *Hiodon* remains in Unit A15, the other units have hearth features in adjacent units. The sauger/walleye elements identified in the archaeological sample seem to be located in the more northerly row of units, particularly along the E9 to E12 line, and two separate clusters in Units E20/F20 and G5 where there also are the most diverse numbers of species present in the sample.

For the most part, all units had the "usual suspects" of catfishes, suckers, and freshwater drum; the most frequent combination of species for almost every other unit. At times, there is only a single species represented in some units, mostly only catfish, but other species do show up alone as well. No investigation was done as to what factors may cause this distribution, but further study may be able to make use of the photographic record to compare any field documentation with the identified fish skeletal remains to determine if there is a pattern to the deposition of individual species.

6.7.4 Interpretation

Figure 6.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 2A.

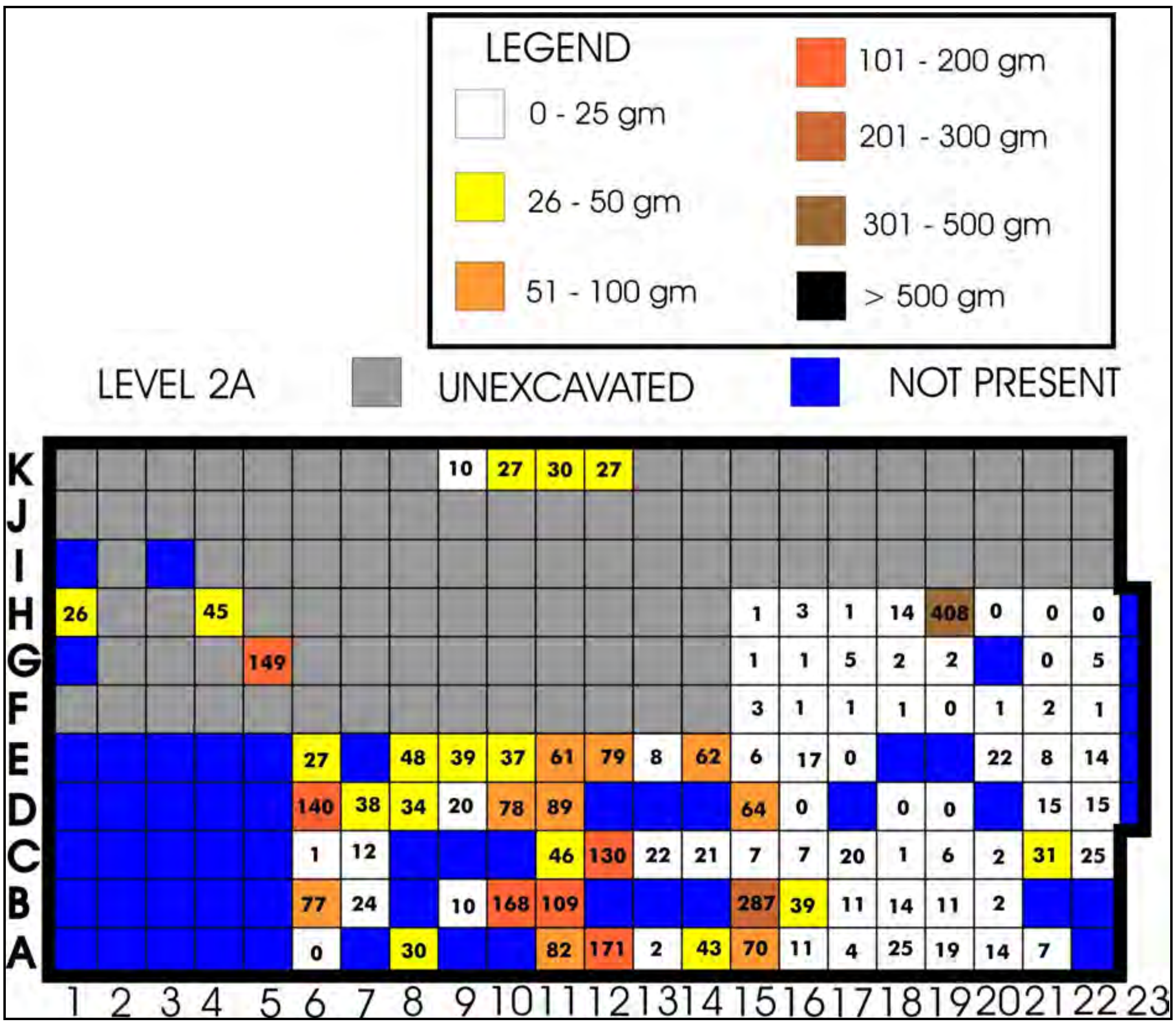


Figure 6.7-3: Distribution of Fish Remains by Weight

A very sparse density appears in the eastern side of the excavation area, which is interesting because a variety of different species are present throughout the same zone. It does seem to suggest, however, that the main area of occupation was in the western zone of excavation since most of the fish remains are located there. This may indicate that much of the human activity took place in those spots as opposed to the other excavated areas of Level 2A. The heavy density in Unit H19 also includes a sample of scales weighing 407.2 grams, so that would reduce the reported weight to almost one (1) gram, consistent with the surrounding units. Other major scale collections were taken in Unit B15 (262.7 grams in weight, lowering the reported total to about 24 grams) and Unit D6 (79.4 grams, reducing the reported weight to approximately 61 grams). Unit G5 shows a heavy density and it also had the highest diversity in the number of species. The area in and around the hearth in Units B11 and C11 shows a strong density suggesting a centre of activity.

No cut marks, which may have indicated any butchering techniques or other processing practices, were recorded on any specimens. No post-depositional marks such as carnivore chewing were recognized on any specimen. Thirty-three (33) artifacts were found to be burnt, charred, or calcined by fire, representing only 0.07 % of the total number of fish remains. Unit C11, which has a hearth in it, has almost half of the thermally-altered bone. The small amount of burned bone in Unit B10 is also associated with the same feature. There is some identified thermally-altered bone in Unit K12 which also has a hearth in it, as well as Unit B7 which has a hearth in the adjacent Unit C7. Unit H4 and Unit H1 have proportionately high occurrences of charred remains, but these are not associated with any excavated hearth features—hearths may occur in the immediately adjacent unexcavated area. Freshwater drum remains were the only species positively identified from the charred remains and they were found mainly in Unit C11 (based on otoliths) with an isolated occurrence in Unit D21 (based on a dorsal spine).

The most dramatic fish remains recovered was the awl, DlLg-33:08A/9341, found in Unit E12 (Plate 6.7-1). It is an extremely large pterygiophore from a freshwater drum. It was found broken in two pieces as a result of soil compaction, but was articulated when exposed and carefully excavated together. It has since been mended and is now a complete specimen. It weighs 3.4 grams and measures a maximum length of 9.8 cm from tip to end, with a maximum width of 1.6 cm. At mid-length it is 0.8 cm wide. It displays a high degree of polish on the tip, which has smoothed the point and rounded it down from great use, for about 5.5 cm up from the tip. The ridges up the sides of the spine also show a bit of wear by rubbing from use. There are no additional modifications to the bone. It appears to have been put to use with no further modification to its form, the natural size and shape being adequate for expedient use as a tool. It should be considered that this tool may have been retrieved from an individual fish that was caught elsewhere and not necessarily at The Forks. A personal tool such as this would likely be transported by the owner until lost or discarded, or it may have been acquired and put to use for only a short period of occupation while harvesting and processing fish from the river systems at The Forks. No other similar fish bone tools have been recovered in the region, it would seem, so little information is available to reveal a more definitive explanation of their function and use by the cultural group.

Plate 6.7-1: Awl (DlLg-33:08A/9341) Made from Drum Pterygiophore (1.5x actual size)

DlLg-33:08A/9341 is one of three culturally modified fish remains found during this excavation that clearly are utilized as tools. This is the first evidence, to date, at The Forks of fish bone being used as tools or for some purpose other than being the discarded remains from butchering and processing a catch. Excavations in other areas of the province of Manitoba have some indication of fish bone being used for a variety of other purposes, which is known ethnographically to be the case, but little archaeological evidence has been uncovered. Therefore, this object is significant for The Forks in particular, and Manitoba in general because it is unique in that regard.

6.8 Shellfish

Eighty-one artifacts representing butchering remains and naturally deposited specimens were recovered from Level 2A.

6.8.1 Butchering Remains

Of the sixty-two butchering remains in Level 2A, sixteen valves were identifiable to species (Table 6.8-1) with the remainder identified only as Unionidae.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	1	6.25	16.9	13.74
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	12	75.00	65.3	53.09
Pink Heel-Splitter (*Potamilus alatus*)	2	12.50	26.7	21.71
Maple-Leaf (*Quadrula quadrula*)	1	6.25	14.1	11.46
Pig-Toe (*Fusconaia flava*)	-	-	-	-
Three-Ridge (*Amblema plicata*)	-	-	-	-
	16	100.00	123.0	100.00

Table 6.8-1: Frequency of Identified Butchering Remains by Taxon

The distribution map, Figure 6.8-1, indicates that only a minor concentration occurred in Unit C12 which is on the outer periphery of a hearth that occurred in Units B11/C11.

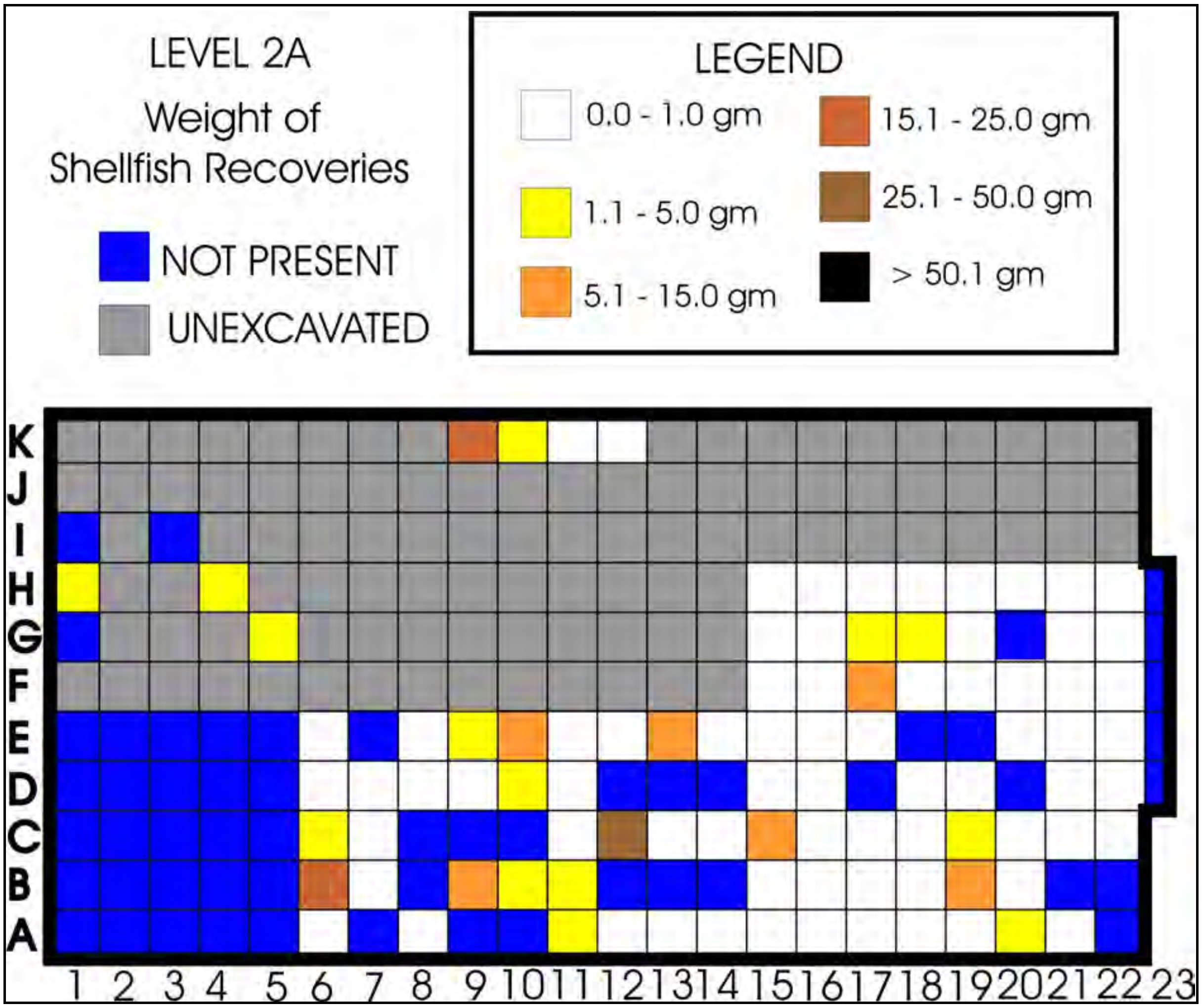


Figure 6.8-1: Density of Shellfish Recoveries in Level 2A

Only four species were present in Level 2A (Table 6.8-1): Black Sand-Shell, Fat Mucket, Pink Heel-Splitter, and Maple-Leaf (Figure 6.8-2). The values in each unit represent the number of valves of each taxon, with Fat Mucket being the predominant species.

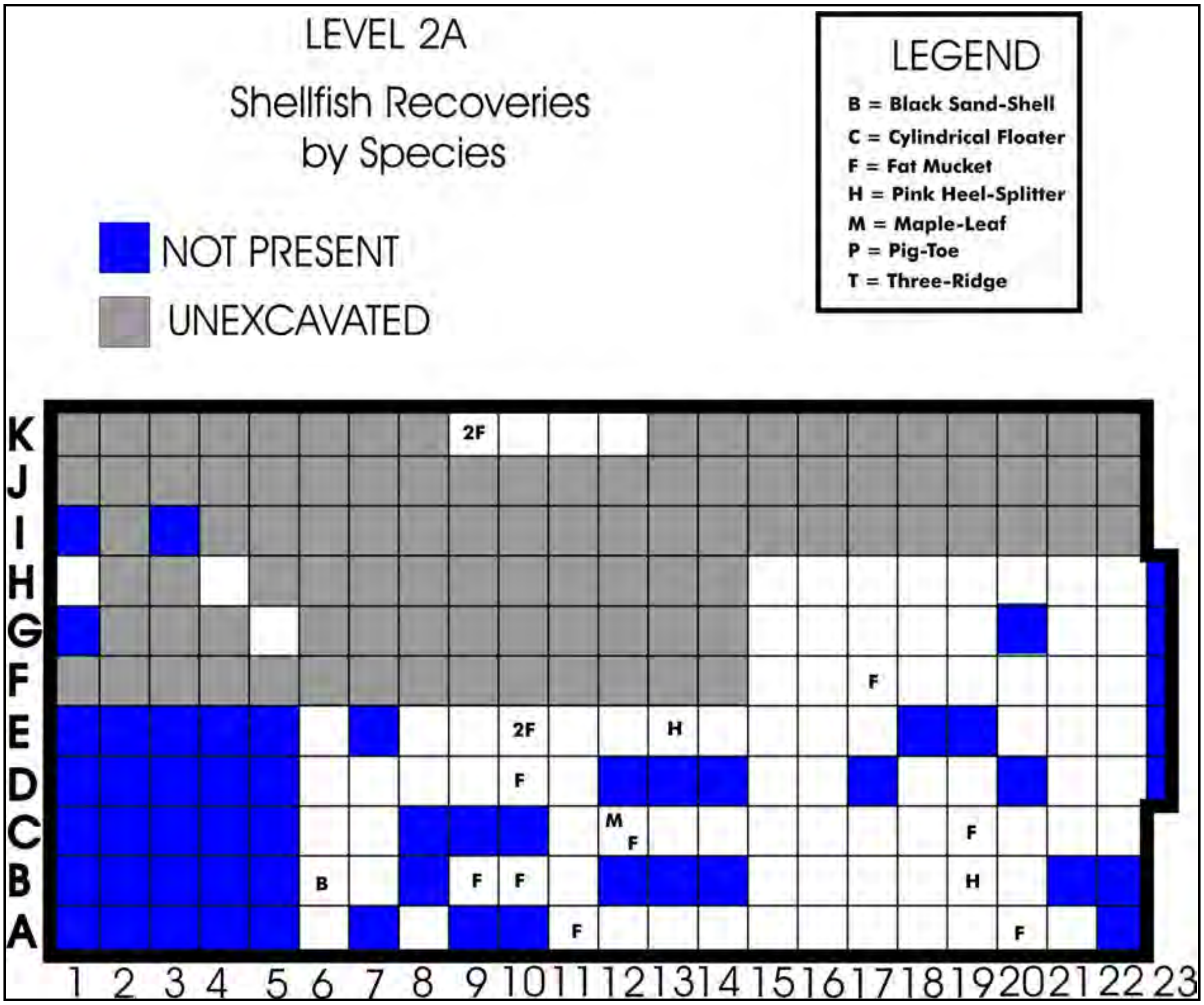


Figure 6.8-2: Frequency of Shellfish Recoveries by Species

Five valves had evidence of charring—DlLg-33:08A/10735 (1 specimen), DlLg-33:08A/13118 (1 specimen), and DlLg-33:08A/23431 (3 specimens). None of these could be identified beyond the Family level, i.e., Unionidae. DlLg-33:08A/10735 was recovered from Unit A19, while the other four specimens were recovered from Unit K10. All are immediately adjacent to hearths. No recovered shell specimens in Level 2A had hematite staining.

The Minimum Number of Individuals (MNI) was calculated and is presented in Figure 6.8-3. Fat Mucket is again predominant and overwhelms all other taxa, comprising 75.0% of the assemblage. Pink Heel-Splitter, Black Sand-Shell, and Maple-Leaf are minimally represented.

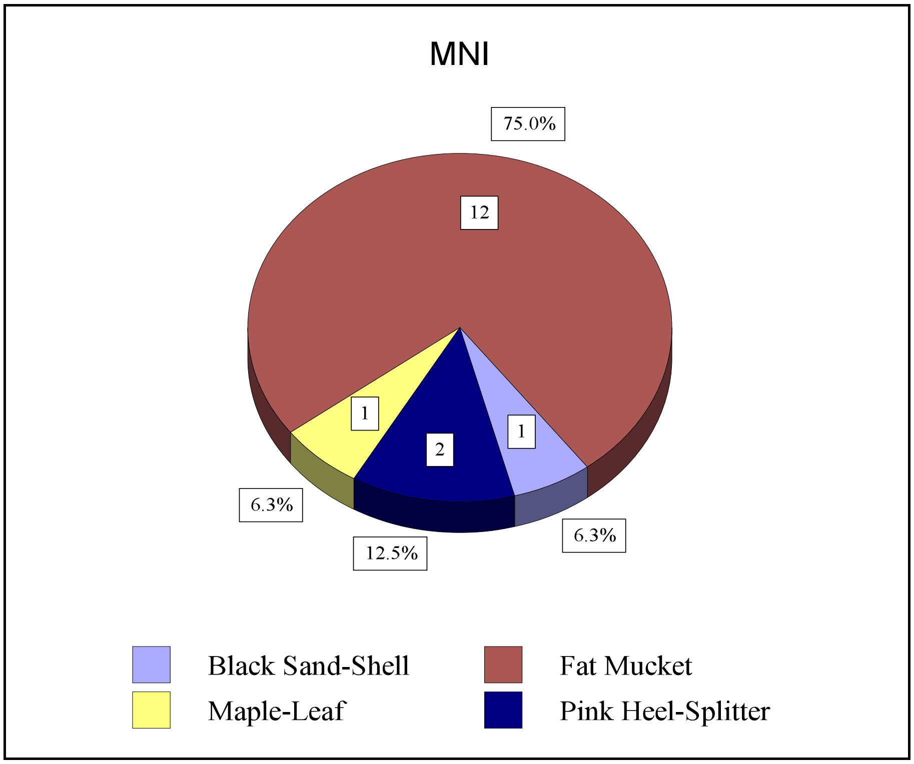


Figure 6.8-3: Frequency of Identified Taxa of Shellfish

6.8.2 Natural Shellfish

Nineteen naturally deposited specimens were recovered from Level 2A (Table 6.8-2). These are illustrated in Figure 6.8-4. The recoveries for this level are very sparse.

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	17	89.47
Ramshorn Snails (Planorbidae)	1	5.26
Pea Clams (Sphaeriidae)	1	5.26
TOTAL	19	99.99

Table 6.8-2: Frequency of Naturally Deposited Shellfish

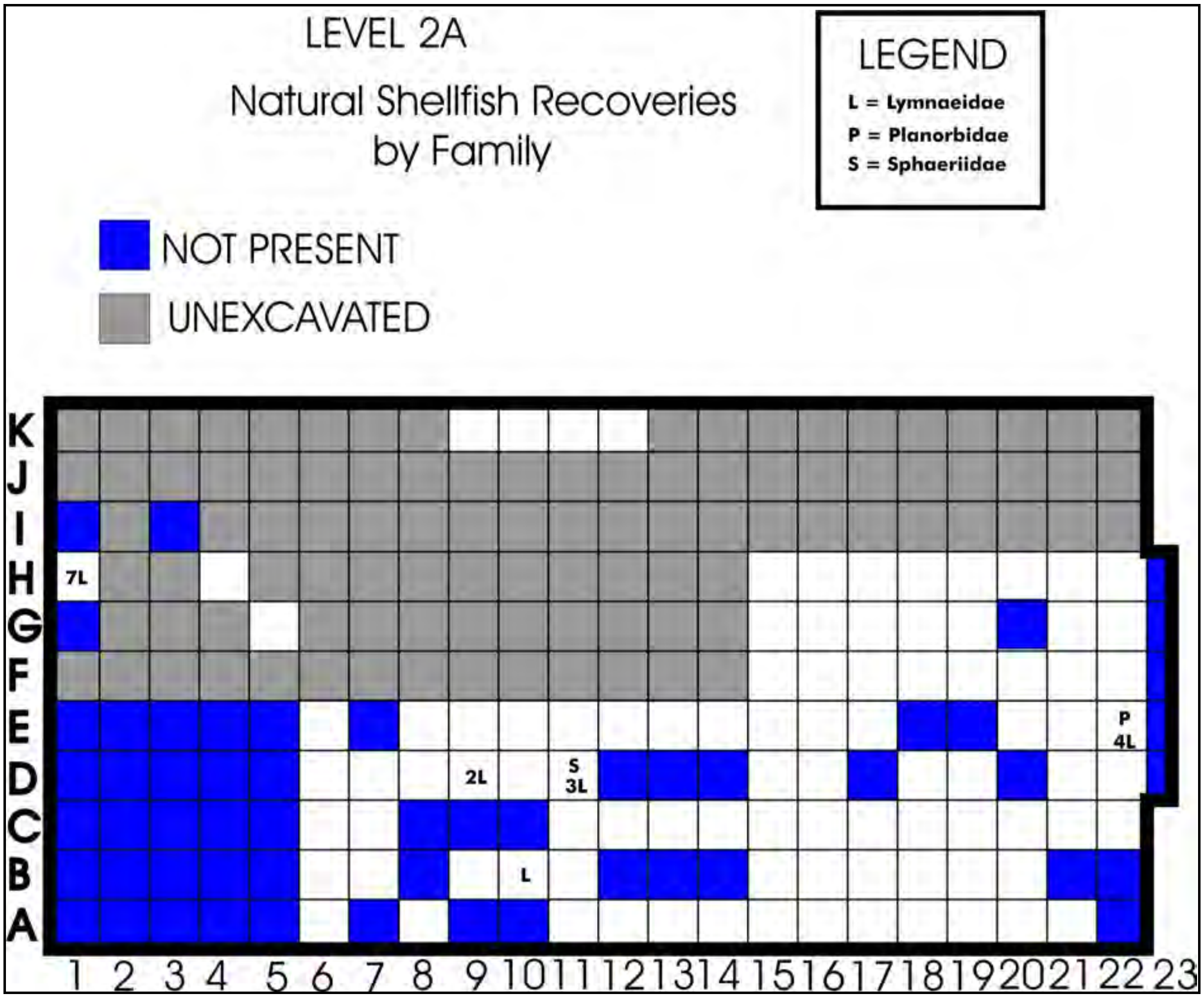


Figure 6.8-4: Location of Recoveries of Natural Shellfish in Level 2A

6.8.3 Summary

The number of recovered shell in Level 2A dropped considerably from that in Level 1 and Level 2. Only eighty-one specimens were recovered, sixty-two of which were butchering remains (76.54%). Of the 62 butchering remains, only sixteen were identifiable to species with four of the more common species, Fat Mucket, Black Sand-shell, Pink Heel-Splitter, and Maple-Leaf, being present. There was only a minor concentration in Unit C12 which is near a hearth, while the remaining recoveries were scattered across the level.

In addition, a much smaller sample of natural shellfish was obtained—nineteen specimens only. Lymnaeidae were predominant with seventeen snails.

Overall, Level 2A has a very sparse density, 0.86/m^2, compared to other levels. In regard to the shellfish, this appears to be a minor habitation or a shorter-term habitation perhaps with fewer people to feed.

6.9 Miscellaneous Recoveries

Miscellaneous recoveries, which do not fit the previous categories, are described in this section.

6.9.1 Soil Samples

Soil samples were collected from each unit and any features. Thus, some units had more than one sample collected. A total of 93 soil matrix samples were curated. As well as the soil samples, samples were taken when circumstances warranted. These include 12 hearth samples, one ash samples, two clay samples, and one caliche sample. Eight samples were taken of hearth clay and six samples of heat-modified clay were recovered.

6.9.2 Coprolites

Six coprolite samples were collected. This could indicate domesticated dogs or scavenging coyotes/wolves.

6.9.3 Copper

A small fragment of a hard material with traces of a blue-green surface encrustation was recovered from Unit K9. DlLg-33:08A/13030 tested positive with Cuprotesmo (L. Croom 2009:pers.comm.).

6.10 Level 2A Summary

As discussed earlier, the lack of stratigraphic separation between Level 2 and Level 2A causes complications in the interpretations of both cultural levels. As Level 2A is extensive to the east of the 5 metre East line and occurs north of the E line, it is probable that some of the artifacts incorporated into the Level 2 cultural layer actually belong to Level 2A. The intermittent gaps in the presence of Level 2A in the eastern section of the excavation area may reflect the original ground topography where separating sediment was not deposited on the higher ground and the artifacts from Level 2A were incorporated into the superceding Level 2.

The hearth pattern is quite sparse, suggesting that this portion of the campsite area was not used extensively for food preparation or residential activities. Twelve of the seventeen recovered ceramic vessels originate in Level 2A and represent a culturally homogenous group with only one extra-local vessel being present. There does appear to have been a technological shift in the ceramic manufacture technology between Level 2A and Level 2 in terms of the surface treatment of the vessels with sprang diminishing in the higher level.

The lithic tools were present in the southern portion of the excavation area except for two artifacts recovered in the K line. Particularly noteworthy are the recovered pipe fragments made from soapstone which occurred at the southern edge of the excavation. The lithic detritus does not show a definitive pattern: generic chert is the dominant material and, as it is obtainable from glacial deposits, it provides no indications of travel or trade. Quartz, which is associated with the Canadian Shield, is the second most common type followed by Knife River Flint. Some limestone and Selkirk Chert is present indicating a degree of use of the quarry sites downstream on the Red River. The picture that emerges, albeit vaguely, is of a group of people who had last been in the edges of the Boreal Forest along the Winnipeg River before moving to the campsite at The Forks. They also had trade connections with the south to obtain the Knife River Flint.

The faunal remains were sparse in comparison with the upper two levels. At least one bison was present along with rabbits, a beaver, and a muskrat. As in the upper levels, fur-bearing species were also represented in the faunal record. Fish and shellfish remains were also less than in Level 2. Only three bone tools were curated, two awls made from bird bone and one made from a pterygiophore from a freshwater drum.

In general, the faunal recoveries suggest a relatively short period of occupation as there would be considerably less meat available than was the case in Level 1 or Level 2. Alternatively, the excavated area was a portion of the campsite which was not actively used for food processing or the main body of the campsite lies beyond the limits of the excavation.

7.0 LEVEL 2B

7.1 Introduction

Level 2B was encountered in through the central portion of the area and the north eastern part (Figure 7.1-1). This cultural horizon was recorded in 67 units, notably absent in the western and southeastern portions of the excavation area.

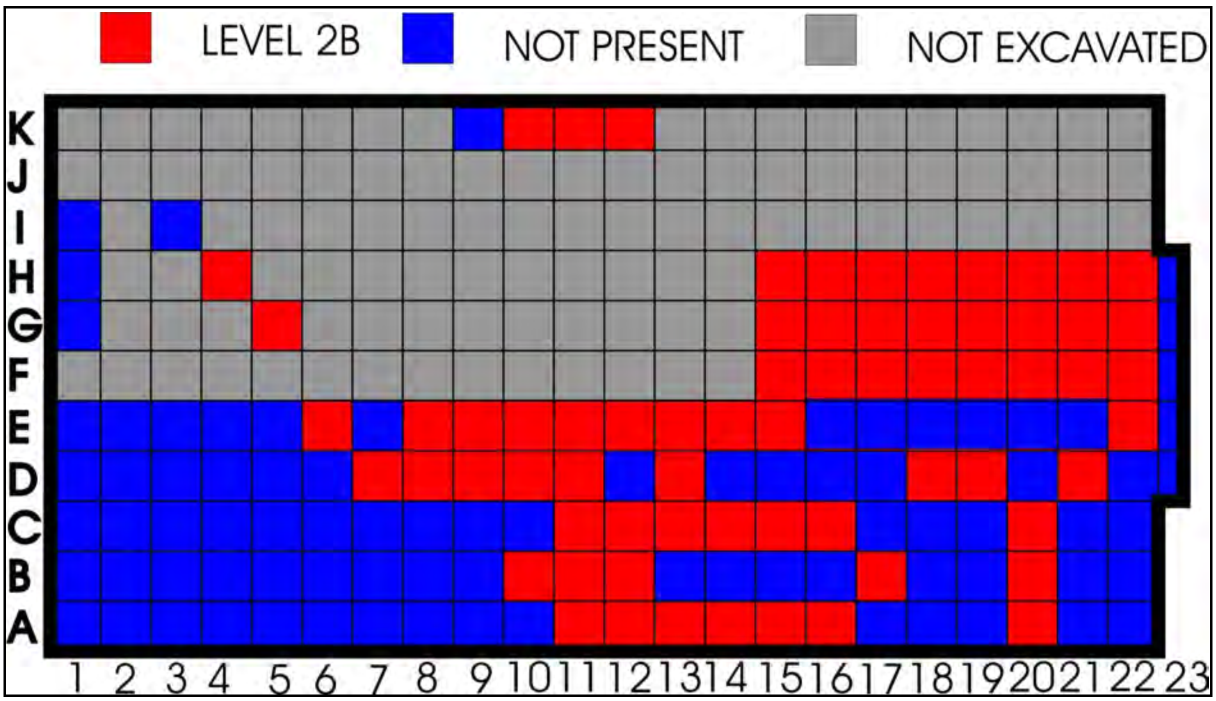


Figure 7.1-1: Map Showing Presence of Level 2B

7.2 Features

The primary feature that was recorded during the excavations was that of hearths (Figure 7.2-1). There are seven hearths, most of which are relatively small. The size of two hearths could not be determined as they were on the periphery of an excavated unit—E6 and K10. The largest hearths are the two hearths in Units G16/G17 and E14 and extending slightly into adjacent units.

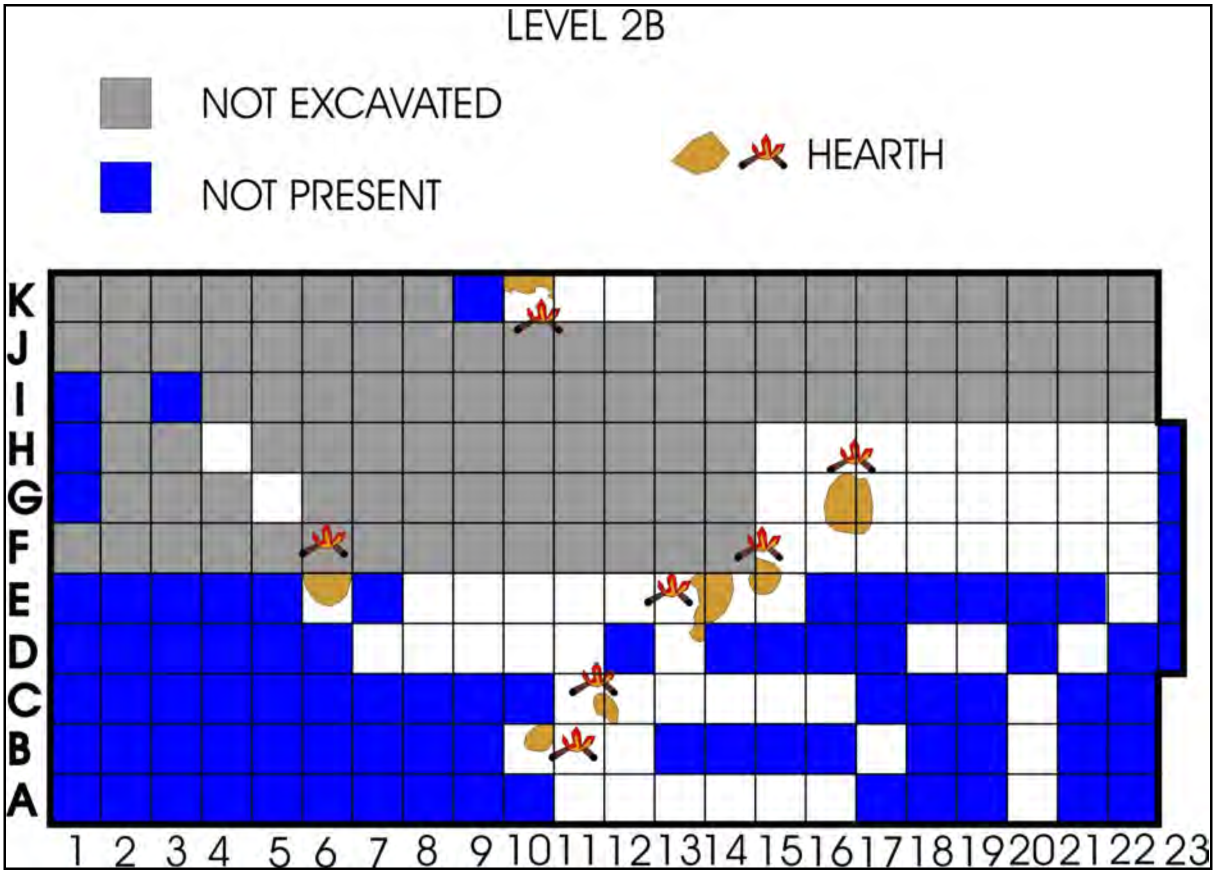


Figure 7.2-1: Distribution of Hearths in Level 2B

7.3 Ceramic Artifacts

7.3.1 Artifact Distribution

Level 2B accounted for 19.1% of the Level 2 Complex recoveries by weight. Within the excavation area of 149 units, Level 2B was recorded in 67 and 19 of those recorded zero ceramic recoveries. Similar to Level 2A, these empty units were scattered across the excavation area with a cluster of nine units in the northeast corner (Figure 7.3-1).

The highest density of sherds came from Unit G15, with 41 sherds weighing 342.8 grams but the highest quantity was recorded in Unit E15, 179 sherds. As mentioned in the section on Level 2A, this is a continuation of a deposit seen in Level 2A and Level 2. Vessel 35 and Vessel 62 are again present here as are Vessel 29 and Vessel 60. As seemed to be the case in Level 2A, the distribution of sherds appears to be oriented roughly NW to SE, more or less parallel to the slope. However, the distribution of individual vessel fragments often do not follow this overall distribution pattern, with a tendency to be scattered on a southwest to northeast axis, which is the direction of the slope.

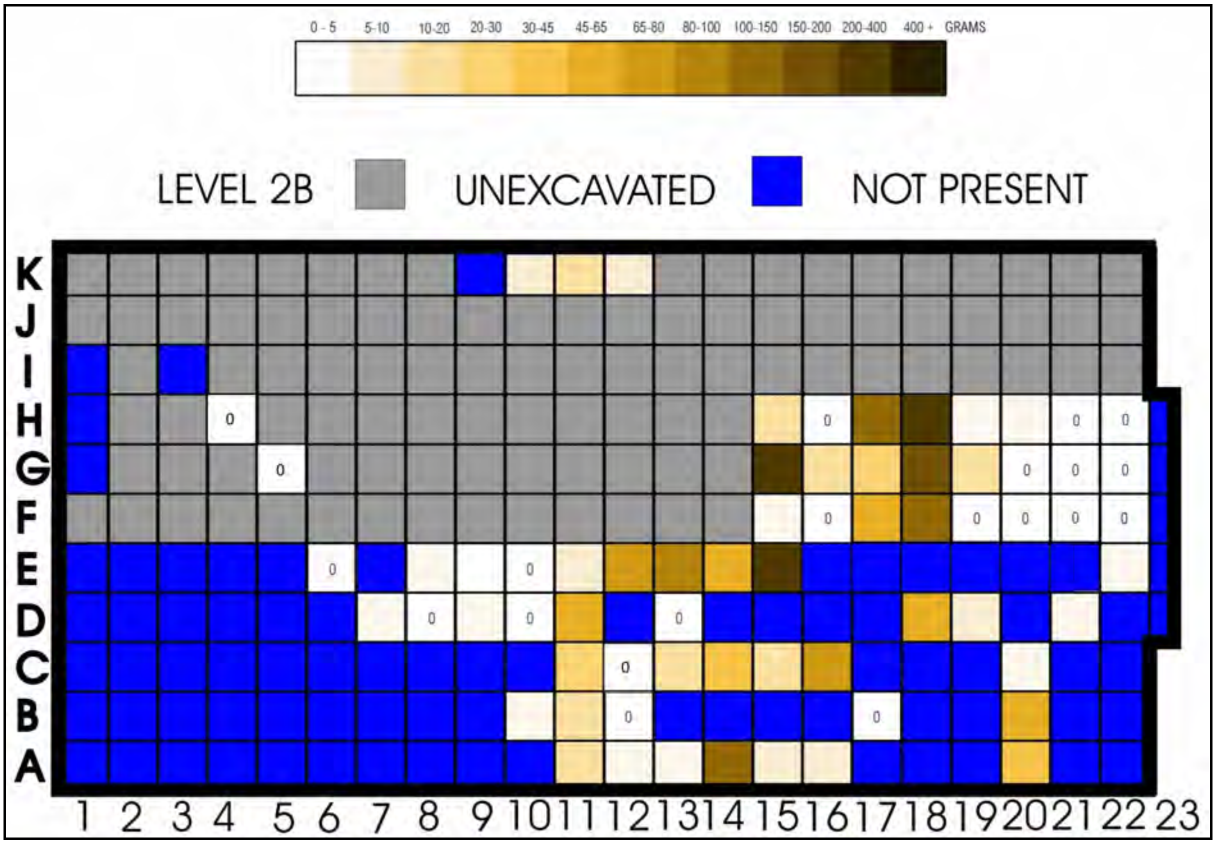


Figure 7.3-1: Distribution of Ceramic Recoveries from Level 2B

7.3.2 Artifact Recoveries

The total ceramic recoveries in Level 2B consist of 829 vessel sherds, with a total weight of 2344.8 grams, and two non-vessel ceramics with a weight of 9.9 grams. The 69 rim sherds accounted for only 19.0% of vessel sherds, which is ten to twenty percentage points lower than the other levels (not including Level 2D, which was fifty-four percentage points higher), based on the individual level totals. The average sherd weight for the rims was 6.4 grams.

7.3.2.1 Identified Vessels

Only five vessels are interpreted as originating on Level 2B, even though manifestations of fourteen different vessels were recovered from this cultural horizon (Figure 7.3-2).

Vessel 28
This vessel, recovered from Unit C12, originates in Level 2.

Vessel 29
This vessel, recovered from Unit E15, originates in Level 2.

Vessel 32
This vessel, recovered from Unit H18, originates in Level 2.

Vessel 35
This vessel, recovered from Units E9, E12, and E15, does not have a definitive level of origin.

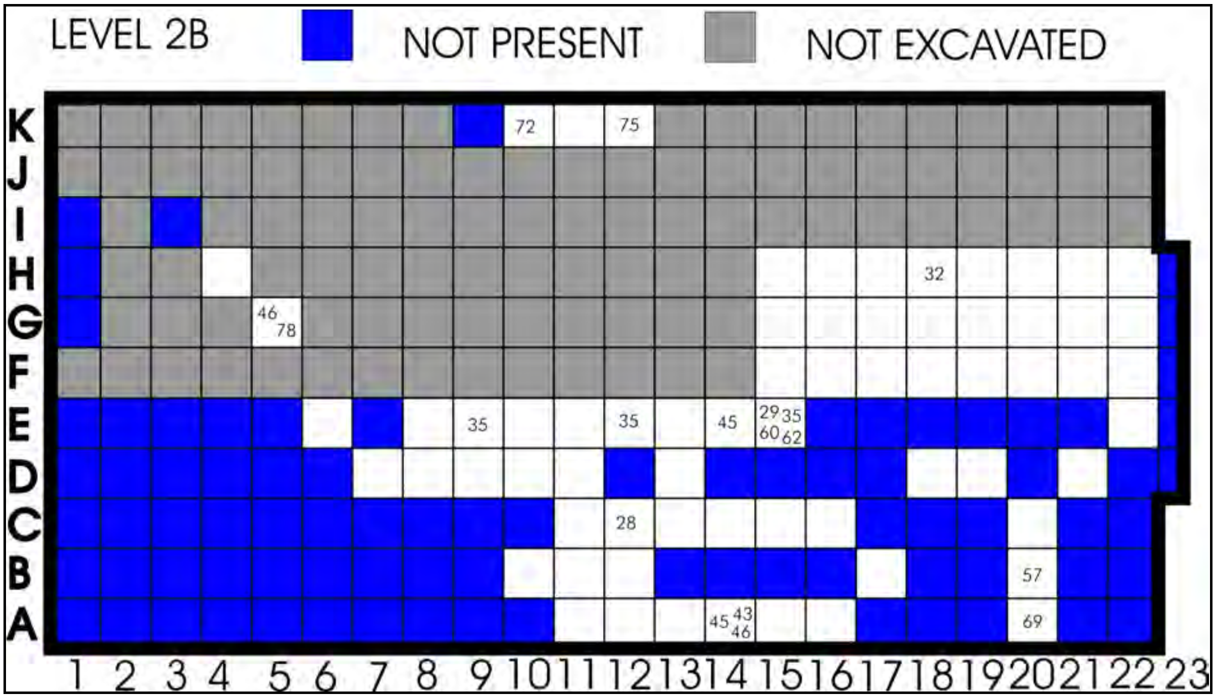


Figure 7.3-2: Distribution of Identified Vessels in Level 2B

Vessel 43
A neck profile described as straight to slightly flared with an outward angle is intended to make a distinction between it and a flared neck profile, which would tend to have curvature through the mid-neck as well as beneath the exterior lip. Vessel 43 has the former, as do the others of the Rainy River Willow type. The decoration is restricted to oblique CWOI on the rim and below the exterior lip on the upper neck. It is sprang impressed up to the exterior lip, but in some places this is obliterated. The neck CWOI are lightly impressed on this pot, and in some cases these impressions bridge between the lip and the neck producing a gap in the impression. The vessel occurred in Unit A14.

Vessel 45
This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). The sherds on this level derive from Units A14 and E14.

Vessel 46
This vessel was located in Unit A14 and Unit G5. It is very similar to Vessel 32 from Level 2 and is a bit of an outsider. Both vessels have the interesting trait of horizontal CWO stamps between the

oblique CWOI above and the horizontal CWOI set or band below. This obviously does not create a pseudo-chevron proper and, thus, its inclusion with that type is perhaps tenuous. This variation should be looked for in the future. This vessel was submitted for residue analysis.

Vessel 57

This vessel, recovered from Unit B20, originates in Level 2A, but also occurs in Level 2.

Vessel 60

This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). On this level, it was located in Unit E15.

Vessel 62

This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). The sherds on this level occurred in Unit E15.

Vessel 69

This vessel, occurring in Unit A20, was identified from Level 2A.

Vessel 72

Only the upper neck and rim of this vessel has been recovered from Unit K9. It is a tantalizing mixture of Plains incising and Woodland decorative pattern. The incised lines are quite deep, one came within less than a single millimetre from slicing through to the interior neck. It is defined somewhat noncommittally as Plains/Woodland.

Vessel 75

This pot, recovered from Unit K12, has nearly vertical CWOI on the upper neck, widely spaced. It is thin and expanding up toward the rim, a slight flare with a vertical stance. The rim on this vessel was cord or fabric roughened after the oblique CWOI were applied.

Vessel 78

The Blackduck/Rainy River decorative suite is achieved here with the use of a serrated tool as opposed to a cord-wrapped object. The impressions are described as dentate stamps because the tool creates a pattern with a single impression, unlike a stamp which is a singular impression, multiples of which create a pattern. This vessel is defined as Rainy River Coalescent because dentate stamps are considered a Laurel decorative trait. Although even with CWOI, however, and in the light of the rest of the assemblage, Vessel 78 would have been defined the same, because of the stamps and the lack of a defined pseudo-chevron, which is considered a defining motif for early Composite pots in this assemblage. This vessel was recovered from Unit G5.

7.3.2.2 Undesignated Vessels

DlLg-33:08A/13267 from K11 is a shoulder sherd exhibiting the stamped necklace pattern (Plate 7.3-1) typical of Bird Lake stamped vessels. There are two possible candidates for vessel of origin, both are not identified as originating on Level 2 or Level 2B.

Plate 7.3-1: Shoulder Sherd (DlLg-33:08A/13267) with Necklace Pattern

Vessel 28 is one of the few vessels that have decorated shoulder sherds that physically refit to the neck. The stamps on this sherd look very similar to those on Vessel 28, recovered primarily from Unit B12 in Level 2. The 6 metres of horizontal separation and two levels vertical separation are not out of the question, at least in the context of what is known to be possible in the Level 2 Complex. The fact that it was not possible to directly connect the stratigraphy of the K-line to the excavated area to the south leaves enough question that this sherd remains uncommitted to Vessel 28. There is no refit with any identified vessel and it is more likely that this sherd is part of Vessel 74 from Unit K12 on Level 2. There is no physical connection, but the proximity and the vessel type that is Vessel 74 make this decorated sherd a probable partner. That is, if the vertical separation can be accepted in the first place.

7.3.2.3 Body Sherds

The majority of the sherds recovered were from the body portion of the vessels. In fact, this level had the highest percentage of body sherds versus rim sherds of any level, at 80.8%. The total body sherds recovered was 760, with a total weight of 1899.5 grams. The average body sherd weight was 2.5 grams, the highest recorded average weight for body sherds.

7.3.3 Manufacturing Characteristics

The sprang impressed sherds are generally thin to medium thickness and well to very well consolidated on this level. However, there are some thick to very thick sprang impressed sherds (8 mm+). The paste quality on these sherds is lower that the thinner sherds. The textile impressed sherds tend to be thicker and less well consolidated.

7.3.3.1 Surface Treatment

Level 2B totals were 822 sherds with a weight of 2316.1 grams. On this level 66.7% was identified as sprang weave impressed, textile impressed dropped to 25.3%. Obliterated textile was recorded for 4.6% and 3.4% were described with no surface treatment (Table 7.3-1).

LEVEL 2B	67 units	WT / grams	QTY	%
SPRANG		1569.9	452	67.0
TEXTILE IMPRESSED		590.3	290	25.2
OBLITERATED		106.8	50	4.6
VERTICAL CORD		-	-	-
SMOOTH		-	-	-
No Recorded Surface		77.8	37	3.3
TOTAL		2344.8	829	100.1

Table 7.3-1: Types of Surface Treatment Recorded in Level 2B

7.3.4 Residue Analysis

A rim/neck sherd from Vessel 46 (DlLg-33:08A/13675) was submitted for residue analysis to Paleo Research Institute in Golden, Colorado (Appendix B).

The pollen profile had elevated levels of *Pinus* (pine) suggesting stronger than average wind patterns bringing northwestern and northern pollen into the area. Other additions to the profile included mustard family, *Polygonum* - persciaria type (knotweed), and Rhamnaceae (buckthorn family). These suggest a wetter climatic regimen and also disturbed ground. The phytoliths are those that would be expected in river water.

The residue analysis indicated the presence of *Allium* (wild onion), *Xanthium* (cocklebur) seeds, and *Helianthus* (sunflower) leaves, as well as *Phaseolus* (beans). Other signatures included those for rabbit, pronghorn, and bird.

7.3.5 Non-Vessel Ceramics

Two interesting items of fired clay were identified in Level 2B. DlLg-33:08A/18130, from Unit H4, is described as a 'pottery coil' in the database. This may be somewhat presumptuous. It is a short length of rolled clay, slightly over 2 cm long and approximately 5-6 mm in diameter (Plate 7.3-2). Rolling clay into ropes, or snakes, is one of the basic techniques of clay modelling. It could be ascribed to work or play.

Coil construction is a technique for building up a vessel form. Ropes or coils of clay are added in successive layers, like building a wall with bricks, gradually forming the vessel body. The layers are compressed and moulded together and the surface smoothed. This approach was used in the earliest ceramics known in Manitoba and has been identified by archaeologists as being part of the Laurel Culture suite of technological aptitudes, dating back to a period around 2000 years ago, or the Early Woodland Period. Coiling can occasionally be found in Late Woodland ceramics, though it is not commonly identified (none was identified in the material from this excavation). Archaeologists doing experimental work in Late Woodland ceramic technologies, in particular Grant Goltz working out of Minnesota, have found that roughing out a vessel by coiling, then placing it in the woven bag and finishing the final vessel form from the inside with scrapers and shaping tools is quite expedient (Syms 2009:pers. comm.). In this scenario, the clay of the walls of the vessel would end up being highly compressed and modified from its coiled origins. One could imagine how the joins between the coils could easily be obscured with that degree of compression and modelling.

If it is assumed that this ‘pottery coil’ fragment is a by-product of vessel manufacture, its dimensions are suggestive. The small diameter (5-6 mm), if used to build a vessel wall, would end up creating a very thin wall, perhaps 2.5 mm thick or less, after compression and final shaping. This is a very thin wall but not particularly unusual in this site as many sherds recovered in this excavation measured 2 mm or even slightly less. This artifact does appear to contain some fine grit temper. These observations do not tell us, conclusively, that its origins are pottery manufacture. From a manufacturing point of view, clay coils of this small diameter would be highly inefficient, requiring a far greater length and many more coils. Thus, more labour all around. This alone might be cause to reconsider the identification. This dimension of coil is perhaps more likely associated with modelling which does not exclude it from pottery manufacture.

Plate 7.3-2: Three Views of Pottery Coil (DlLg-33:08A/18130)

The other non-vessel ceramic artifact from this level is DlLg-33:08A/7587 (Plate 7.3-3). Facetiously termed ‘footware’, it is a piece clay described as a curl of mud extruded from foot compression. It was apparently stepped on, only to adhere to the side of the foot. Eventually, it was knocked off and was fired. The density of the clay and the surface characteristics suggest that the raw material had been compacted or potentially even manually worked. This may have been the result of being stepped on more than once. The fact that it held its form after falling off or being knocked off suggests it had dried somewhat. There is no apparent reason to fire this type of detritus which suggests it was in the fire without particular intent. One can easily envision a scenario where a glob of clay stuck to a foot, was picked off at the end of the day, and tossed into the campfire.

Plate 7.3-3: Upper (left) and Lower (right) Views of DlLg-33:08A/7587

7.4 Lithic Artifacts

7.4.1 Lithic Tools

There are a total of 20 tools in the Level 2B assemblage (Table 7.4-1). The combined weight is 1031.0 grams, the majority of which is accounted for by the two chithos which weigh a total of 817.4 grams. The materials of the tools are tabulated in Table 7.4-2 and their distribution is portrayed in Figure 7.4-1. The tools will be described by type on an individual basis. The metrics will be illustrated in tables following each tool type or within the artifact description for smaller groupings.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	2	10 00
Projectile Point Preform	2	10.00
Scraper	3	15.00
Biface	5	25.00
Knife	1	5.00
Retouched Flake	2	10.00
Utilized Flake	2	10.00
Chitho	2	10.00
Whetstone	1	5.00
TOTALS	20	100.00

Table 7.4-1: Lithic Tool Types in Level 2B

LITHIC MATERIAL TYPE	QUANTITY	%
Swan River Chert	5	25.00
Chert (Undifferentiated)	3	15.00
Denbeigh Point Chert	3	15.00
Knife River Flint	2	10.00
Selkirk Chert	2	10.00
Quartzite	1	5.00
Soapstone	1	5.00
Granite	1	5.00
Sandstone	1	5.00
TOTALS	20	100.00

Table 7.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 2B

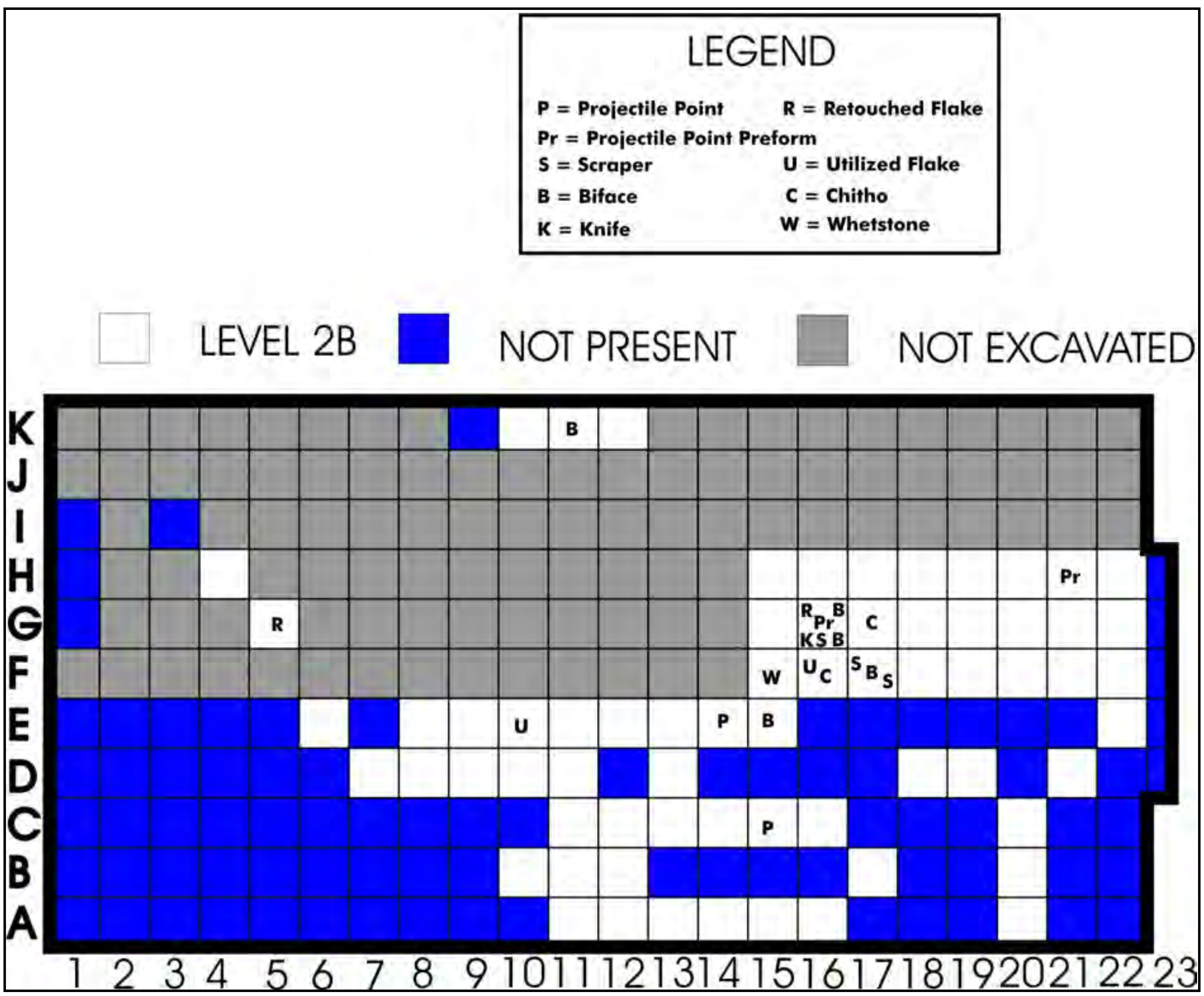


Figure 7.4-1: Distribution of Lithic Tools in Level 2B

7.4.1.1 Projectile Points

Two projectile points were recovered from Level 2B. The attributes for these tools are listed in Table 7.4-3.

DlLg-33:08A/9566 is a quartzite projectile point tip from Unit E14.This artifact is a very small remnant of a projectile point tip. Because the prevalent projectile point definitions require the presence of a base or at least a notch and this point tip has none of those, no further definition of type can be made. It has been designated a projectile point tip because of its overall shape. It is triangular in form with the break forming one of the edges. The tip (opposing the break) is itself broken as well. Two edges are bifacially knapped but, due to the fact that there are breaks on every corner of the triangle, no further metrics were taken.

Plate 7.4-1: Dorsal and Ventral Faces of DlLg-33:08A/10798

DlLg-33:08A/10798 is a Swan River Chert Prairie Side-Notched projectile point from Unit C15. This pinkish projectile point is made out of low grade material and broken at the tip. It also has a break at the right notch at the shoulder. The base is flat with some evidence of grinding along the edge. The base appears to have only one flake scar that takes up the majority of the base, being 14.2 mm wide and 3.4 mm deep. The right notch appears to be made of a single flake scar as well, but as the shoulder is broken this cannot be stated absolutely. From the surviving portion of the right shoulder to the break at the tip, only one flake scar can be discerned. Along the left edge from the broken tip to the shoulder, three flake scars are notable, moving a maximum of 3.0 mm into the point. The flake scars overlap in such a way that only one has a definable width, 2.4 mm. The notch is made out of a single flake scar 5.1 mm deep and 5.9 mm wide. On the dorsal face, the base has three flake scars, 3.0 mm, 4.3 mm, and 4.8 mm wide, moving a maximum of 2.0 mm into the body of the point. The notch on the right side of this face is made up of a single flake scar, 7.0 mm deep and 5.5 mm wide. From the shoulder to the tip, one large flake scar is visible, 5.4 mm wide and 8.0 mm deep. From the tip to the broken shoulder, two partial flake scars are visible; both outer edges of these flake scars have been broken, one by the break of the tip and the other by the break at the shoulder.

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
9566	14.65	12.40	3.90	n/a	n/a	n/a	n/a	n/a	n/a	49
10798	16.15	13.13	4.85	13.00	7.92	4.96	5.24	54	n/a	n/a
22406	19.70	12.28	3.14	n/a	n/a	n/a	n/a	n/a	n/a	53
23789	14.60	17.00	2.40	n/a	n/a	n/a	n/a	n/a	n/a	70

Table 7.4-3: Measurements of Projectile Points and Preforms from Level 2B

7.4.1.2 Projectile Point Preforms

As well, two projectile point preforms were recovered. The attributes for these tools are listed in Table 7.4-3. A broken projectile point preform, DlLg-33:08A/22406, was recovered from Unit H21. This preform, made from KRF, is broken horizontally along one edge. Only a small portion of this edge remains at the tip. The opposite edge from the tip has the beginnings of a notch on it. The base of this preform has five flake scars visible, ranging from 1.46 mm to 1.77 mm along 8.34 mm. The left edge is broken until 7.37 mm below the tip. One of the four flake scars is affected by the break, leaving three small flake scars that are 1.57 mm, 0.99 mm, and 0.99 mm. Eight flake scars make up the right edge, ranging from 0.62 mm to 2.33 mm. The obverse side of the base has five flake scars visible, ranging from 1.53 mm to 2.7 mm. The notch appears to be ground, but this may be due to the pressure flaker slipping several times, as often happens. Above the notch are five flake scars, ranging from 1.13 mm to 2.8 mm. This point was broken in manufacture as there is no evidence of useage.

DlLg-33:08A/23789 is a Denbeigh Point Chert projectile point preform from Unit G16. Only the tip of this point preform survives. It is extremely thin at 2.2 mm and is broken directly across the faces. Due to the thinness of the preform, it was most likely broken in manufacture. The sharpening flake scarring creates a serrated edge, with flakes running from 1.4 mm to 2.9 mm.

7.4.1.3 Scrapers

Three scrapers were present in Level 2B. Their attributes are listed in Table 7.4-4 and they are illustrated at twice actual size.

A broken Swan River Chert end scraper, DlLg-33:08A/21239, was recovered from Unit F17. This end scraper is broken along the right edge. Inclusions along that edge spelled the end of this tool's life. The ventral face has medium polish on the high spots. This face has a somewhat concave shape when viewed in cross-section from the proximal end; most of the concavity is near the left edge. At the proximal end, one large flake scar exposes a flaw in the material that may have exacerbated the concavity at this end. The working edge of this tool is made up of three large flake scars, 4.90 mm, 4.19 mm, and 3.01 mm in width with a maximum length of 6.09 mm. Step and hinge fractures run across the length of the working edge. The dorsal face is a jumble of flake scars moving in from all angles; therefore no flake scar count was made on this face. The break on the right hand edge obscures all flake scars on that edge. The left edge is made up of two large flake scars, the largest being 10.28 mm in width and 5.49 mm in depth.

Plate 7.4-2:
DlLg-33:08A/21239

Plate 7.4-3: DlLg-33:08A/21315

DlLg-33:08A/21315 is a Knife River Flint side scraper which has been broken and heat treated/burnt. It was recovered from Unit F17. Most of the dorsal face of this scraper is cortex; one large flake has been removed from the peak of the semi-lunar shape of the scraper that terminates in a hinge fracture. As the tool is broken, only a part of this flake scar can be seen. On the working edge are a total of nine flake scars, ranging from 1.73 mm to 2.66 mm, most of which are fairly invasive. The average depth of these flake scars is 8.66 mm. The ventral face of this scraper is unadorned with either flake scars or polish. The tool is broken across the faces on one end and there is a crystalline structure right on the face of the break, suggesting that the impurity is the cause of the break.

An end scraper, DlLg-33:08A/21525, made of Denbeigh Point Chert, occurred in Unit G16. This end scraper has collected a fair amount of post-depositional patination; areas of agglomerated sandstone obscure some of the surface and edges of the tool. This renders analysis of the tool somewhat more complex. The working edge of this scraper contains eleven flake scars across 24.39 mm. The most invasive flake is 6.76 mm deep. No polish could be detected on this tool due to the patination. This tool appears to be complete so it is most likely that it was lost or abandoned and not discarded.

Plate 7.4-4: DlLg-33:08A/21525

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
21239	end	21.07	13.82	6.30	13.15	2.33	69
21315	side	21.30	16.73	9.20	20.03	2.05	71
21525	end	34.00	24.85	7.87	24.39	5.12	70

Table 7.4-4: Measurements of Scrapers from Level 2B

7.4.1.4 Bifaces

Five bifaces were recovered from Level 2B. The measurements are listed in Table 7.4-5. Illustrations are at twice actual size.

DlLg-33:08A/11033 is a broken Denbeigh Point Chert biface recovered from Unit E15. This biface is in two components. The third (or more, which would make up the tip of the tool) was not recovered. The majority of flake scars terminate in hinge and step fractures. One very large flake scar on the ventral face is at least 3.0 mm deep and terminates in a hinge 13.42 mm in from the working edge. Other, later flakes have obscured its direction. Flake scars range from 1.30 mm to 5.12 mm. As the tip of the tool is missing, not much further can be added, other than that the base is quite thick in comparison with the rest of the tool. At the base, 14.5 mm have not been thinned. Some basic shaping has occurred but nothing as specific as thinning flaking occurred. Working edge metrics are taken on the incomplete portions remaining and listed in Table 7.4-5.

Plate 7.4-5: Obverse and Reverse Faces of DlLg-33:08A/11033

A biface made from Selkirk Chert was recovered from Unit K11. DlLg-33:08A/13269 appears to be a tool of opportunity. There is no noticeable bulb of percussion on the ventral surface and the working edge is at right angles to the apparent point of impact, which suggests a few more large flakes were removed from this flake prior to edge-sharpening and shaping. The tool may have been discarded due to a large break at one end of the tool's edge; with the dorsal side up the break is at the 'apparent point of impact' end. The edge length is 46.2 mm. Flaking size ranges from 0.9 mm to 2.25 mm along the working edge.

DlLg-33:08A/21238 is a Swan River Chert biface which occurred in Unit F17. This tool has been kept unwashed due to its potential as an object for residue analysis. As such, only the basic metrics have been taken. Flake scar counts and measurements would require removing the majority of the adhering matrix as well as possibly damaging the potential for further analysis. The tool itself is vaguely knife shaped; both ends taper to a point that could be used as a working edge. The points are along the same axis, making the tool symmetrical. The faces are smooth and uniform in shape and, in cross section, this tool has similar arcs when viewed from either edge. This is a well made tool. One face of one end has a pink colouration; whether this is from heat treating or burning, or the result of the natural variation in colour in Swan River Chert, cannot be determined without cleaning this tool.

Plate 7.4-6: Both Faces of DlLg-33:08A/21238

Plate 7.4-7: Dorsal and Ventral Faces of DlLg-33:08A/21524

DlLg-33:08A/21524 is a chert biface which was located in Unit G16. This chert biface has been kept unwashed for the same reasons as DlLg-33:08A/21238. As with that tool, this description will deal with what can be gleaned from the biface without removing the adhering matrix. This biface is complete and elongated triangular in form. The base has slight shoulders—3.0 mm (R) and 4.0 mm (L)—but these are so small in comparison to the rest of the tool that any attempt to use this biface once hafted would cause the biface to either break or slip out of its bindings. The knapping scars along both faces of the base eliminate the possibility that the biface had broken while attached to a shaft as they are on one corner at least overlapped by the flake scars coming in from the working edge of the tool. Both edges are sharp and appear to be freshly flaked as there does not appear to be any polish or rounding at the visible edges. The dorsal face has a group of at least five flake scars that terminate in step fractures around a high point in the middle of the face. The right working edge is somewhat blunted where this high area could not be reduced without markedly changing the curve of that edge. It is possible that the knapper abandoned the tool when this blunt spot became an impediment to working with the tool. The area around the tip of the tool, from the tip to 9.1 mm below it on both faces, has some delicate sharpening scars that do not continue past this 9.1 mm demarcation. There are at least five flake scars within this 9.1 mm distance on the dorsal face's right edge. The rest of the working edges are much rougher in form and have an undulating, slightly serrated form. It is possible that this tool was used as a drill prior to its loss or abandonment.

Plate 7.4-8: Dorsal and Ventral Faces of DlLg-33:08A/23377

A Swan River Chert biface, DlLg-33:08A/23377, was recovered from Unit G16. This roughly triangular biface, broken at the end opposite the working edge, has medium polish on the ventral face as well as some polish on the working edge on the dorsal face. The two edges that meet the working edge have some polish on them. The left edge has polish and scarring only on the dorsal face. The right edge has some conchoidal fracturing with minor polish on the ventral face. At the working edge on the ventral face, three heavy ripples indicate that the original impact point may have been 90º from the working edge, but this has been obscured from subsequent reduction and shaping flaking. The high points of the ripples on this face all have medium polish on them, indicating that this biface saw long use prior to breakage. As well, the ventral face has twenty sharpening flake scars visible. The dorsal face has numerous step fractures running all along the working edge, suggesting that this tool was used on hard surfaces (bone, stone, etc.) prior to discarding. Due to the nature of these step fractures and their ubiquity on this face, flake counts are not possible. The break line exists at a point where the quality of the material steps down sharply, so it is possible that this change in material integrity contributed to the breakage of this tool.

7.4.1.5 Knife

DlLg-33:08A/21526 is a complete quartz knife which was recovered from Unit G16. The measurements of this tool are in Table 7.4-5.This knife, made of medium to high quality quartz, is a pleasure to behold. The base has four flake scars, one of which is 4.78 mm wide and invasive at 9.88 mm in length. The left edge follows a crack in the material. One of the other three flake scars shows an attempt to remove this crack, but termination in a hinge fracture prevented this correction. On the left working edge of the tool, nine flake scars of very different sizes and forms make up the 26.78 mm of the working edge. Flake scars range from 1.41 mm to 5.20 mm. The maximum depth along this edge is 5.22 mm. On the right (and backing) edge, nine flake scars make up the 23.42 mm of this edge. These flake scars are generally more uniform in width, depth, and construction and range from 3.28 mm to 5.29 mm in width with a maximum depth of 5.30 mm. On the dorsal face, the base is made up of eight flake scars. There are two banks of flake scars, the earlier and larger shaping flakes left scars that are obscured by four hinge-fracture terminating flake scars that occurred after the longer shaping flakes. The shaping flake scars range from 1.97 mm to 3.64 mm and the hinge fracture flake scars range from 1.15 mm to 3.08 mm. On the left (backing) edge, there are a total of six large flake scars, ranging in width from 1.79 mm to 4.83 mm with a maximum depth of 7.92 mm. The largest flake scar is 4.83 mm wide and 7.92 mm deep and has a slightly smaller companion directly adjacent, both ending in a common hinge fracture. These two flake scars considerably thin that section of the back of the blade, and the fact that this deeper, more invasive flaking occurs only in this one spot suggests that the knapper realized that more flakes like these would render the tool too fragile for continued use. Nine flake scars make up the right (working) edge, ranging from 2.38 mm to 5.81 mm in width with a maximum depth of 7.61 mm. Between the 7.61 mm flake on this edge and the two 7.92 mm deep flake scars on the opposite edge, a small ridge is created that undulates along a portion of the blade's dorsal face. As quartz is a very hard stone with a high natural sheen, no use wear polish could be detected on this tool. It is probable that, as this is a complete tool in good working form, it was simply lost and not discarded.

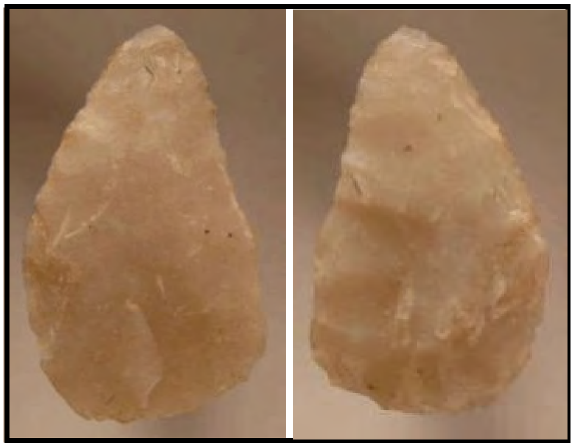


Plate 7.4-9: Dorsal and Ventral Faces of DlLg-33:08A/21526

7.4.1.6 Retouched Flakes

Two retouched flakes were recovered in this level. Their metrics are listed in Table 7.4-5. DlLg-33:08A/13683 is a chert retouched flake from Unit G5. It has been heat treated. It has a very straight working edge. The dorsal face is mostly cortex; the only section that is not cortex is the edge opposite the working edge, which has four large flake scars on it. The working edge on the left edge was finely knapped on the dorsal face, with thirteen flake scars ranging from 1.0 mm to 3.6 mm. There is some polish on the knapped face of the tool. The ventral face has a high glossy sheen consistent with heat treating and, as such, it prevents detection of polish on that face. The tool has broken laterally so it is probable that this tool was longer prior to its abandonment or loss.

DlLg-33:08A/21530 is also made of chert and has been heat treated/burnt. This retouched flake was recovered in Unit G16. It has knapping scars along the working edge. The flake is triangular in cross-section, curving slightly toward the working edge. The proximal end of the flake is identified by the fairly subtle bulb of percussion. The flaking on the incurvate working edge is unifacially on the dorsal face (although the ventral edge has some use wear flakes removed) and is generally not very invasive. It is most likely that this retouched flake was a tool of opportunity, with minimal sharpening necessary. There are a total of fourteen flake scars visible on the dorsal face, ranging from 1.1 mm to 2.79 mm. Some light step-fracturing along the edge suggests this tool had been well used prior to its loss or abandonment.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
11033	biface	41.46	31.15	11.41	L 23.40 R 37.30	L 2.50 R 7.70	L 37 R 55
13269	biface	40.20	17.90	10.90	41.40	3.85	30
21238	biface	50.40	18.20	9.30	L 35.00 R 35.70	L 2.90 R 8.00	L 65 R 46
21524	biface	48.25	26.00	8.50	L 47.00 R 44.90	L 6.20 R 8.20	L 31 R 38
23377	biface	34.60	22.50	5.70	33.50	3.60	46
21526	knife	26.39	15.97	4.74	L 23.90 R 26.39	L 2.74 R 6.26	L 43 R 37
13683	retouch fl.	22.70	18.80	4.90	23.50	0.00	50
21530	retouch fl.	38.53	13.97	5.54	37.70	1.53	45
21156	utilized fl.	25.50	21.05	4.90	20.50	2.00	43
23821	utilized fl.	21.30	15.90	3.40	14.30	1.40	23
21154	chitho	187.18	104.71	20.94	161.63	7.66	45
22843	chitho	131.30	63.20	17.40	indeterm	indeterm	indeterm

Table 7.4-5: Measurements of Knapped Tools (other than Scrapers) from Level 2B

7.4.1.7 Utilized Flakes

There were two utilized flakes in this level (Table 7.4-5). DlLg-33:08A/21156 is a Selkirk Chert utilized flake, which has been heat-treated/burnt, from Unit F16. This utilized flake is roughly similar in shape to an end scraper and has some minor use wear along the base of the triangle. There is a very slight polish along that edge, but no other polish is visible across either face.

DlLg-33:08A/23821 is a Swan River Chert utilized flake recovered in Unit E10. This flake has seen light use along the left edge only. Other than the presence of regular conchoidal fractures along the edge, there is no other evidence of useage.

7.4.1.8 Chithos

Two chithos were recovered. The measurements, where obtainable, are listed in Table 7.4-5. DlLg-33:08A/21154 is a granite chitho recovered from Unit F16.

Plate 7.4-10: Both Faces of DlLg-33:08A/21154 (50% actual size)

This large, flat oblong granite artifact may have seen use as a palette or anvilstone as well as being a chitho. Three edges are knapped and the length of the tool, 187.18 mm, makes it a comfortable grip for two hands. At 104.71 mm wide, it is easy to see that this is a fairly large object. Both faces are flat but rough. One face has two patches of pinkish ash adhering to the surface of the tool (both faces have the soil matrix of Level 2B adhering to it as well). These stains and the uniformly flat nature of both faces together make it at least possible that this tool saw multipurpose use for the duration of its working life. It is equally possible that the stains in the adhering ash could be blood residue or plant matter residue. This chitho has been left unwashed due to its potential to yield results in a residue analysis. As the chitho is whole, it may be safely assumed that this tool was either lost or abandoned.

DlLg-33:08A/22843, recovered from Unit G17, is a sandstone chitho. This chitho is extremely fragile and is degrading rapidly. The working edge has spalled off numerous small spalls such that other than identifying this tool as a chitho, no further work will be done with it. Basic metrics have been taken only. During this process, numerous fragments spalled off the chitho so the decision has been made to preserve this object's integrity as much as possible. The original weight was 183.6 grams but a later reweighing resulted in a weight of 162.9 grams. The material that remains in the artifact bag equals the difference, which is an indication of how rapidly this object is degrading.

7.4.1.9 Whetstone

DlLg-33:08A/21059 is a soapstone whetstone from Unit F15, weighing 143.63 grams. The overall dimensions are: length - 101.65 mm; width - 48.77 mm; and thickness - 19.08 mm. This artifact may well be another multipurpose tool. Both faces as well as all edges are liberally covered with hematite. Shaped roughly like an elongated equilateral triangle (short in height but long on the hypotenuse) with the hypotenuse coming to a broken point, it has several areas that have been ground down to a smooth, almost polished surface, and other areas that are nearly untouched. In general appearance, this object has been broken and reused. This is inferred by the fact that in the areas that have polishing/abrasion marks, these marks occasionally continue from the higher polish areas into the broken areas, suggesting that the tool was utilized after those areas were broken.

Plate 7.4-11: Whetstone (DlLg-33:08A/21059) (actual size)

The tool is roughly broken vertically across both faces and it should be noted that there are 2.5 mm deep grooves that contributed to the break. At the very least, they were affected by the break as only half of them are still extant on the tool.

This whetstone has strong polish on the 'hypotenuse' of the triangle. Abrasions run from the break to the tip of the triangle along the lower half of this face. There are also the remnants of horizontal grooves faintly visible on this face. These grooves are all vertically oriented and measure (from the break) 9.2 mm, 16.8 mm, 23.5 mm, 47.4 mm, and 63.5 mm. These grow fainter the further from the break they are measured and there is no proof that they are not post-depositional. It is worth noting that there is one vertical scar directly beside the break, 2.0 mm away, and that it follows the general verticality of the other fainter grooves. It is possible that these were markings for reducing this tool or even markings for defining areas for decorative purposes. However, this is extremely conjectural.

This face is split horizontally into the polished lower half and the broken upper half. There is a deeply channeled groove running the length of the piece right at the edge of the broken half of this tool. There are numerous abrasion marks within this groove, which is approximately 2.0 mm deep. This groove appears to have been used at two different angles. One angle moves along the length of the tool for 83.4 mm, while the other groove angles up slightly and terminates 46.0 mm from the right angle break. Using the grooved break mentioned earlier, the 83.4 mm groove is at an 85º angle, while the 46.0 mm groove is at a 90º angle. Any area that is not in a raw material state has polish and abrasion as well as random impact marks all across the worked areas.

On the reverse face, there are more unbroken areas than on the obverse face. There is a vertical grove right at the break but only a small portion of it survives. It is 15.2 mm long, running vertically from the 90º angle's corner. This groove is 2.3 mm deep and, unlike the opposite face's vertical groove, more than half it survived the break, leaving a slight upturn still extant. Above this groove's terminus, the face of the tool is broken with two large triangular portions removed. These areas are raw stone. Directly at the point that this small vertical groove terminates, a long horizontal groove begins. A very small portion of the stone has been broken off so it is not possible to tell if these two grooves were connected, although, it is most likely that they were. This long horizontal groove is 75.9 mm long; measuring from the break itself gives a measurement of 82.2 mm. This groove is at 92º with the major break as the base. Most of this face has abrasions over the unbroken surfaces, the majority of these do not follow the long horizontal groove but are at approximately 100º. This face has numerous random scratches all over the worked areas but almost none in the broken areas.

The tip of the triangle is broken. This break is akin to a triangle moving from the tip of the tool into the body of it. It is very vaguely mouth-shaped. There is some slight polish on the inner faces of this break, so it is possible that this break was used opportunistically but minimally.

Both the upper and lower edges of this tool are, where not broken, highly polished. At the right angle, both edge areas are smooth and clearly were worked with care. At the break's 90º corner are three grooves (akin to the grooves that may have contributed to the break). These do not line up with the vertical grooves on both faces but are 3.2 mm, 5.2 mm, and 7.2 mm from that groove. The remainder of this edge, where not broken, is highly polished. The opposite edge is mostly broken with one thin piece moving from the right angle to 48.1 mm. This edge is highly polished and relatively unabraded. The rest of that edge is raw material excepting one very small area near the tip that has some slight polish detectable.

Overall this whetstone (sharpening stone) gives the impression of a ground stone tool that was used for purposes unknown, broken, and then reused as a sharpening stone. It was once a highly polished tool, but the surviving shape does not lend itself to strong suggestions of its former use.

7.4.2 Detritus

Detritus is a term used by archaeologists to define the waste material that results from the creation of a stone tool. The large piece of stone that the detritus comes from is called a core and the pieces that are removed from the core are generally called flakes.

7.4.2.1 Cores

One core, DlLg-33:08A/18414, was recovered in Level 2B. This Swan River Chert core, from Unit E9, weighs 170.0 grams. A total of six flake scars are visible, circling the middle of this oblong core. It contains a high number of vugs and inclusions throughout the material that may be the reason that this core was abandoned. The material quality in between the vugs and inclusions is low to medium.

7.4.2.2 Flakes

Flakes, the byproducts of the tool manufacturing process, represent different stages of the process. The assemblage has representations of four of the five categories (Table 7.4-6, Figure 7.4-2). A total of 100 flakes were recovered from Level 2B. Thinning/sharpening flakes account for 45.5% by quantity, while accounting for only 9.0% of the assemblage by weight. This is not surprising as thinning/sharpening flakes are removed from the working edge of a tool and are often small so that judicious knapping might leave a flat working edge. This accounts for the higher numbers but lower weight. Secondary shaping flakes account for the biggest single weight type at 47.1% and 37.4% of the total number of flakes.

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	7	27.4
Secondary decortication	10	29.9
Secondary shaping	38	62.3
Thinning/sharpening	45	11.7
TOTAL	100	131.3

Table 7.4-6: Frequency of Types of Recovered Flakes from Level 2B

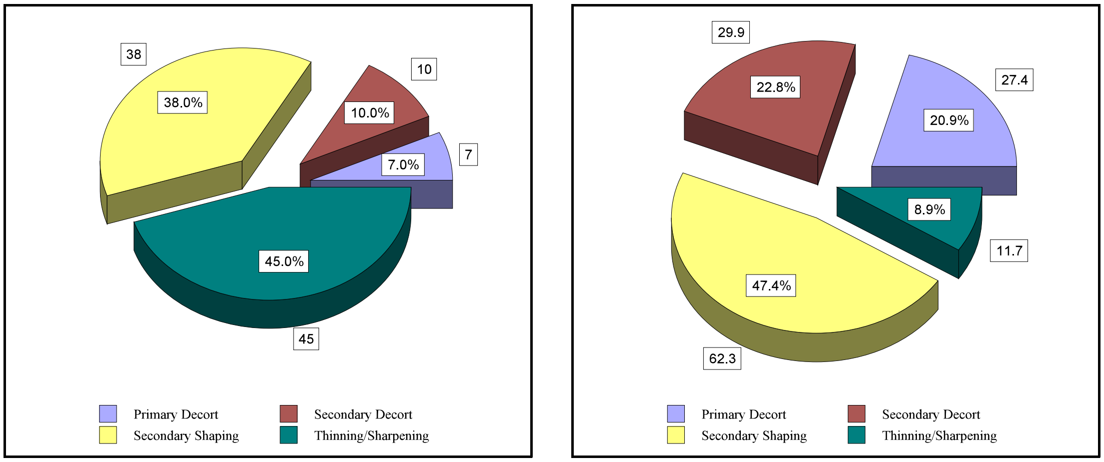


Figure 7.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

The flake distribution pattern in Level 2B is shown in Figure 7.4-3.

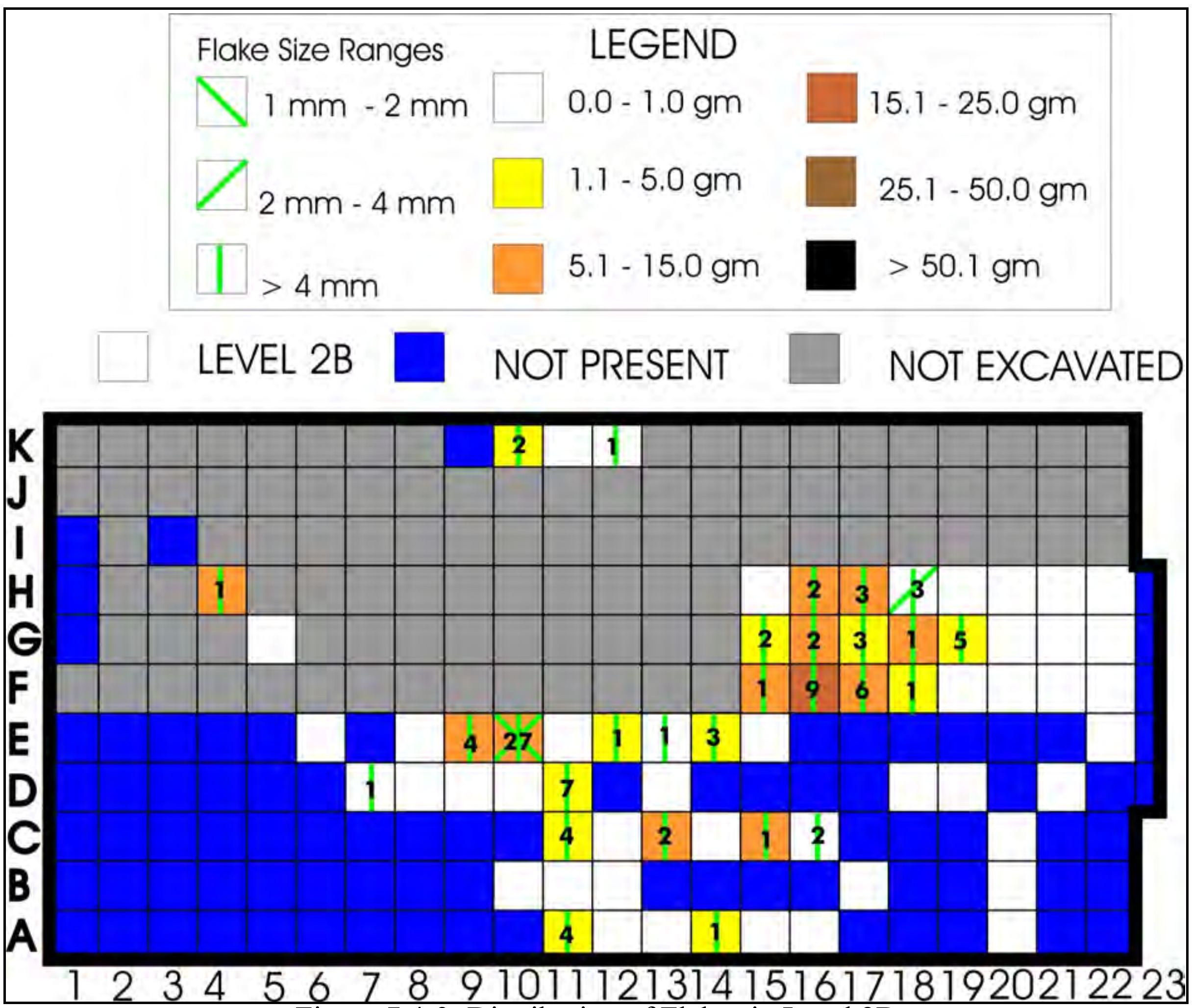


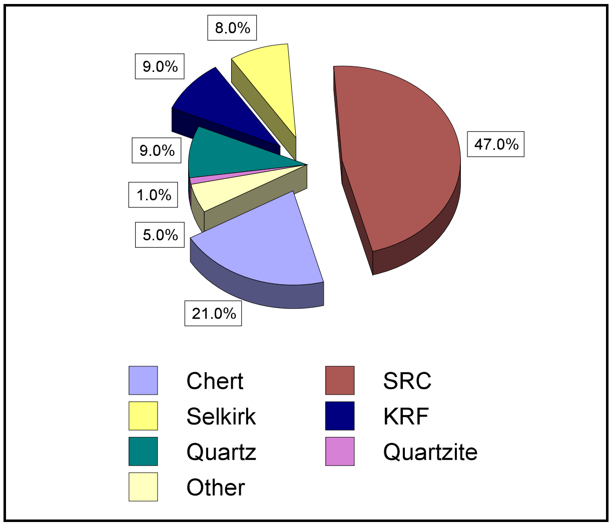
Figure 7.4-3: Distribution of Flakes in Level 2B

The flakes concentrate around the large hearth centered in Units G17/G18 although a large number appear in Unit E10. Out of the 27 flakes in Unit E10, only two are not Swan River Chert but Selkirk Chert. As most of the flakes in this unit are of a consistent variety, it may be assumed that a single manufacturing event took place in the immediate area of this unit. Three out of the four flakes recovered in Unit E9 are Swan River Chert as well. All of the SRC flakes in this area are small flakes, so it is possible that an SRC tool underwent some sharpening or even reshaping.

There are 10 different types of stone among the flake assemblage for this level (Table 7.4-7, Figure 7.4-4). They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes.

MATERIAL	QTY	%	WT	%
Denbeigh Point Chert	1	1.00	5.6	4.27
Gabbro	1	1.00	0.7	0.53
Quartzite	1	1.00	0.3	0.23
West Patricia Recrystallized Chert	1	1.00	1.0	0.76
Cathead Chert	2	2.00	5.6	4.27
Selkirk Chert	8	8.00	5.7	4.34
Quartz	9	9.00	19.7	15.00
Knife River Flint	9	9.00	17.1	13.02
Chert (Undifferentiated)	21	21.00	32.4	24.68
Swan River Chert	47	47.00	43.2	32.90
	100	100.00	131.3	100.00

Table 7.4-7: Frequency of Level 2B Flakes by Material Type



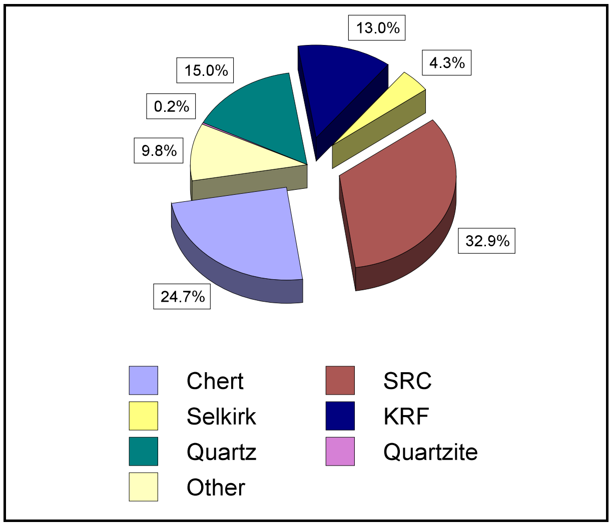


Figure 7.4-4: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

The distribution of material types across the excavation area is illustrated in Figure 7.4-5. Level 2B is somewhat unique in that this is the only level in this excavation in which Swan River Chert outweighs Undifferentiated Chert by both amount and weight. Perhaps the people who occupied the site during this occupation were more successful at retrieving Swan River Chert than at other times. All of the materials (excepting Knife River Flint) in this level could have been gathered on the way to and back from the upper west shore of Lake Winnipeg. It is equally possible that the people occupying the site traded for the material.

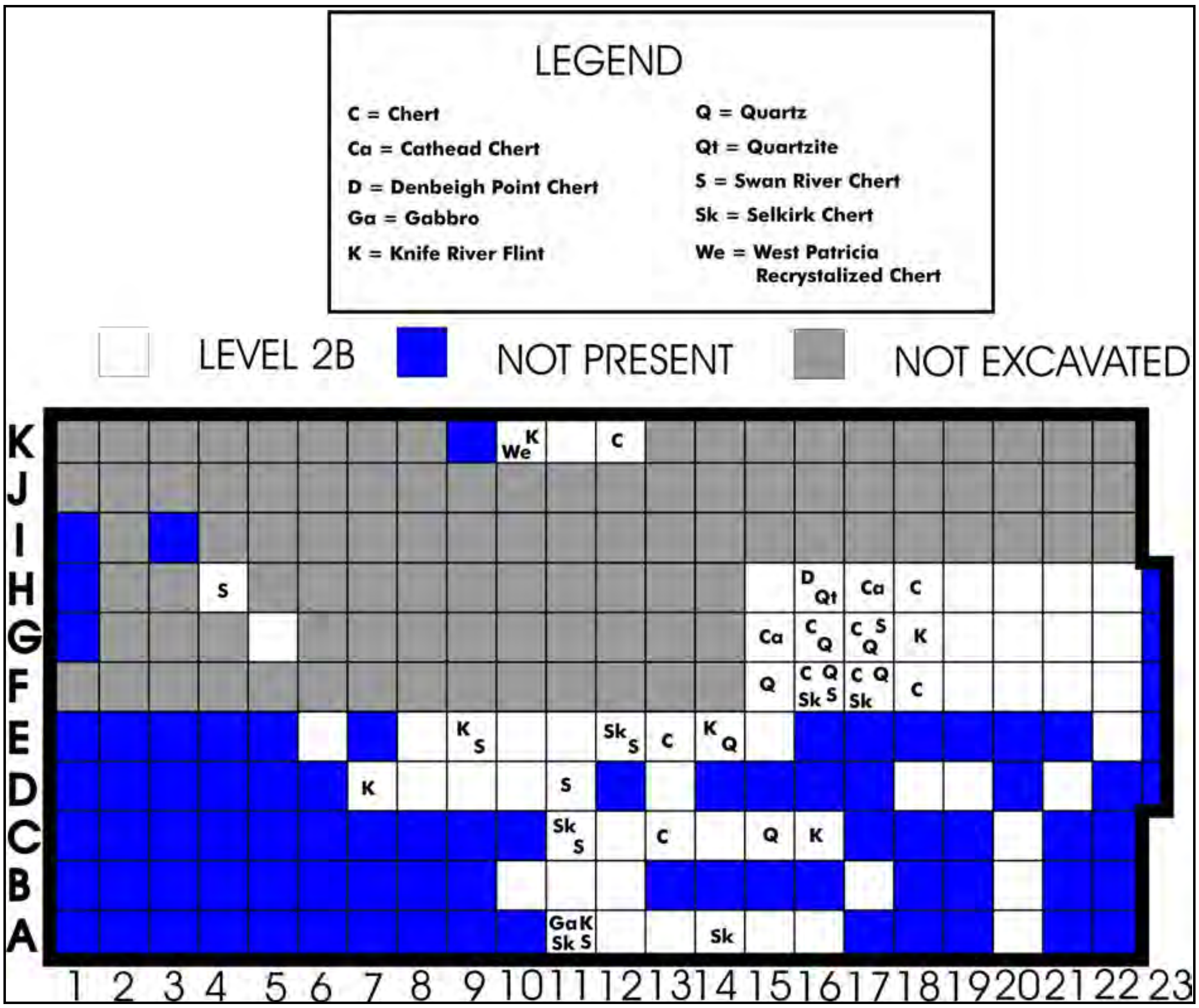


Figure 7.4-5: Distribution of Flakes by Material Type

7.4.3 Natural Object Modified

Three types of modified natural objects were recovered from Level 2B: fire-cracked rock (FCR), a hearthstone, and ochre. The FCR (Table 7.4-8) is all granite and all four specimens were directly associated with hearths in or near their respective units. A limestone hearthstone was recovered from Unit D9 and weighs 98.1 grams. The ochre from Level 2B (Table 7.4-9) was found in only six units, five of which either contain or are in close proximity to a hearth. One isolated piece of ochre, weighing 0.2 grams, was recovered from Unit C15.

CAT. #	UNIT	QTY	WT
6615	B10	1	12.7
6616	B10	1	2.2
8509	A12	1	3.4
23015	H18	1	19.1
TOTAL		4	37.4

Table 7.4-8: Fire-cracked Rock in Level 2B

CAT. #	UNIT	QTY	WT
7385	E8	1	0.1
7386	E8	1	0.1
8377	A11	1	0.1
8508	A12	1	0.5
10806	C15	1	0.2
21251	F17	1	0.1
22848	G17	1	0.1
TOTAL		7	1.2

Table 7.4-9 Ochre Recovered from Level 2B

7.4.4 Natural Objects Unmodified

Four unmodified natural objects were uncovered in Level 2B, two sandstone pebbles and two mudstone pebbles (Table 7.4-10). Both of these objects are small enough that they could have been transported in a lump of mud affixed to a piece of leather or the bottom of a pot. There is no proof in the objects themselves that they were manuported.

CAT #	OBJECT	UNIT	MATERIAL	QTY	WEIGHT
18131	pebble	H4	Mudstone	2	0.4
21158	pebble	F16	Sandstone	2	8.7
TOTAL				4	9.1

Table 7.4-10: Unmodified Natural Objects in Level 2B

7.4.5 Summary

A total of twenty tools were recovered during the excavation of Level 2B. This is a small assemblage but is again a fairly typical cross-section of tools that were being manufactured, used, and broken or lost in the daily life of the people who used the living floor of this level.

7.5 Botanical Remains

A total of 77 charcoal samples, comprising 246specimens were collected from Level 2B (Table 7.5-1). Overall, there was a frequent occurrence of maple, ash, elm, with poplar/ willow falling fourth in frequency. Oak is scarce and there is a rare occurrence of Elaegnaceae (Oleaster Family). The Elaegnaceae wood was either *Elaeagnus* (wolf willow) or *Sheperdia* (buffaloberry).

TAXON	CAT #'S	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	13	29	26.13
Elm (*Ulmus*)	11	23	20.72
Maple (*Acer*)	14	29	26.13
Oak (*Quercus*)	2	2	1.80
Poplar (*Populus*)	2	6	5.41
Poplar/Willow	10	19	17.12
Willow (*Salix*)	2	2	1.80
Oleaster (Eleagnaceae)	1	1	0.90
Diffuse Ring Pattern	4	8	
Semi-ring Porous	-	-	
Hardwood	2	6	
Unidentified	16	121	
	77	246	

Table 7.5-1: Frequency of Charcoal Recoveries

Graphically, the frequency of the identified taxa is depicted in Figure 7.5-1. Ash and maple are tied for dominance with elm next in frequency.

Three of the seven hearths (Figure 7.2-1) had charcoal samples from adjacent units (Table 7.5-2). Two of the hearths were composed of a single wood type: Unit B10 contained only maple, while the hearth in Unit E15 had only charcoal from ash present. The larger hearth which is in Units G16 and G17 had maple, ash, elm, poplar/willow and Oleaster Family wood. There was no oak in any of the Level 2B hearth features.

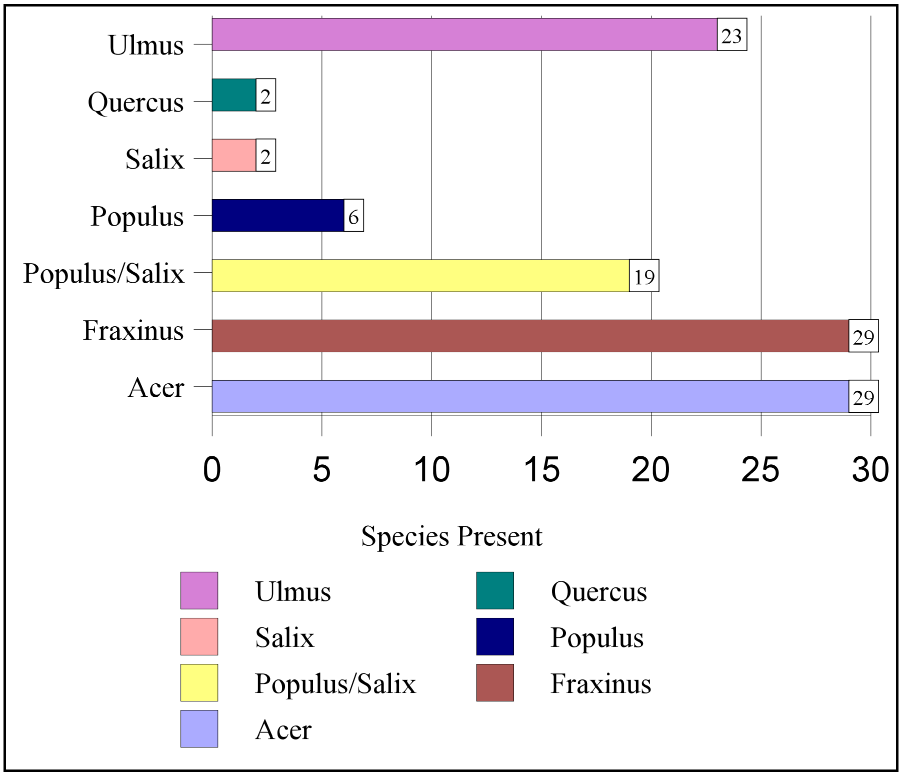


Figure 7.5-1: Frequency of Identified Taxa

HEARTH	G17-G17	B10	E15
NUMBER OF SAMPLES	5	2	5
Ash (*Fraxinus*)	2	2	-
Elm (*Ulmus*)	2	-	-
Maple (*Acer*)	2	-	1
Poplar/Willow	4	-	-
Willow (*Salix*)	2	-	-
Eleagnaceae	1	-	-
Diffuse Ring Pattern	2	-	1
Hardwood	1	-	-
TOTAL	16	2	2

Table 7.5-2: Frequency of Identified Charcoal Recoveries at Hearth Locations

In addition to the charcoal, 16 fragments of bark were recovered, only from Unit G17. A fragment of charred wood with a diffuse ring pattern derived from Unit F15. A single unidentifiable organic fragment, thought to be floral, came from Unit B11.

7.6 Mammal, Avian, and Reptilian Remains

7.6.1 Mammal Butchering Remains

Just as Level 2A was slightly smaller than Level 2, Level 2B is reduced from Level 2A. There were 550 specimens with a weight of 2259.9 grams. Half of this weight derived from a single large mammal element. It was also possible to determine the size range of many of the specimens which could not be identified to species and only 57% remained undetermined (Figure 7.6-1). The undetermined category shrinks considerably when weight is considered (Figure 7.6-2). The mammal materials in Level 2B are very sporadic with a great many units devoid of any mammal remains (Figure 7.6-3).

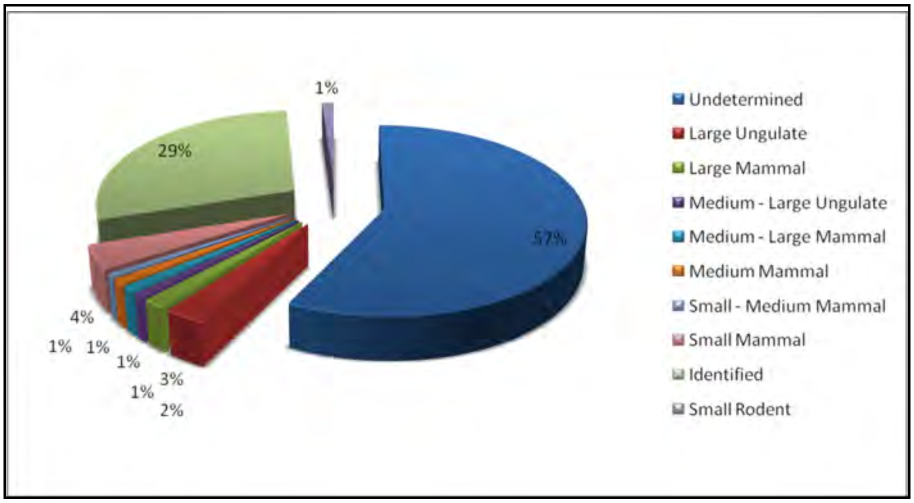


Figure 7.6-1: Frequency of Mammal Taxa by Quantity

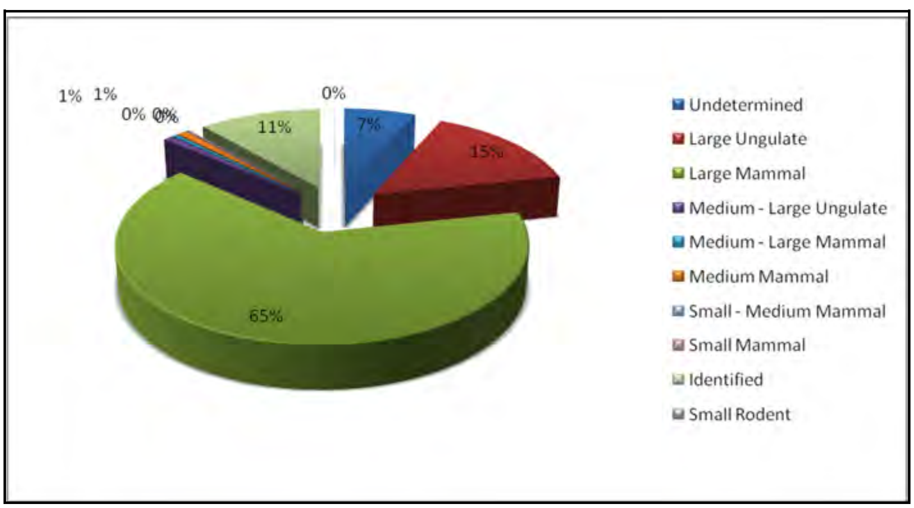


Figure 7.6-2: Frequency of Mammal Taxa by Weight

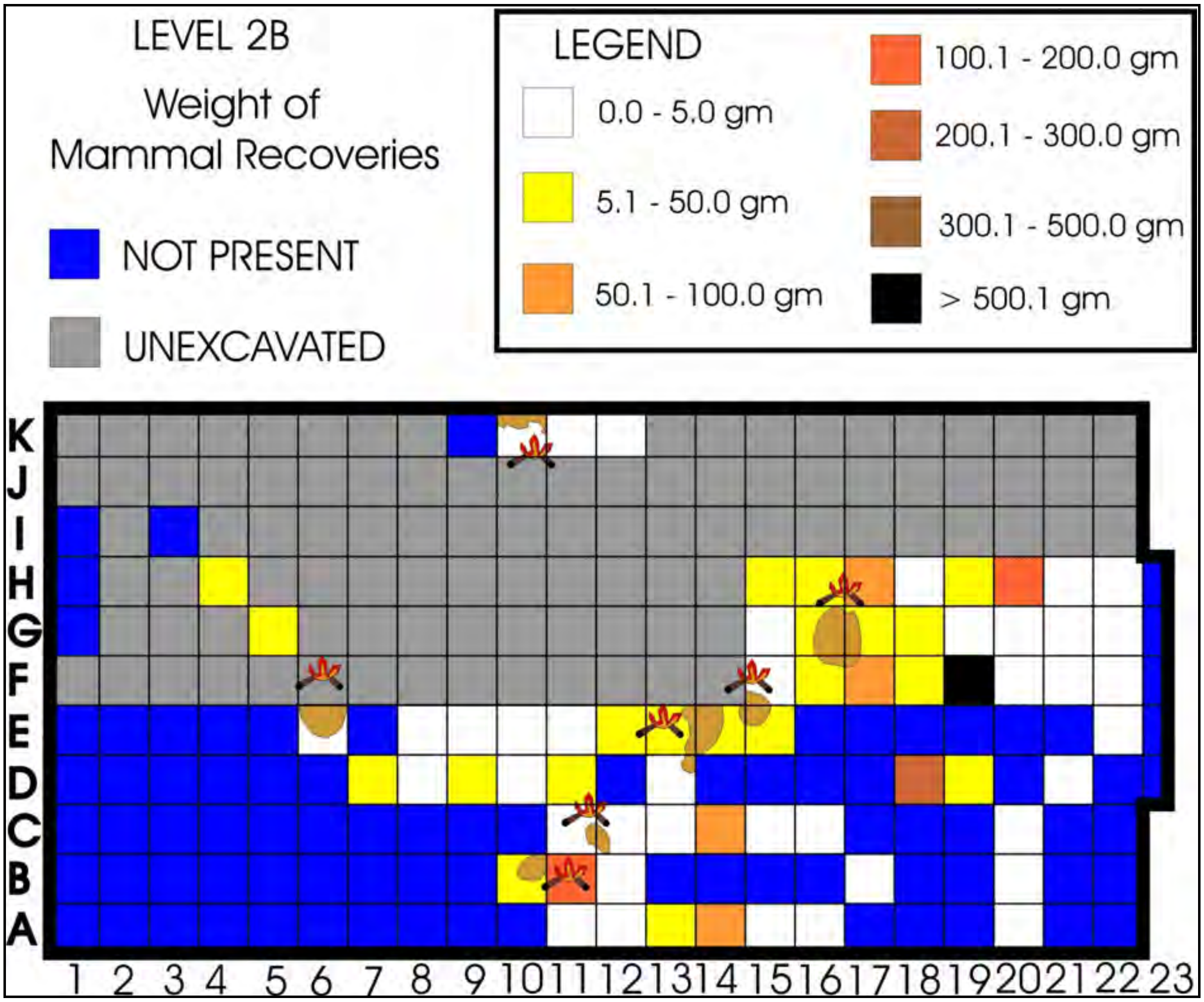


Figure 7.6-3: Distribution of Mammal Butchering Remains in Relation to Hearths

There are a number of hearths in this level and the remains are typically clustered around them. Based on the map (Figure 7.6-3), it appears that the hearths in Units G16 and E14 form somewhat of a focus area. However, with much of the area north of Unit E14 being unexcavated, it is difficult to say anything concrete. There are also several units that contain hearths but have no mammal remains present—specifically Unit E6, Unit K10, Units C11 and C12. These hearths may represent communal fires for gathering around rather than areas for food preparation/consumption. With some of these hearths being in areas where the amount of surrounding excavation was very limited, it is problematic to infer too much. There are also two units that contain a large amount of mammal bone, Unit D18 and Unit F19. Within Unit F19, this concentration is due to a single radius from an undetermined large mammal. In Unit D18, there are several smaller bones, also from an unknown large mammal, that together create a marked concentration. This might indicate a discard area rather than an activity area especially when these units are at the edge of the main activity area. This replicates a pattern seen in both Level 2 and Level 2A.

The materials in Level 2B were in fairly good condition and a full 29% of the remains were identified to species. The distribution of the identified species and those elements categorized by general size range indicates the denser material is in the northern portion of the excavated level (Figure 7.6-4).

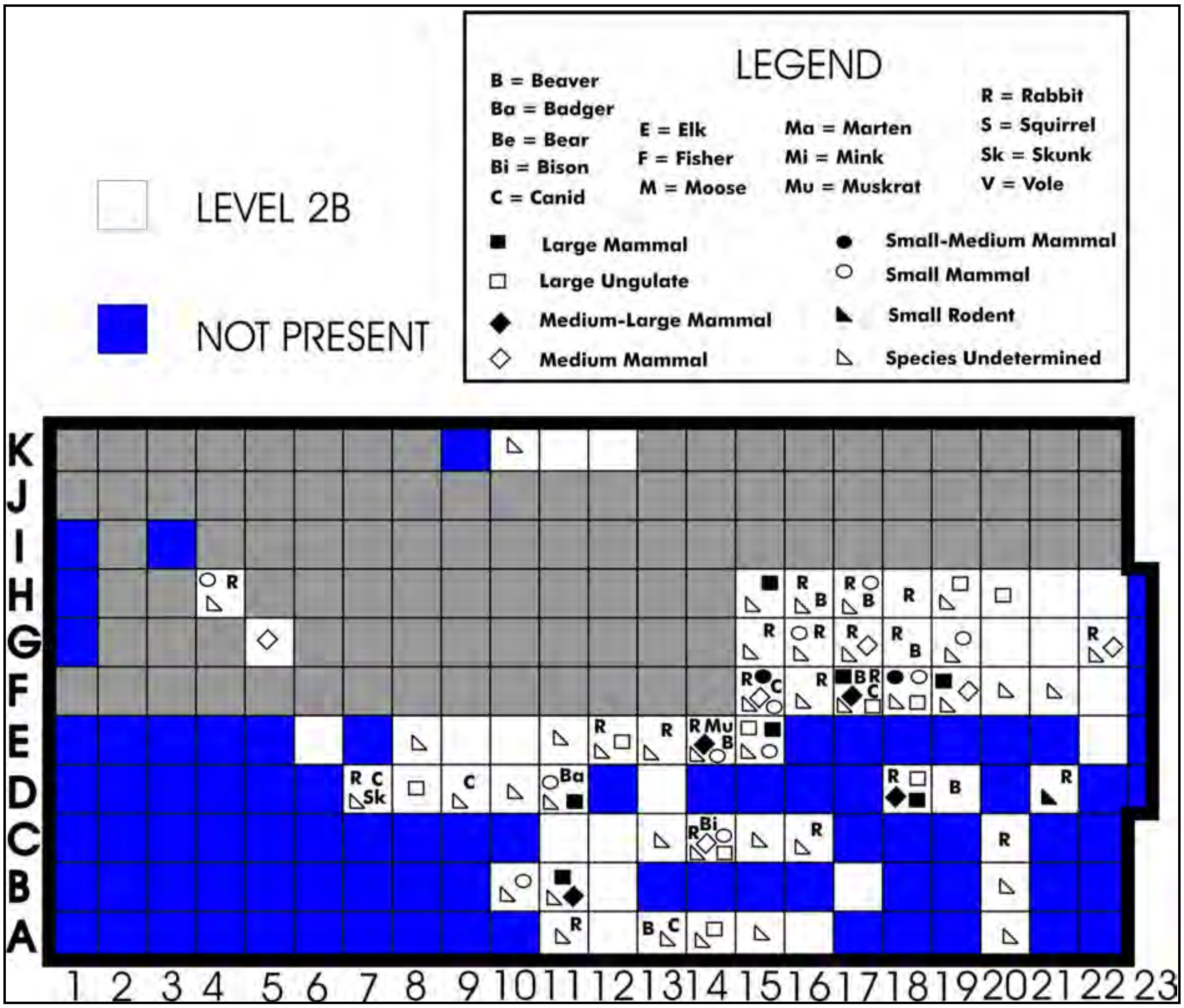


Figure 7.6-4: Distribution of Identified Taxa in Level 2B

When examining the materials identified to species, there are several interesting changes. By quantity, the rabbit remains dominate with 82% while the remainder is divided up over the other six categories (Figure 7.6-5). But in terms of weight, the materials are spread across the four main groups seen throughout many of the levels, bison, beaver, canid, and rabbit (Figure 7.6-6).

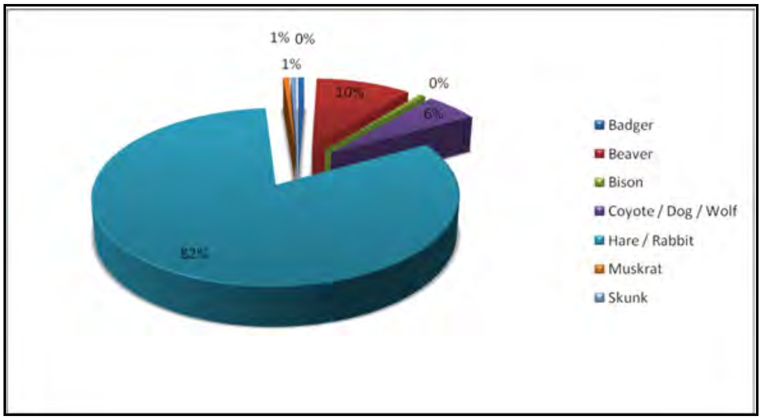


Figure 7.6-5: Frequency of Identified Species by Quantity

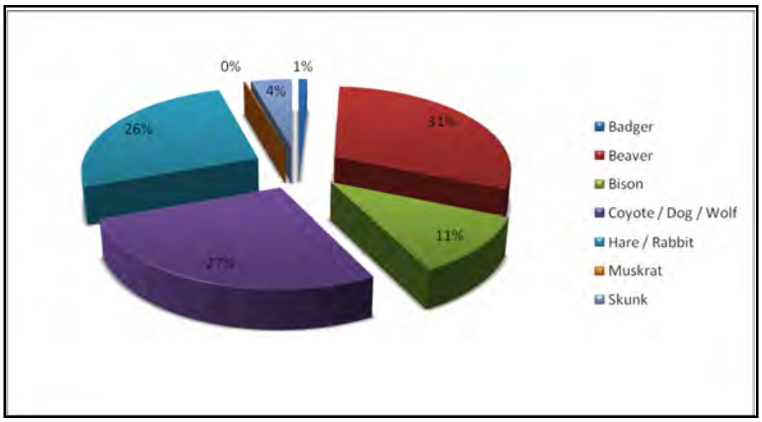


Figure 7.6-6: Frequency of Identified Species by Weight

However, when the MNI table (Table 7.6-1) is examined, all species, except rabbit and canid, are only represented by single animals.

SPECIES	MNI
Badger (*Taxidea taxus*)	1
Beaver (*Castor canadensis*)	1
Bison (*Bison bison*)	1
Coyote/dog/wolf (Canidae)	2
Hare/Rabbit (Lagomorpha)	6
Muskrat (*Ondatra zibethica*)	1
Skunk (*Mephitis mephitis*)	1
Total	13

Table 7.6-1: Minimum Numbers of Identified Species

7.6.2 Bone Tools

There are only two tools present within Level 2B: an awl, DlLg-33:08A/21237, in Unit F17 and a graver, DlLg-33:08A/9554, in Unit E14.

DlLg-33:08A/21237 (Plate 7.6-1) is a tool of excellent craftsmanship. This awl is constructed out of a piece of long bone, but due to the extensive modification of the object there is no way to determine the element from which it came. Several tool marks can be seen from where the tool was carved with stone blades. The measurements are: length - 15.2 cm; width - 1.2 cm; thickness - 0.9 cm; and weight - 7.8 grams.

Plate 7.6-1: Bone Awl, DlLg-33:08A/21237, from Level 2B (actual size)

The second tool, DlLg-33:08A/9554, is a graver constructed from the tooth of a beaver (Plate 7.6-2). The tooth has been carefully split lengthwise and displays an unnatural wear angle for the edge of a beaver's tooth. In addition, there is evidence of the tooth being cut along the inside edge. The reason for these marks is not apparent, but it might have been to provide a way to haft a handle, as the tool is small and might have been awkward to use without a handle.

Plate 7.6-2: Beaver Incisor Graver (DlLg-33:08A/9554) (2x actual size)

7.6.3 Avian Butchering Remains

While Level 2B has some of the largest amounts of bird bone of any of the levels excavated, there is still only a small amount present (Figure 7.6-7). Units E14 and E15 contain only a large number of broken fragments which is not necessarily indicative of a high number of elements. Unit G18 does in fact have a number of identifiable elements, most of which seem to be from a medium-sized bird.

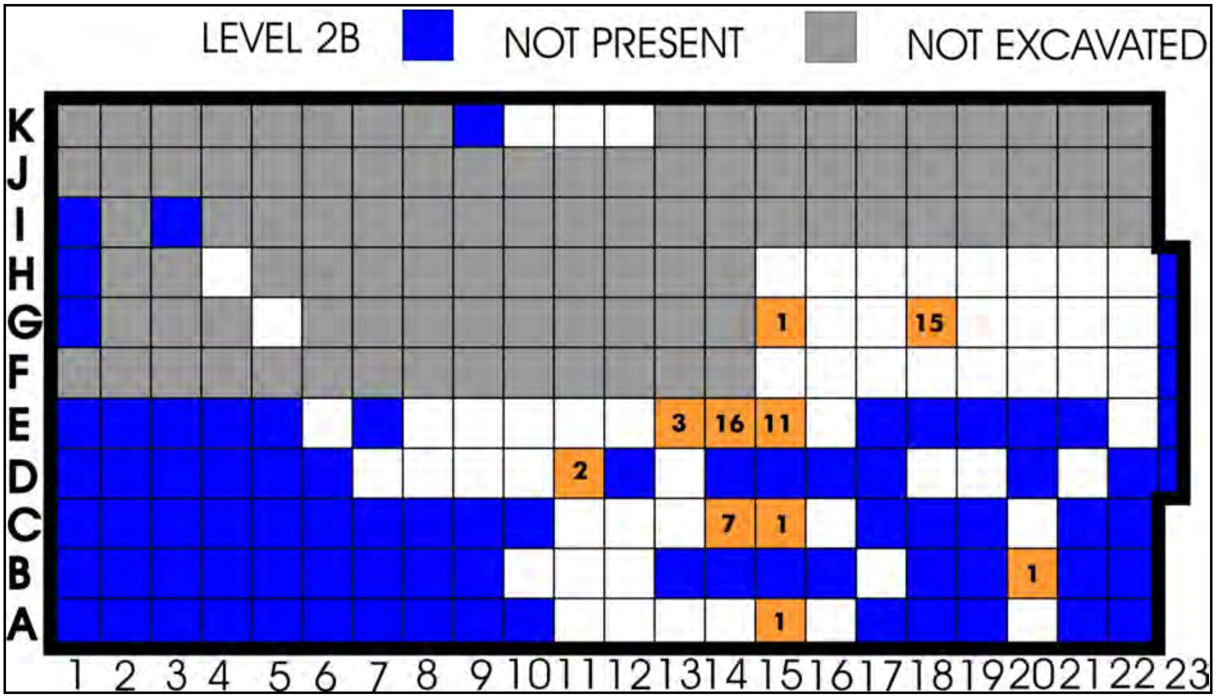


Figure 7.6-7: Distribution of Avian Butchering Remains

The distribution of bird elements mimics that of the mammal remains and further indicates the general areas of activity. Much like the mammal, it is not clear from some of the somewhat isolated units in the A and C lines exactly how these areas are related to the hearths.

7.6.4 Summary

As in the previous levels, the low level of mammal remains may suggest a summer or fall occupation, probably short-term. Fish likely would have provided the majority of the food for the camp with mammals being desirable for variety as well as providing material for the manufacture of tools and hides and furs for clothing and shelter.

Compared to Level 2A, there does appear to be several areas of activity indicated by the mammal remains. However, the fragmented nature of this horizon makes more general statements about the occupation difficult and additional information from the other artifact analyses will be needed to create more definitive hypotheses.

7.7 Fish Remains

7.7.1 Artifact Recoveries

There are 13777 artifacts (1517 catalogued assemblages) in Level 2B which have been identified as fish remains. Two of these catalogued assemblages (DlLg-33:08A/8654 and DlLg-33:08A/21784) have been defined as bone samples of fish remains and were collected at the time of excavation from two separate units (A14 and G18, respectively). They have not been processed and have been kept intact for future reference. There were no diagnostic elements in either of the two samples, but each consist of 'mung' and soil matrix. The quantity of 101 specimens in total from the two samples combined are excluded, for the most part, from this analysis.

This leaves 13676 selected artifacts from which to determine a quantitative analysis. Of this sample, undetermined bone (N=1118) and unidentified bone (N=1644) accounted for 2762 specimens, leaving 10914 specimens (79.22%) which were identified as to their element. However, 8852 of those specimens (i.e., 64.73% of the selected artifacts from this level) were either scales (N=6651), rib/ray/spine (N=1140), or vertebra (N=1061) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

7.7.2 Species Determination

The remaining 2062 specimens (14.97%) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 7.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

Of great interest is the artifact that has been tentatively identified as a gorge/leister, DlLg-33:08A/11584 from Unit B11, which is discussed more fully in later sections. It is one of two identical bone tools found during these excavations, the other being recovered in Level 3A. Since it was positively identified as being a culturally-modified catfish pectoral spine, it could be included in the general count of catfish pectoral spines for those objects, but its function is clearly much different than a product of butchering remains, and thus it is catalogued as a bone tool.

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Perc-idae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Angular; Articular; Dentary; Retroarticular								1	1
Angular; Articular; Retroarticular	1								1
Angular; Retroarticular	52			2		10		1	65
Articular	1								1
Basioccipital	15								15
Basioccipital; Exoccipital	1								1
Ceratohyal	25					28		5	58
Ceratohyal; Epihyal			1						1
Cleithrum	178	44						15	237
Coracoid	79							1	80
Dentary	66	4		2	8	11			91
Epibranchial	3								3
Epihyal	7					3		1	11
Exoccipital	4							1	5

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Perc-idae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Frontal	20					1			21
Gorge/Leister	1								1
Hyomandibular	52	45	1	5	1	2		1	107
Hypohyal	6								6
Interoperculum	3								3
Lacrimal	5								5
Lateral Ethmoid	7								7
Maxilla	3	25	1			13			42
Metapterygoid	17								17
Operculum	41	58	1		21			4	125
Otolith						133			133
Palatine	11								11
Parasphenoid	33		2					6	41
Pharyngeal Arch		13							13
Pharyngeal Plate						9		8	17
Pharyngeal Plate, Lower						21			21
Pharyngeal Plate, Upper						43			43
Posttemporal	1					4			5
Premaxilla	10			1		48		1	60
Preoperculum	30			3					33
Preoperculum; Quadrate	7								7
Prootic	5								5
Pterotic	4								4
Quadrate	13	11	3	3				1	31
Ray								1	1
Ray, Branchiostegal	1							7	8
Rib / Ray / Spine								1140	1140
Sample, Bone								101	101
Scale								6651	6651
Scapula			1			7		1	9
Scute							30		30
Sphenotic	12	1							13
Spine	14								14
Spine, Dorsal	9		1			239		9	258
Spine, Dorsal; Pterygiophore						3			3
Spine, First Pterygiophore	1								1
Spine, Modified First	3								3
Spine, Pectoral	170					35		1	206
Spine, Pterygiophore	2					75		10	87
Spine, Second Dorsal	32					8			40
Spine, Second Pterygiophore	2					6			8
Suboperculum			1					7	8
Supracleithrum	14								14
Supraethmoid	14								14
Supraoccipital	11								11
Undetermined Bone	1		1					1116	1118
Unidentifiable Bone								1644	1644
Urohyal	6								6
Vertebra	17							1044	1061
TOTAL	1010	201	13	16	30	699	30	11778	13777

Table 7.7-1: Identified Elements by Taxon

7.7 .3 Analysis

There are seven different taxa present in the sample. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 7.7-2. The results are further illustrated in Figure 7.7-1.

The most significant species with respect to MNI frequencies is *Aplodinotus grunniens* (freshwater drum)—just over half the total of minimum individuals represented in this deposit—followed by Ictaluridae spp.(catfishes) and Catostomidae spp. (suckers), with *Hiodon* sp. (goldeye/mooneye) showing up prominently. Percidae (perches), *Sander* sp. (sauger/walleye), and *Acipenser fulvescens* (sturgeon) are represented in very low numbers.

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	1010	50.53	19	16.52
Catostomidae (2)	201	10.06	18	15.65
Percidae (3)	13	0.65	2	1.74
Sander (4)	16	0.80	2	1.74
Hiodon (5)	30	1.50	13	11.30
Aplodinotus (6)	699	34.97	60	52.17
Acipenser (7)	30	1.50	1	0.87
TOTAL	1999	100.01	115	99.99

Elements Used for MNI Determination

1. Angular; Retroarticular (Right)
2. Hyomandibular (Left)
3. Quadrate (Right)
4. Hyomandibular (Right)
5. Operculum (Right)
6. Otolith (Right)
7. Scute

Table 7.7-2: Species Determination

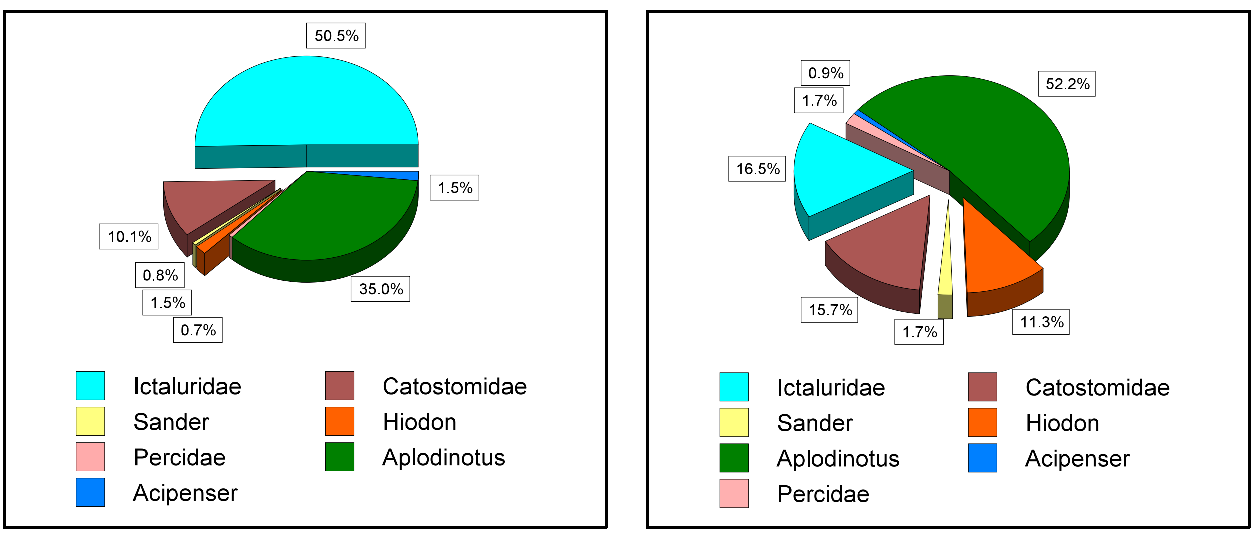


Figure 7.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The NISP counts do suggest that some species may have a greater significance, such as the catfishes and, as to be expected given their MNI percentage, the frequency of freshwater drum. More suckers were identified than the remaining species, including the perches, sauger/walleye, and sturgeon, which is reflected in the MNI counts for those species.

The distribution of the fish remains by species is shown in Figure 7.7-2.

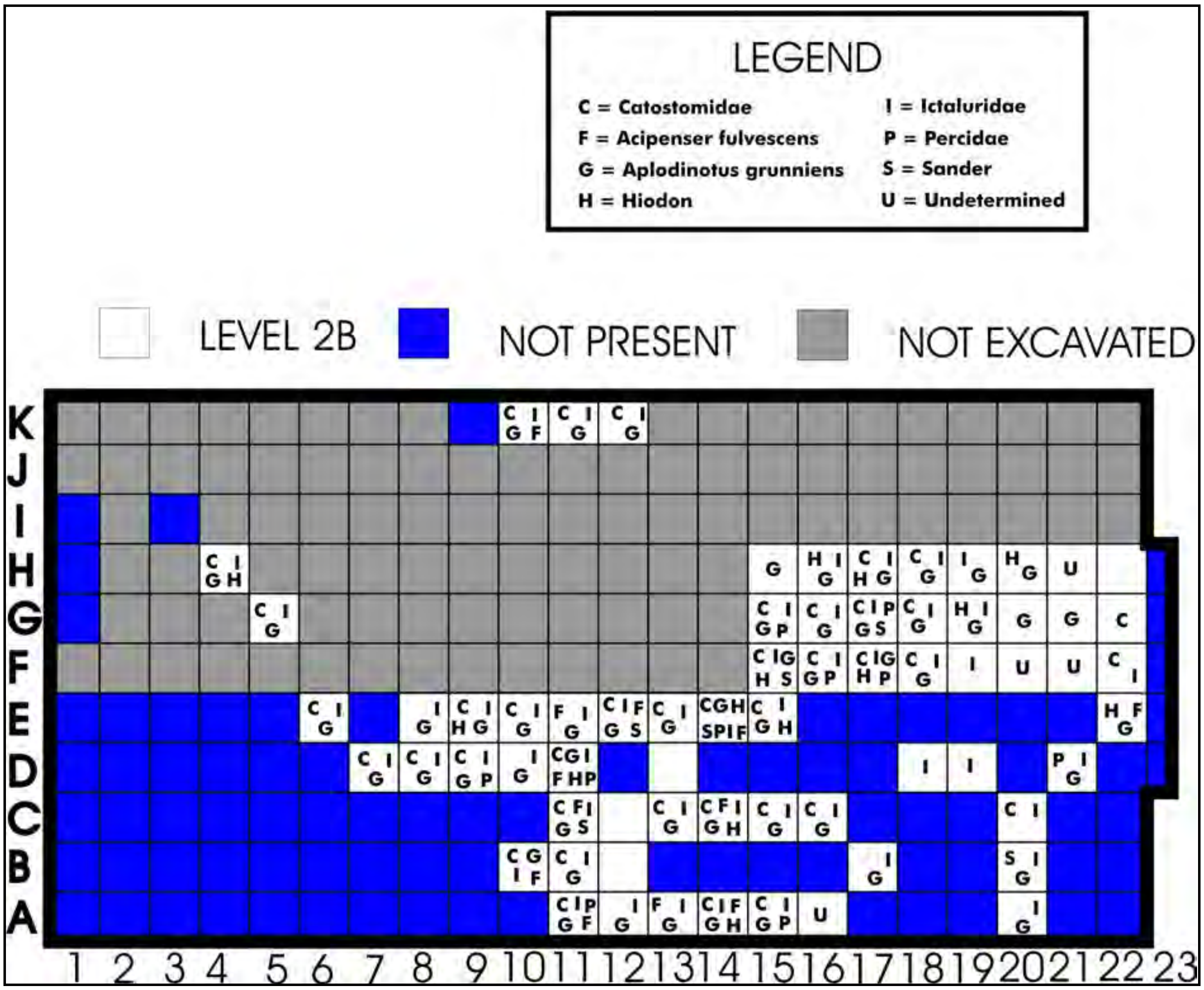


Figure 7.7-2: Distribution of Fish Species in Level 2B

Several units do not contain any fish remains that have been identified as such, namely Units B12, C12, D13, and H22. This seems unusual and cannot be accounted for. There are major clusters of different fish species particularly around the five separate hearth areas in Unit B10, Units C11 and C12, Units E13 and E14, Units E15 and F15, and Units G16 and G17. The other hearth in Unit K10 has mostly a typical assorted collection of species, catfishes, suckers, and freshwater drum which is the most frequent combination of species for almost every other unit. But Unit K10 also has sturgeon. The northern K line of three excavation units was separated from the main excavation in the southern grid area by a block that was left unexcavated, and yet sturgeon is found scattered across most of the main excavation area. Sturgeon is generally represented at its most minimum individual count of one given that scutes are the only evidence of this species, but the distribution suggests that there may be a couple more associated with each of the hearths in this level. Similarly, there is a broad distribution with the goldeye/mooneye (which could be expected given the number of individuals), but the sauger/walleye are widely scattered mostly around a few hearth areas that may indicate a few more individuals than accounted for in the computations.

7.7.4 Interpretation

Figure 7.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 2B.

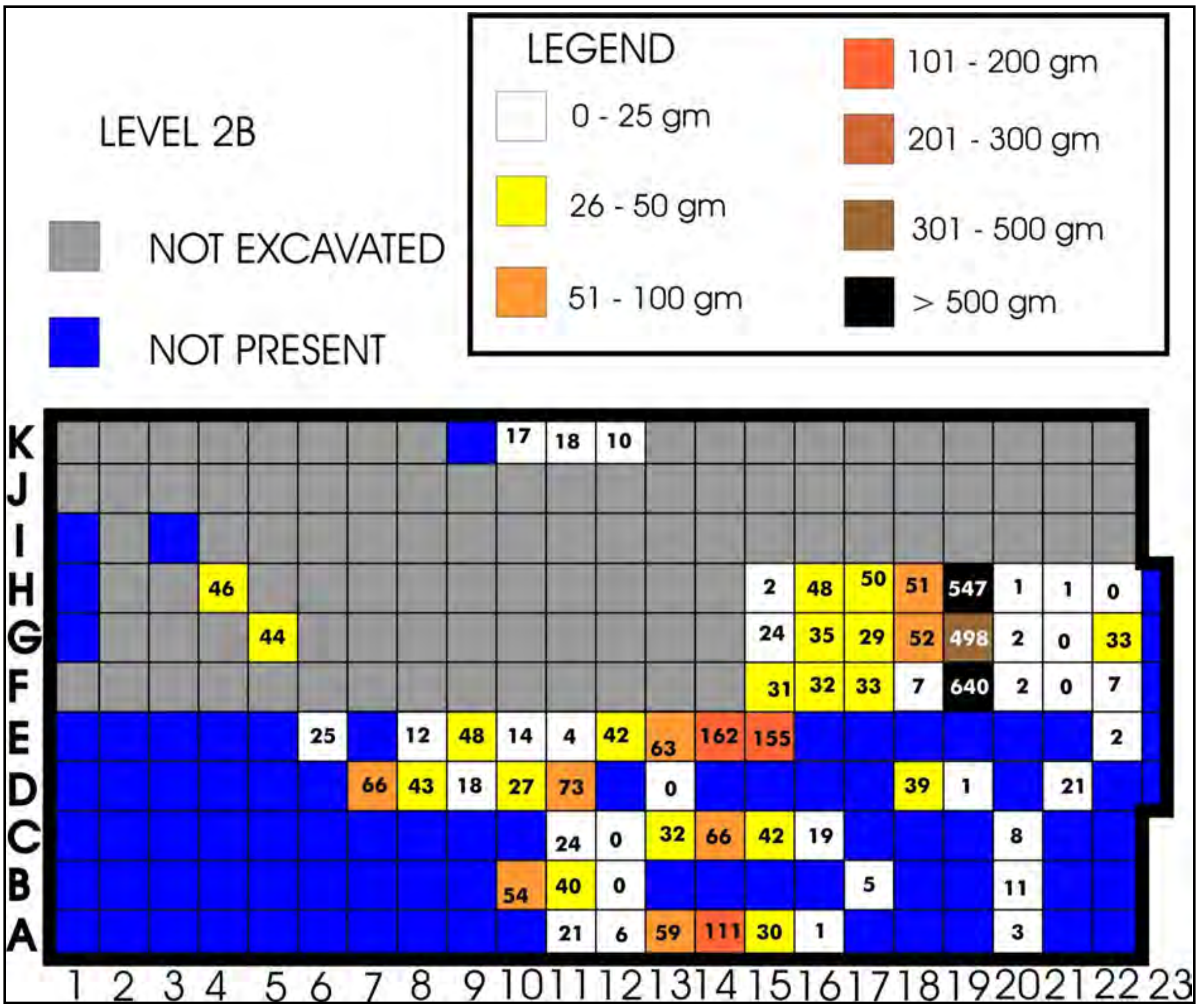


Figure 7.7-3: Distribution of Fish Remains in Level 2B

The dense concentration, running north through Units F19, G19, and H19, has a sample of scales in each unit that constitutes part of the weight shown in Fig. 7.7-3. If the weight of the scales is subtracted in each of these units (i.e, DlLg-33:08A/20629, DlLg-33:08A/22113, and DlLg-33:08A/22601 respectively), the density is much lower (Unit F19 = 21 grams; Unit G19 = 15 grams; and Unit H19 = 39 grams). This is comparable to the surrounding units. It does appear, though, that there are more dense concentrations associated around the hearth areas, suggesting greater deposition as a result of increased human activity in the immediate vicinity of these hearth features.

No cut marks were recorded on any specimens. However, forty-one (41) artifacts were found to be burnt, charred, or calcined by fire, representing only 0.30% of the total number of fish remains. However, Units G15, G16, and G17 make up almost half the altered bone, with Unit B10 having another significant proportion, and finally two other concentrations located in Units E15 and F15. All four concentrations are clearly associated with the hearth features that are found in these same units. Freshwater drum is the only species that has been identified with charring, specifically in Unit E15, and so no comparison to other species can be made with respect to differential treatment. The final three units to contain charred fish remains are Units A14, C15, and H4. Oddly, they are not as close to hearths as the other charred remains. Some mechanism of intra-site transfer may be necessary to explain their presence in those units through human activity.

A uniquely modified catfish pectoral spine shaft (DlLg-33:08A/11584) was recovered from Unit B11 (Plate 7.7-1). Identified as a gorge/leister, it is more fully described with an identical specimen recovered from Level 3A in the final summarizing chapter on fish remains. This unusual object was located in a unit that had hearths in adjacent units.

Plate 7.7-1: Left and Right Sides of Gorge/Leister (DlLg-33:08A/11584) (2x actual size)

Another object, DlLg-33:08A/8378, was initially identified as a possible bead for ornamental use, but upon further examination it was determined that the hollow center (Plate 7.7-2) was the result of natural occurrence in deterioration of the artifact and not culturally modified. It was reclassified as a vertebra (the original material) and included in the computations for that element.

Plate 7.7-2: Fish Vertebra, DlLg-33:08A/8378, with Central Hole

7.8 Shellfish

There were 144 shell artifacts recovered from Level 2B. These represent butchering remains and naturally deposited specimens.

7.8.1 Butchering Remains

Twenty-one valves, of the 121 butchering remains, were identifiable to species (Table 7.8-1). The remainder were identified only as Unionidae.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	3	14.29	26.7	19.57
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	12	57.14	47.7	34.97
Pink Heel-Splitter (*Potamilus alatus*)	5	23.81	56.1	41.13
Maple-Leaf (*Quadrula quadrula*)	-	-	-	-
Pig-Toe (*Fusconaia flava*)	-	-	-	-
Three-Ridge (*Amblema plicata*)	1	4.76	5.9	4.33
	21	100.00	136.4	100.00

Table 7.8-1: Frequency of Identified Butchering Remains by Taxon

The distribution map, Figure 7.8-1, indicates no major concentrations in this level, with only minor concentrations occurring in Units A14, E13, and H20. Only Unit E13 is on the edge of a hearth that is located predominantly in Unit E14 with some overlap into Unit E13.

As in Level 2A, only four species were present in Level 2B (Table 7.8-1, Figure 7.8-2), three of which were the same: Black Sand-Shell, Fat Mucket, and Pink Heel-Splitter. Three-Ridge occurred in Level 2B but not Level 2A . Fat Mucket is, again, the predominant species.

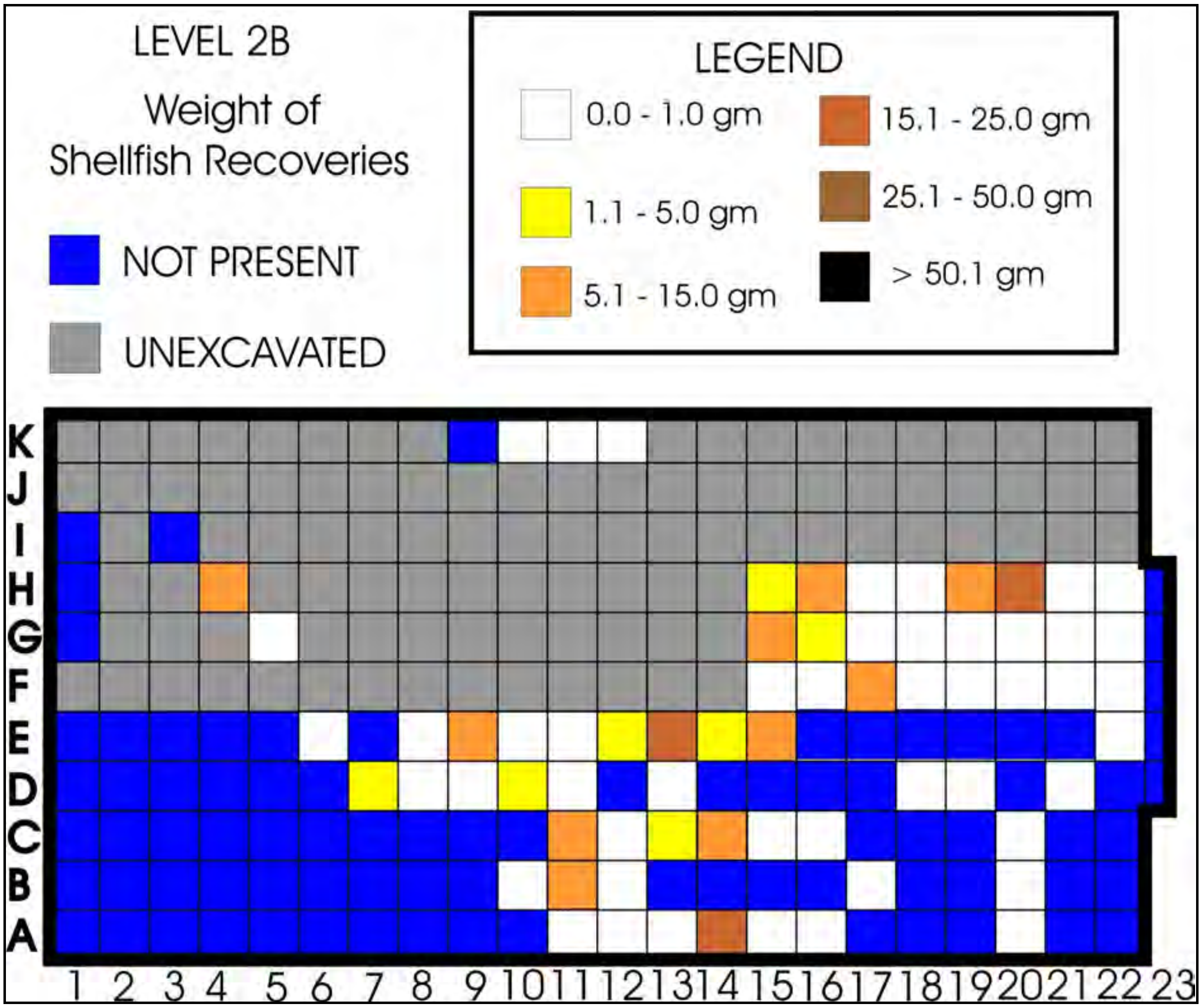


Figure 7.8-1: Density of Shellfish Recoveries

Fifty-one specimens had evidence of charring through close contact with fire. Table 7.8-2 outlines the recoveries from Level 2B. Only one specimen could be identified to species, i.e., Three-Ridge, and another specimen was either Lampsilis sp. or Ligumia sp. The remainder were Unionidae. With the exception of the charred specimens in Unit E14 and G16, the remainder of the charred shell was not immediately adjacent to a hearth.

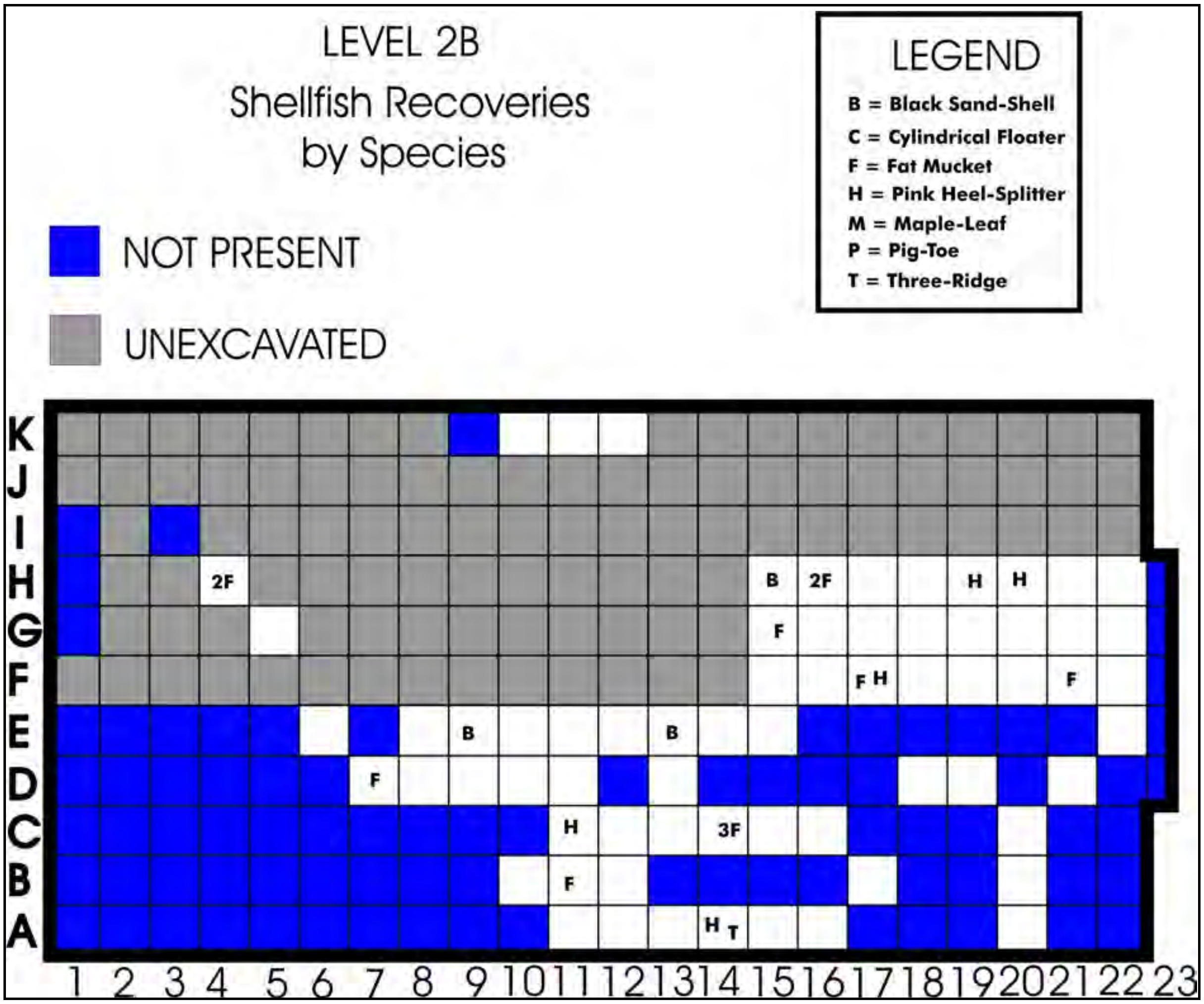


Figure 7.8-2: Frequency of Shellfish Recoveries by Species

CAT. NO.	UNIT	QTY	SPECIES
8652	A14	1	Three-Ridge
9568	E14	2	Unionidae
10279	C13	1	Unionidae
16286	D21	1	Unionidae
18134	H4	8	Unionidae
21359	F18	1	Lampsilis/Ligumia
21532	G16	37	Unionidae
TOTAL		51	

Table 7.8-2: Charred Shellfish Specimens from Level 2B

The Minimum Number of Individuals (MNI) is portrayed in Figure 7.8-3. Fat Mucket comprises 57.1% of the assemblage, while Pink Heel-Splitter is 23.8 % with Black Sand-Shell and Three-Ridge being minimally represented.

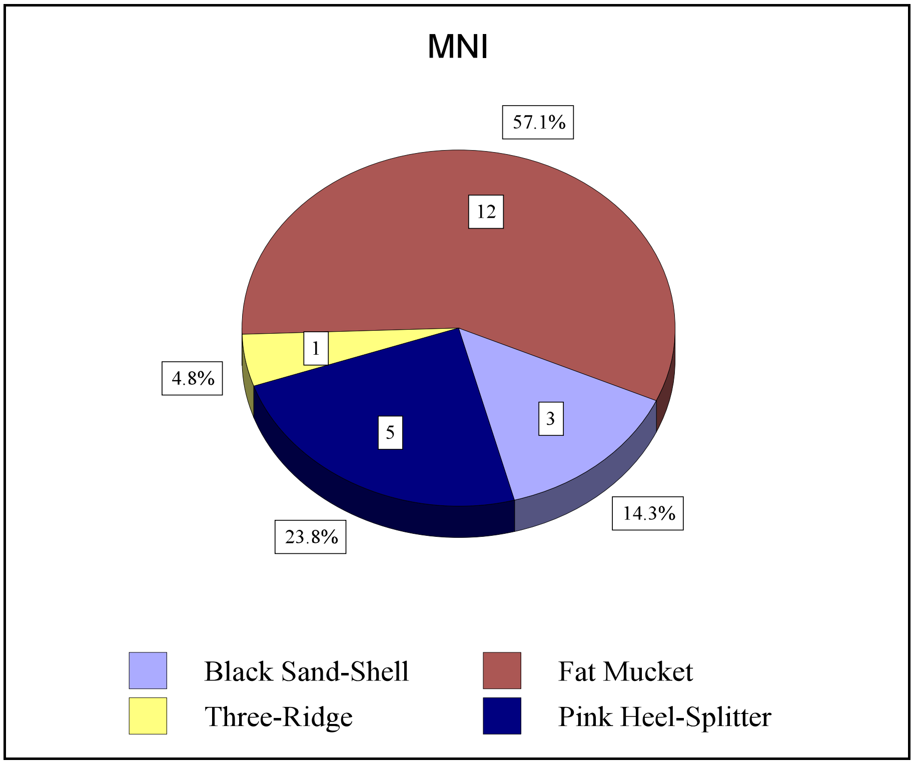


Figure 7.8-3: Frequency of Identified Taxa of Shellfish

7.8.2 Natural Shellfish

Only twenty-three naturally deposited specimens were recovered from Level 2B (Table 7.8-3). The taxa are illustrated in Figure 7.8-4. The recoveries are very sparse with the majority of the specimens occurring in the central portion of the excavation area.

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	17	73.91
Ramshorn Snails (Planorbidae)	1	4.35
Pea Clams (Sphaeriidae)	5	21.74
TOTAL	23	100.00

Table 7.8-3: Frequency of Naturally Deposited Shellfish

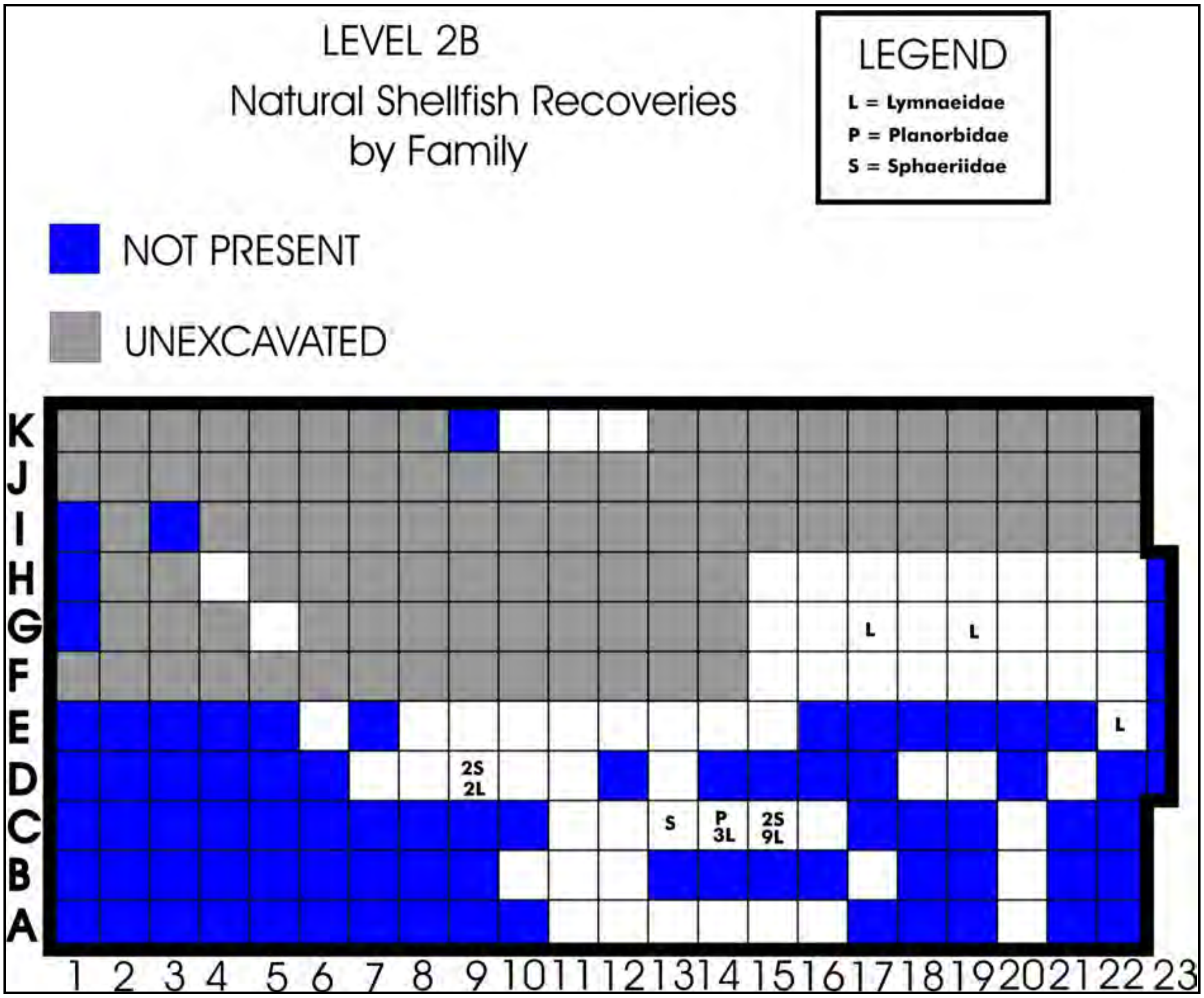


Figure 7.8-4: Location of Recoveries of Natural Shellfish in Level 2B

7.8.3 Summary

The number of recovered shell rose to 144 specimens in Level 2B, a higher number than that of Level 2A, but still substantially less than Level 1 or Level 2. The density in Level 2B is calculated to be 2.08 artifacts per square metre. As with Level 2A, there were only four identified species present, three the same—Fat Mucket, Black Sand-shell, and Pink Heel-Splitter—while the fourth was Three-Ridge rather than Maple-Leaf. Only 21 of the 121 butchering remains could be identified to these species (17.36% of the butchering remains, 14.58% of the total recoveries). Minor concentrations were present, but only one (Unit E13) was in the vicinity of a hearth. The identified shell was scattered across the level. In regard to the natural shellfish, only twenty-three specimens were curated. The largest number were, again, the pond snails (Lymnaeidae).

Overall, Level 2B may have been another short-term occupation with not a great deal of shellfish harvesting occurring.

7.9 Miscellaneous Recoveries

This section describes the various types of recoveries do not fall into other categories. These range from various types of soil samples to esoteric artifacts.

7.9.1 Soil Samples

A total of 70 soil matrix samples were collected, at least one from each excavation unit. In addition to the soil samples, other samples were taken. These were 12 hearth samples, one ash sample, and six clay sample. Sixteen samples of hearth clay and 11 samples of heat-modified clay were recovered.

7.9.2 Coprolites

Four coprolite samples were collected.

7.9.3 Copper Artifact

A definite copper artifact was recovered from Unit G17. DlLg-33:08A/22839 is a tapered linear tool that probably functioned as an awl (Plate 7.9-1). It is flat and the dimensions are 36.8 mm in length, 3.9 mm in width at the proximal end, and 2.4 mm thick. Under 10x magnification, it appears to have been hammered rather than ground to shape at the tip. The specimen is wrapped with a narrow fiber which has not been analyzed. It could be very finely cut tanned hide as it appears to be solid rather than composed of strands as would be expected for cordage. Further analysis of this artifact could include determination of the wrapping, the exact method of shaping the artifact, and spectrographic analysis of the copper to attempt to locate the source area.

Plate 7.9-1: Copper Artifact - DlLg-33:08A/22839 (3x actual size)

7.10 Level 2B Summary

Level 2B occupies the central portion of the excavation area, occurring in 67 of the units. It is present on the western and eastern sides of the slight swale that cuts across the area and is most contiguous to the north. The taphonomic problems inherent in the Level 2 Complex are particularly noticeable with regard to the ceramic recoveries. Sherds from fourteen different vessel were recovered but only five appear to originate in this cultural level. All of the others originate in higher levels and appear to have been relocated to this lower level. Rodent burrowing activity is a definite probability for some of the displacements.

The ceramic vessels appear to be part of a cultural continuum which continues into the later levels (Levels 2A, 2, and 1). Among the Rainy River ceramics, a single manifestation of a Plains/Woodland style of vessel was recorded. This may suggest that a smaller group, or a single family, met with the larger group at the campsite location.

The lithic tools, considerably less than in the upper levels, are largely concentrated on the eastern side of the swale. The materials they are made from tend to be western (Swan River Chert) and northwestern (Denbeigh Point Chert) with some southern (Knife River Flint) and local (Selkirk Chert) components. Most are related to food procurement and processing, with some hide processing tools as well. The lithic detritus is sparse suggesting little tool manufacture occurred during the occupation. The flakes are concentrated in the same area as the tools on the eastern side of the swale. Western material dominates the assemblage with generic chert a distant second. Small amounts of southern, eastern, local, and northwestern detritus materials are present. It would appear that the occupants recently arrived from the west, using lithic materials acquired there in conjunction with material obtained from the south and the east by trade.

The faunal remains are concentrated around four of the seven hearths, most noticeably on the eastern side of the swale. Given the presence of faunal resources in excavation units immediately adjacent to units which had no evidence of Level 2B, it is likely that material from Level 2B was incorporated into the superceding Level 2A as the intervening depositional event did not reach far enough inland to put down a sterile layer of sediment between the two levels. A bison, along with rabbits and beaver, provide the mammal component of the diet. Some avian remains were recovered as well as a considerable number of fish and some shellfish. These remains represent a varied diet with several sources of protein.

A ceramic sherd was submitted for residue analysis and the results provide some insight into the plant component of the diet. The species identified by the analysis were beans, sunflower leaves, cocklebur seeds, wild onion, rabbit, bird, and antelope. The presence of the cocklebur seeds suggests late summer or early fall as the season of occupation.

In general, it would appear that this campsite was part of the seasonal round of the occupants who travelled according to availability of food resources in the appropriate seasons. Probably, the visit to this location was due to the fish resources which could provide preservable food for the forthcoming winter.

8.0 LEVEL 2C

8.1 Introduction

Level 2C was encountered in only 33 units. Ten units are isolated with a contiguous area in the northeast corner of the excavation area (Figure 8.1-1). It is generally a sparse level in comparison with the more extensive upper levels.

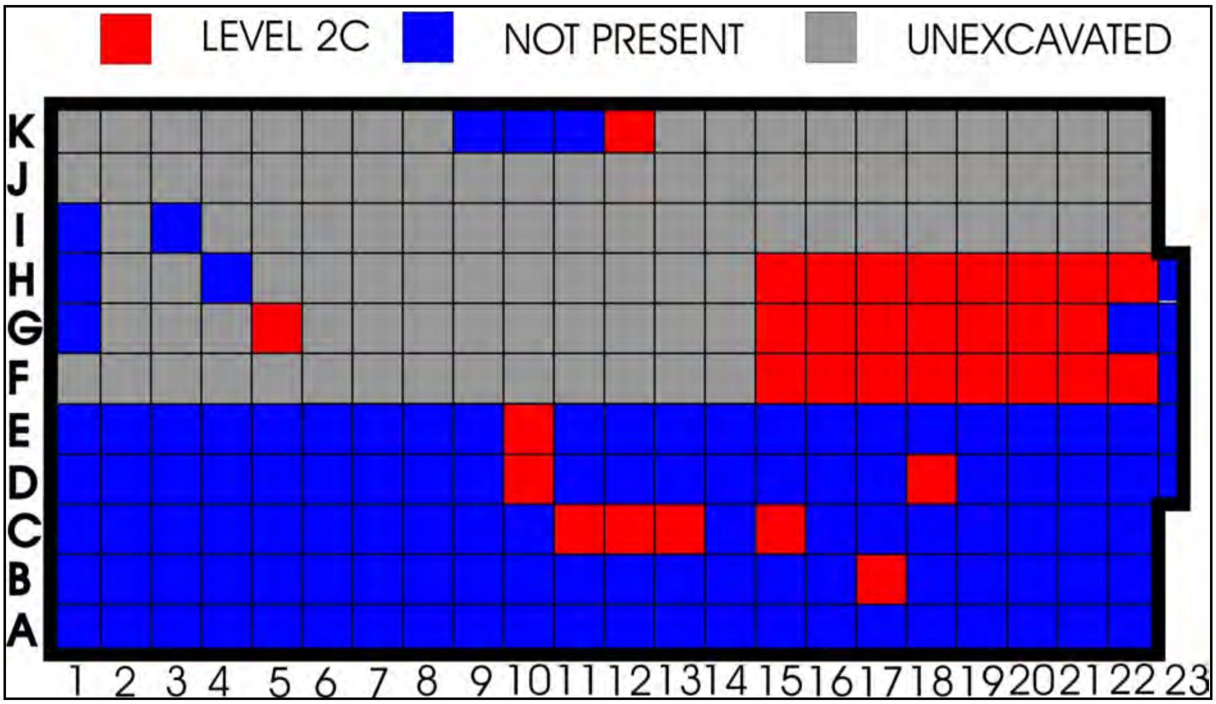


Figure 8.1-1: Map Showing Presence of Level 2C

8.2 Features

The primary feature that was recorded during the excavations was that of hearths (Figure 8.2-1). There are only two hearths. The larger of the hearths sprawls from Unit F16 to Unit G18 while the smaller is localized in the south portion of Units C12 and C13. The cultural horizon was not evident in the adjacent southern units and it appears that this hearth had been truncated by taphonomic events.

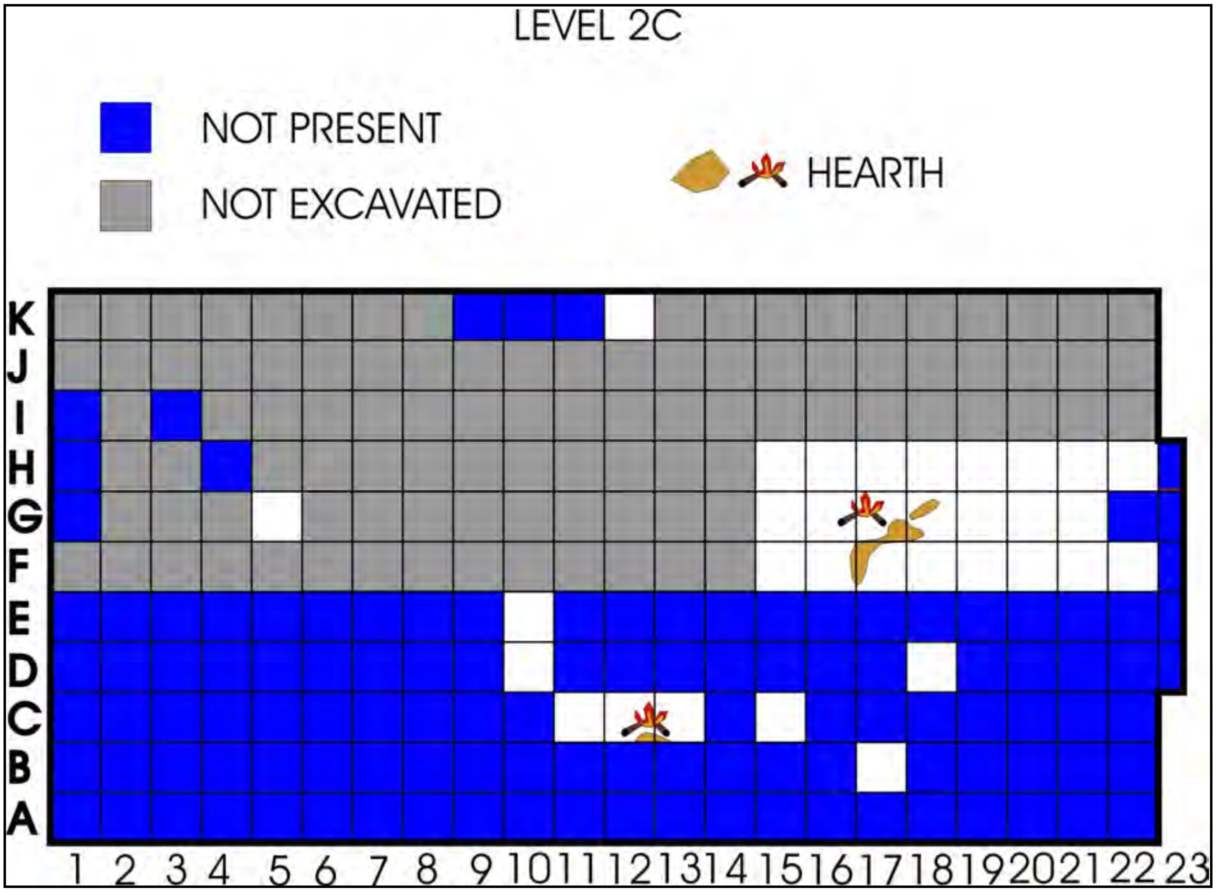


Figure 8.2-1: Distribution of Hearths in Level 2C

8.3 Ceramic Artifacts

8.3.1 Artifact Distribution

Only 33 units defined Level 2C, all were below the slope and most were north of the E-line (Figure 8.3-1). Twelve of these units recorded zero ceramic recoveries.

The highest densities were recorded in two adjacent units, F15 and F16, with 155.9 grams from 110 sherds and 146.4 grams from 82 sherds respectively. These two units correspond with the high density deposits on Level 2, Level 2A, and Level 2B. Vessel 35 is not present, at least not in rim or neck sherds, but Vessel 60 is again found here. The weight distribution map illustrates the trend towards increasingly sporadic deposition. No scatter pattern is observed from the identified vessel fragments on this level alone but, when viewed with the distribution on the other levels, the same general southwest to northeast tendency was in effect.

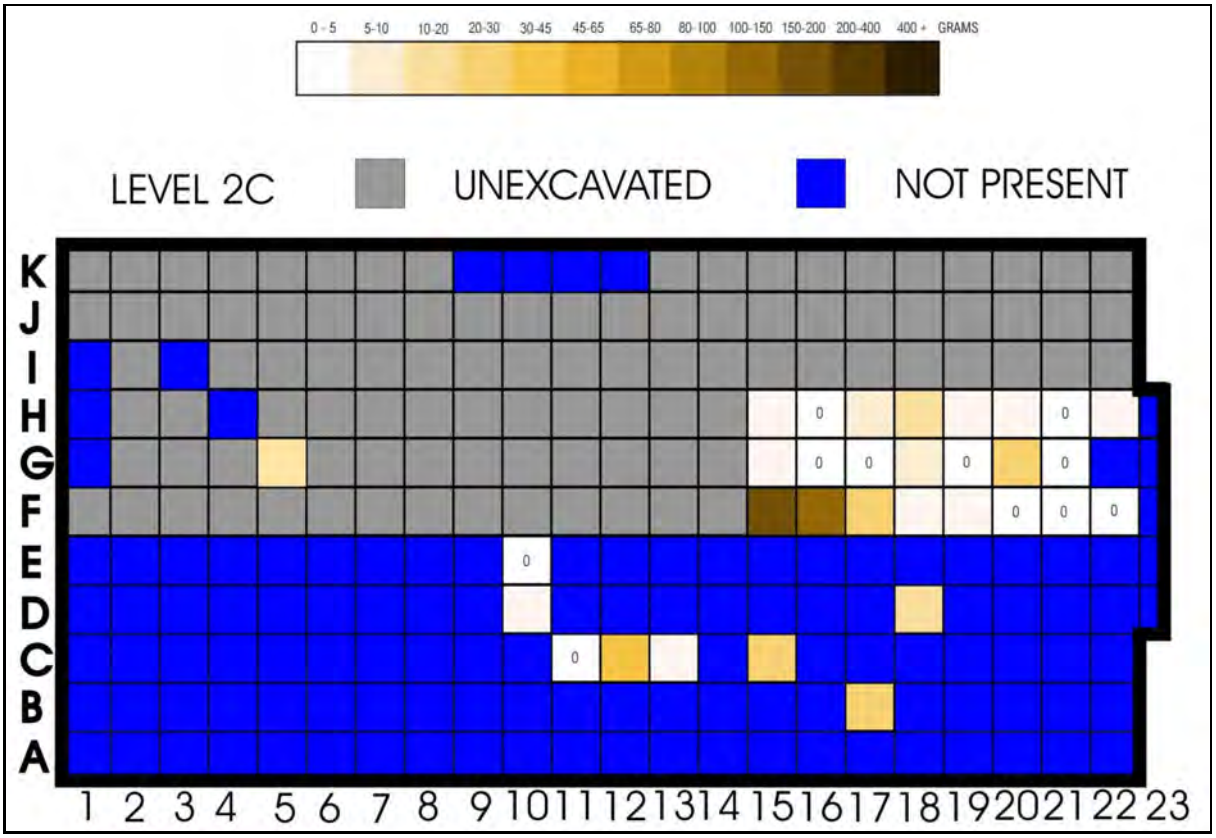


Figure 8.3-1: Distribution of Ceramic Recoveries from Level 2C

8.3.2 Artifact Recoveries

A total of 518.1 grams of vessel-related ceramics were recovered, 264 sherds and sherdlets. Body sherds accounted for 71.8% and 28.2% were identified as rim sherds, a total of 35. The average rim sherd weight was 4.2 grams.

8.3.2.1 Identified Vessels

Sherds from six vessels were identified as being present on Level 2C (Figure 8.3-2). All but one are represented by one or two sherds. Vessel 60 was identified from three sherds on this level. The only vessel that was recovered exclusively from Level 2C was Vessel 79 (a single sherd).

Vessel 6
This vessel, recovered from Unit B17, originates in Level 2.

Vessel 28
This vessel, recovered from Unit C12, originates in Level 2.

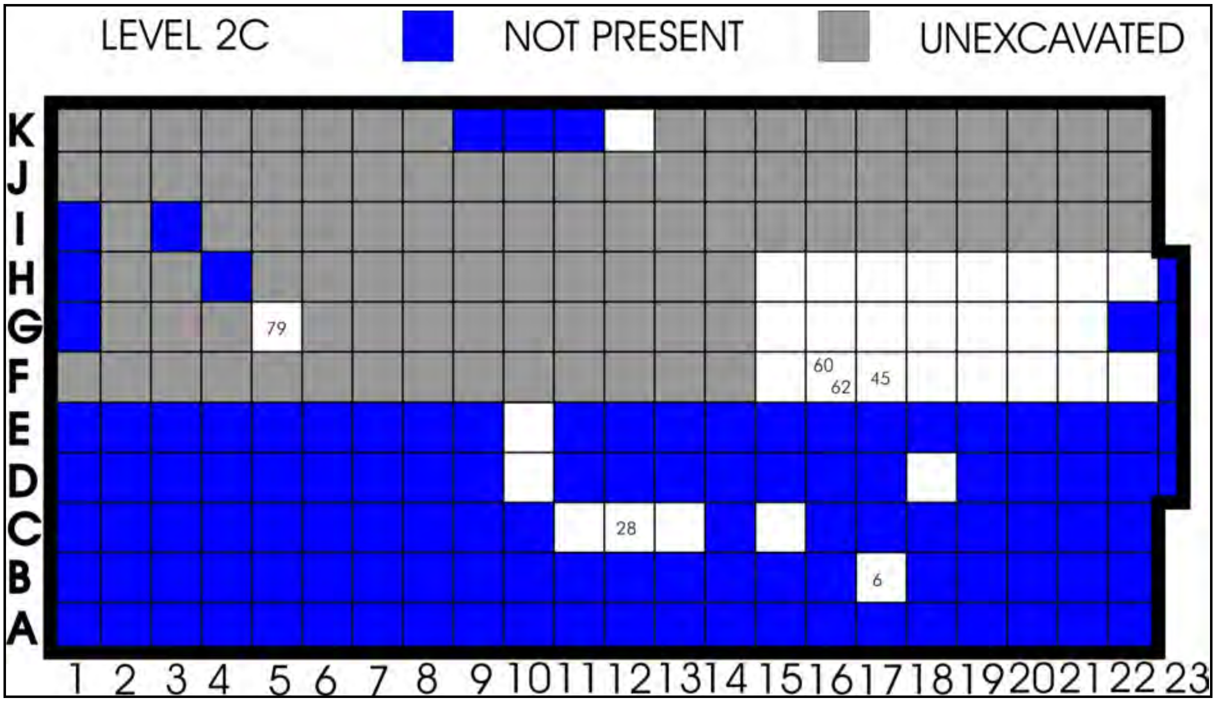


Figure 8.3-2: Distribution of Identified Vessels in Level 2C

Vessel 45

This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). The sherds on this level derive from Units A14 and E14.

Vessel 60

This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). On this level, it was located in Unit E15.

Vessel 62

This vessel was not assigned to a specific level. It is described in Level 2 (Section 5.3.3.1). The sherds on this level occurred in Unit E15.

Vessel 79

A Rainy River Coalescent vessel, Vessel 79 is defined as an example of the Soft Shoulder type. This pot, located in Unit G5, in particular refrains from flaring outward—it actually appears to be leaning inward slightly. The short CWOI are so short, and the manner of application so atypical, that this vessel could be considered as representing a distinct type or tradition. But, one vessel cannot decide this. Within this assemblage it appears most closely related to the Soft Shoulder type, which itself has blurry origins.

8.3.2.2 Body Sherds

The body sherds and sherdlets of Level 2C are 71.8% of the total vessel-related ceramics. There are 229 sherds weighing 372.2 grams, yielding an average weight of 1.6 grams.

8.3.3 Manufacturing Characteristics

Sherds were generally thin with some drifting into the medium thickness range (between 5-7.5 mm). A few examples of very thin walls were identified (approximately 2.5 mm). The thinner sherds tend to show greater density and better consolidation, though all in all the consolidation was defined as good to very good. With thin sherds and sprang impression comes the assumption of bag-formed pots. There is little evidence of other techniques. Many of the shoulder sherds were noted to have partial obliteration of the impressed weave pattern.

8.3.3.1 Surface Treatment

The quantity of ceramics recovered from this level is significantly less than in Level 2B with only 264 sherds for a total weight of 518.1 grams. Of this, 75.2% were identified as sprang weave impressed, 16.0% textile impressed, 2.2% obliterated, and 0.2% showed vertical cord impression. No surface treatment could be recorded for 6.4% (Table 8.3-1).

LEVEL 2C	33 units	WT (grams)	QTY	%
SPRANG		389.5	194	75.2
TEXTILE IMPRESSED		82.9	27	16.0
OBLITERATED		11.2	7	2.2
VERTICAL CORD		1.1	1	0.2
SMOOTH		-	-	-
No Recorded Surface		33.4	35	6.4
TOTAL		518.1	264	100.0

Table 8.3-1: Types of Surface Treatment Recorded in Level 2C

8.4 Lithic Artifacts

8.4.1 Lithic Tools

A total of five lithic tools, weighing 23.0 grams, were recovered from Level 2C. There are four different types of tools (Table 8.4-1), composed of four different materials (Table 8.4-2). The location of these artifacts is depicted on Figure 8.4-1.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	1	20 00
Biface	1	20.00
Retouched Flake	1	20.00
Utilized Flake	2	40.00
TOTALS	5	100.00

Table 8.4-1: Lithic Tool Types in Level 2C

LITHIC MATERIAL TYPE	QUANTITY	%
Knife River Flint	2	40.00
Chert (Undifferentiated)	1	20.00
Denbeigh Point Chert	1	20.00
Quartzite	1	20.00
TOTALS	5	100.00

Table 8.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 2C

8.4.1.1 Projectile Points

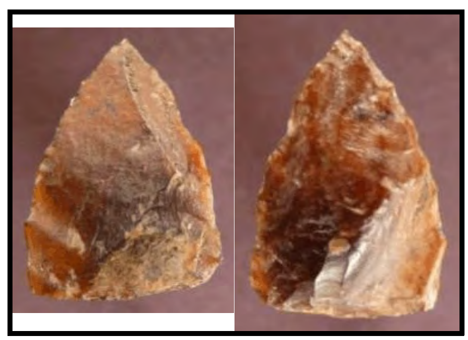


Plate 8.4-1: Dorsal and Ventral Sides of DlLg-33:08A/22796 (2x actual size)

DlLg-33:08A/22796 is a KRF Plains Triangular projectile point recovered from Unit G15. This projectile point is complete and has seen relatively little knapping as the original bulb of percussion, striking platform, and bulbar scar are still present. In fact, the largest knapping scar is the bulbar scar! Seven flakes have been removed from the base, ranging from 1.8 mm to 3.91 mm. The base itself appears to have been partially ground; two-thirds of the base has a rounded edge and the right side of the edge is sharp. On the left edge, from the base, are three flakes scars, 0.87 mm, 0.94 mm, and 1.82 mm. There follows a gap of 2.53 mm, then four flakes scars totaling 1.54 mm (these may be work-scar flakes), then one relatively large flake scar measuring 2.49 mm (immediately beside the four small flake scars), and then a gap that leads to the tip of the point. On the right edge, from the tip to the base are eleven flake scars in 15.58 mm. The flake scars end 4.84 mm above the shoulder where the material is unmodified. On the dorsal face, the base and left edge are entirely unmodified. Furthermore, a triangular section extending up from the base is cortex with several high polish spots on it. These polish spots are most likely unrelated to the tip's use, unless they are created by the process of binding the tip to its shaft. The right edge of this point has a large hinge fracture that runs approximately half the length of the edge, from the tip to midway down the point. This hinge fracture averages 2.73 mm from the edge. Knapping occurs beneath this large hinge fracture. A second hinge fracture immediately below the first speaks to the difficulty of knapping harder stones such as Knife River Flint. Twelve flake scars, totaling 18.80 mm in length, make up the sharpened edge. This artifact measures 18.91 mm in length, 13.15 mm in width, and 3.93 mm in thickness. The tip angle is 61°.

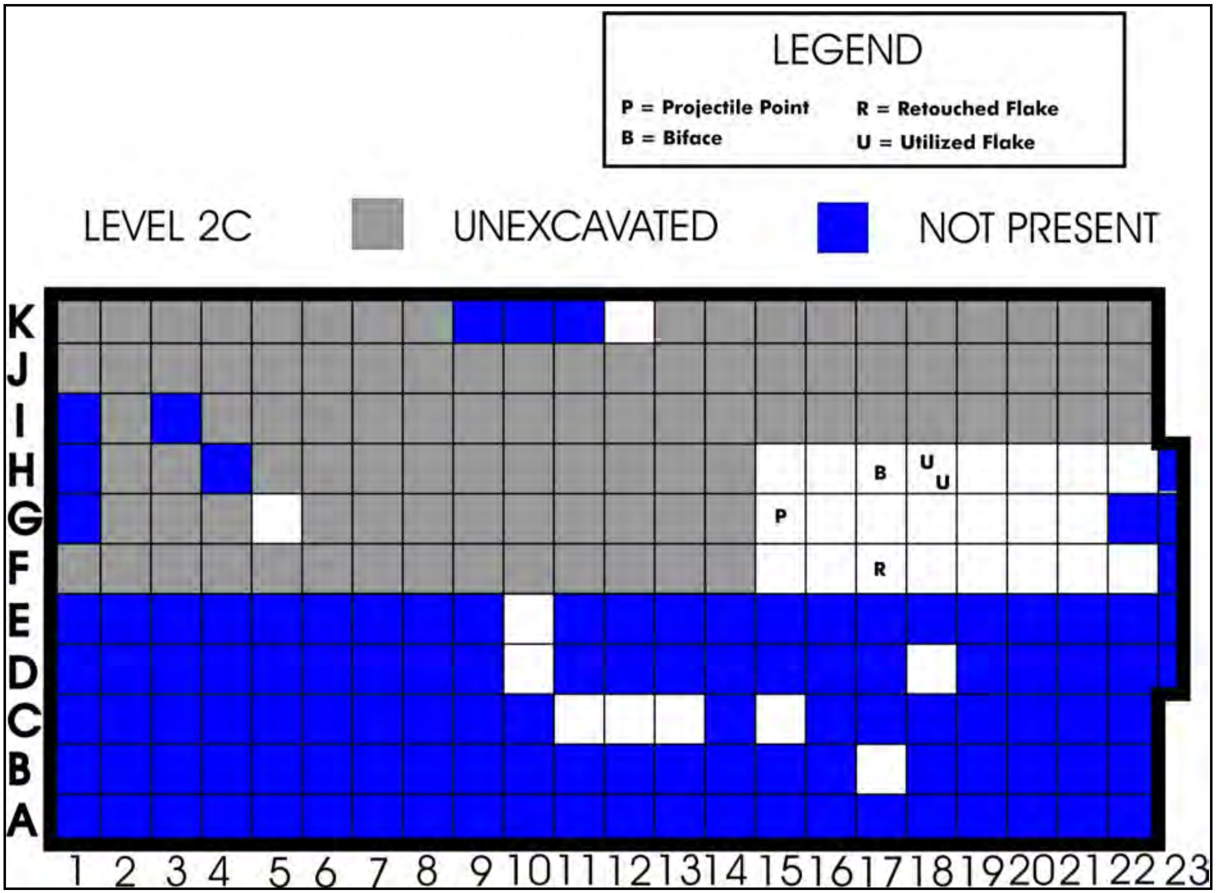


Figure 8.4-1: Distribution of Lithic Tools in Level 2C

8.4.1.2 Biface

DlLg-33:08A/22952 is a broken quartzite biface which occurred in Unit H17. The measurements for this tool are delineated in Table 8.4-3. The artifact is depicted at twice actual size (Plate 8.4-2). This section of a biface is broken on both ends such that a section of one working edge and a very small section of the opposite edge exists as well. This second edge is only 5.38 mm long and will not be discussed as it is such a small area that no real information is recoverable from it. The primary working edge has had seven flakes removed from it, ranging from 3.83 mm to 6.33 mm. Six of these flakes terminate in hinge and step fractures. On the dorsal face, there is a ridge of hinge and step fractures following the same general curve at the working edge; it is most likely that this ridge consists of the original shaping flakes that created the working edge. The ridge is from 7.24 mm to

10.39 mm in depth, measuring from the edge into the body of the tool. Further sharpening flakes make up the remainder of this edge.

Plate 8.4-2: Both Sides of DlLg-33:08A/22952

8.4.1.3 Retouched Flake

A retouched flake, DlLg-33:08A/21857, was recovered from Unit F17. The measurements are in Table 8.4-3. This KRF tool is unusual in that, although it is very thin at 1.7 mm, it has been knapped on three edges and is drill-shaped. It is, however, much too thin to withstand any twisting or boring. An interesting conjecture is that this could have been a bloodletting (phlebotomy) tool, for medicinal purposes. Flaking on this retouched flake is unifacial. It occurs on the ventral face at the proximal end on the left edge, moves to the dorsal edge 8.0 mm from the proximal base, and continues to the tip of the tool for 10.8 mm. From the tip of the tool along the opposite edge, the knapping begins on the ventral face for 9.0 mm (this knapping creates a shoulder in the outline) and moves to the dorsal face, continuing for 16.5 mm to the base of the tool. Flake scars range from 0.7 mm to 1.5 mm.

8.4.1.4 Utilized Flake

Two utilized flakes were recovered and their measurements are outlined in Table 8.4-3. DlLg-33:08A/23050, a Denbeigh Point Chert utilized flake recovered in Unit H18, is being described as heat treated due to several 'potlids' on the surface of the faces. Only a very small section of the edge survives as there are breaks on each side of the working edge. Some slight polish is visible on the tool edge. No flake scars are visible on this tool.

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
22952	biface	44.03	29.25	10.91	29.25	4.46	44
21857	retouch fl.	21.90	14.20	1.70	8.74	0.08	32
23050	utilized fl.	18.90	13.20	4.60	10.80	0.00	50
23051	utilized fl.	31.00	22.90	8.70	20.50	3.40	33

Table 8.4-3: Measurements of Knapped Tools from Level 2C

DlLg-33:08A/23051 is a chert utilized flake from Unit H18. This utilized flake has no real polish on the edge, but this is as much due to the material as anything else. Numerous conchoidal flakes run all along the edge, but other than the presence of those conchoidal flakes there is not much else to demonstrate this tool's useage.

8.4.2 Detritus

Detritus consists of waste material that results from the manufacture of a stone tool. The large piece of stone that the detritus comes from is called a core and the pieces that are removed from the core are called flakes.

8.4.2.1 Cores

A chert core (DlLg-33:08A/21378) was recovered in Unit F18. It weighs 11.1 grams. This core has been exhausted. Most faces are hinge or step fractured to the point that they can no longer provide flakes. One face is extremely flat and could provide more flakes, but the core is not very large overall and the combination may have been the reason for this core's abandonment.

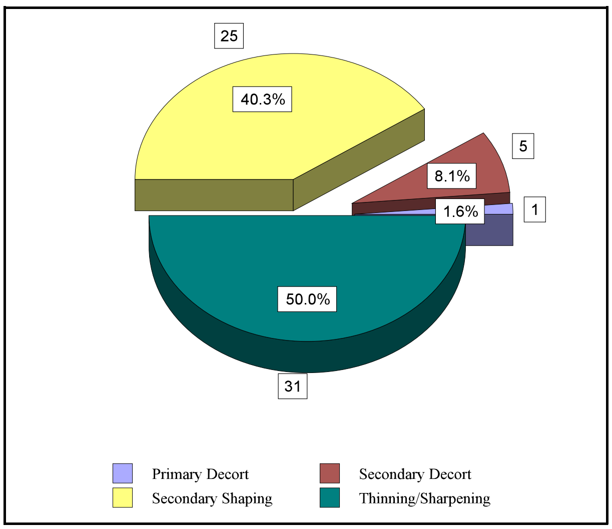
8.4.2.2 Flakes

Flakes are the byproducts of the tool manufacturing process and represent different stages of the process. The assemblage from Level 2C has representations of four of the five categories (Table 8.4-4, Figure 8.4-2).

A total of 62 flakes were recovered from Level 2C. By amount, these are fairly evenly split between thinning/sharpening at 50.0% and secondary shaping at 40.3%, but by weight secondary shaping represents 51.8% of the assemblage and thinning/sharpening makes up a mere 9.4% of the total weight. This is explained by the fact that many more thinning/sharpening flakes are required to reduce a working edge compared to the relatively few but larger flakes that are removed during secondary shaping.

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	1	4.6
Secondary decortication	5	20.3
Secondary shaping	25	33.2
Thinning/sharpening	31	6.0
TOTAL	62	64.1

Table 8.4-4: Frequency of Types of Recovered Flakes from Level 2C



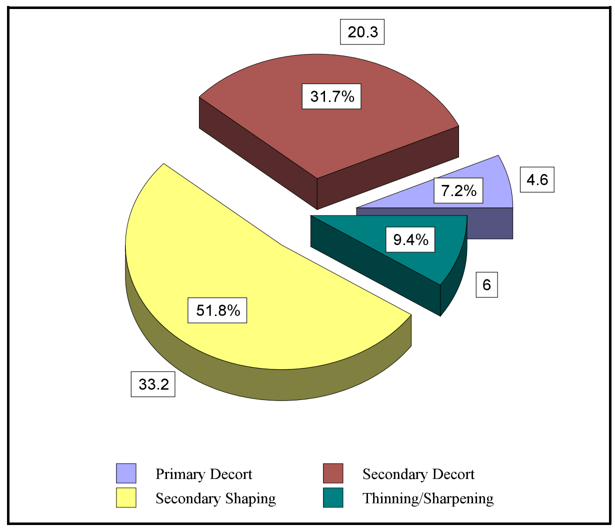


Figure 8.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

Flakes are numerically concentrated in Unit E10 where 42 flakes were recovered (Figure 8.4-3). Unit D10 contains nine flakes. These two units combined encompass the vast majority of flakes from this level. Unusually, there is no hearth associated with this concentration, but the unexcavated area of the F line may well have more to reveal. There is a secondary concentration of eight flakes surrounding the hearth which is located in Unit G17.

There are only four different lithic materials among the flake assemblage for this level (Table 8.4-5 Figure 8.4-4). They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes.

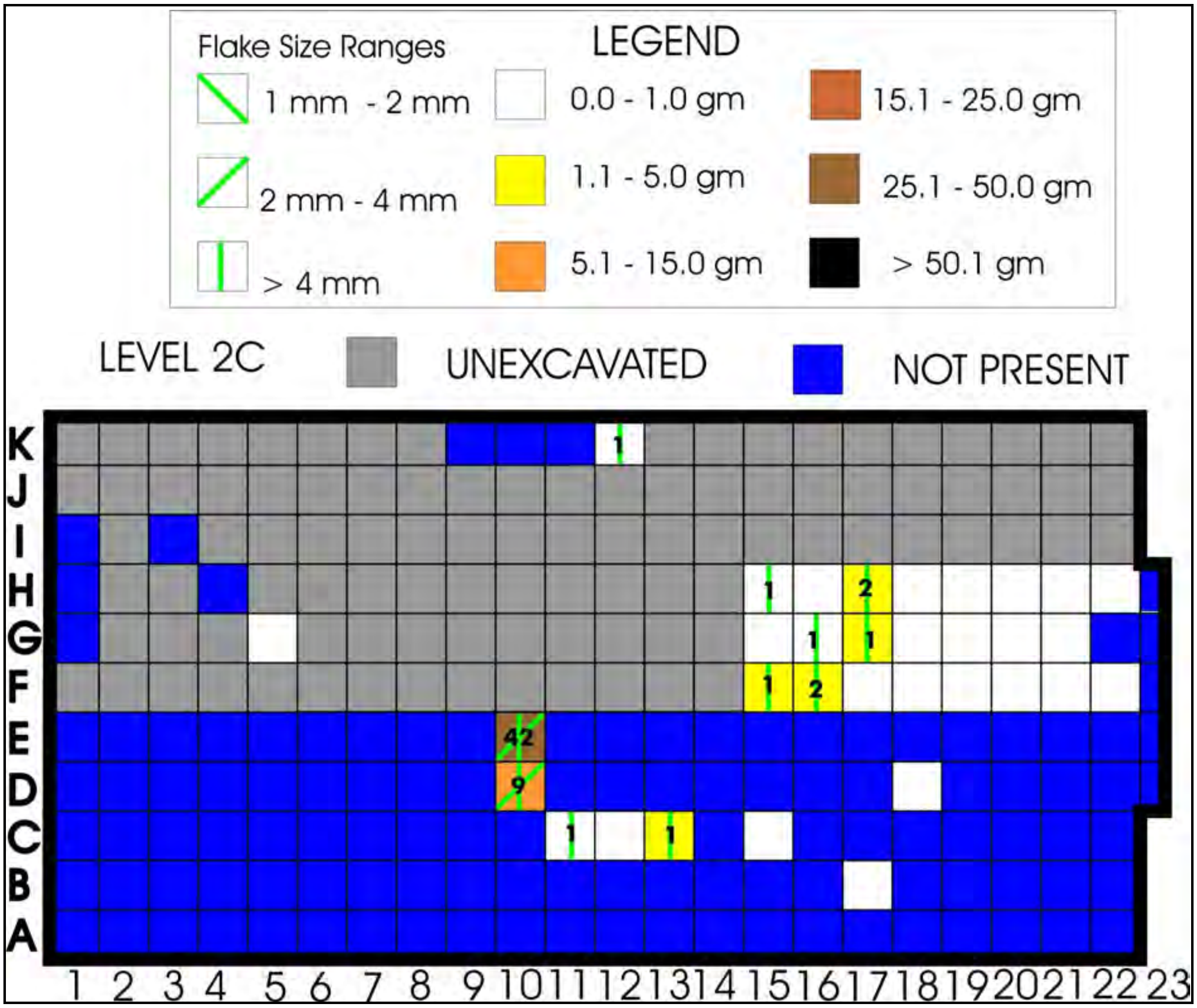


Figure 8.4-3: Distribution of Flakes in Level 2C

MATERIAL	QTY	%	WT	%
Knife River Flint	3	4.84	2.9	4.52
Chert (Undifferentiated)	11	17.74	16.5	25.74
Selkirk Chert	16	25.81	9.7	15.13
Swan River Chert	32	51.61	35.0	54.60
	62	100.00	64.1	99.99

Table 8.4-5: Frequency of Level 2C Flakes by Material Type

While frequency counts in very small samples (only 62 flakes in this assemblage) can be suspicious, the majority of flakes from this level are Swan River Chert, outweighing undifferentiated chert by a large amount. Swan River Chert is over 50% of the material by weight and amount. Swan River

Chert is accessible via a few days travel from the site by water. The distribution of material types across the excavation area is shown in Figure 8.4-5.

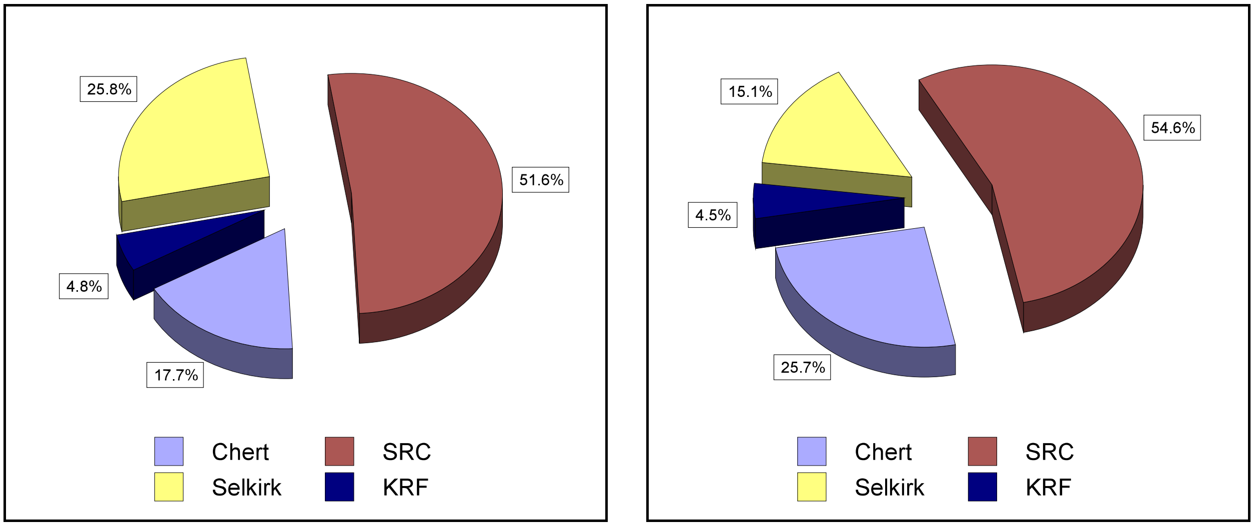


Figure 8.4-4: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

8.4.3 Natural Object Modified

Only two modified natural objects were recovered from Level 2C. One fragment of granite FCR (DlLg-33:08A:21993) was recovered from Unit G16. It weighs 36.7 grams. A limestone hearthstone occurred in Unit E10. It weighs 5.7 grams.

8.4.4 Natural Object Unmodified

No unmodified natural objects were recovered.

8.4.5 Summary

A total of five tools and a relatively minimal quantity of manufacturing detritus were uncovered in Level 2C. There are not enough tools to build an accurate picture of the lifeways of the people that inhabited this site.

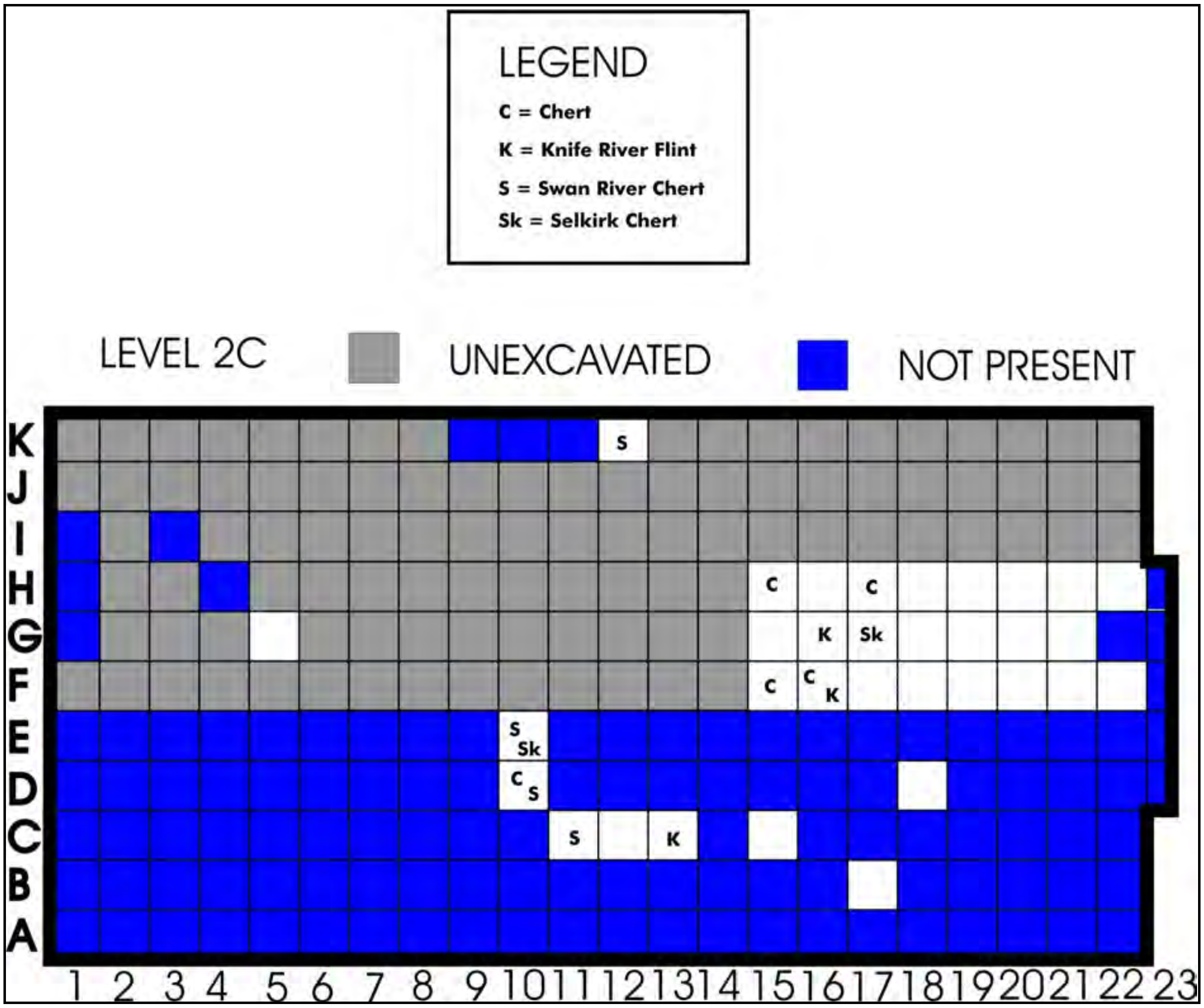


Figure 8.4-5: Distribution of Flakes by Material Type

8.5 Botanical Remains

Forty charcoal samples, comprising 123 specimens were collected from Level 2C (Table 8.5-1). Maple was abundant with elm frequent. Oak and ash were occasional. There was no poplar or willow wood in this level. Graphically, the frequency of the taxa is depicted in Figure 8.5-1. Maple overwhelms the other three taxa with elm a distant second. Oak and ash are minimally present.

Two hearths were identified (Figure 8.2-1) and both were sampled for charcoal (Table 8.5-2). One of the hearths, in Unit C12, had only one sample with maple wood. The other amorphous hearth in the northeastern part of the excavation area, had eight samples that contained maple, elm, and oak wood.

TAXON	SAMPLES	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	3	3	5.00
Elm (*Ulmus*)	8	19	31.67
Maple (*Acer*)	10	35	58.33
Oak (*Quercus*)	2	3	5.00
Poplar (*Populus*)	-	-	-
Poplar/Willow	-	-	-
Willow (*Salix*)	-	-	-
Diffuse Ring Pattern	5	7	
Semi-ring Porous	-	-	
Hardwood	-	-	
Unidentified	12	56	
	40	123	

Table 8.5-1: Frequency of Charcoal Recoveries

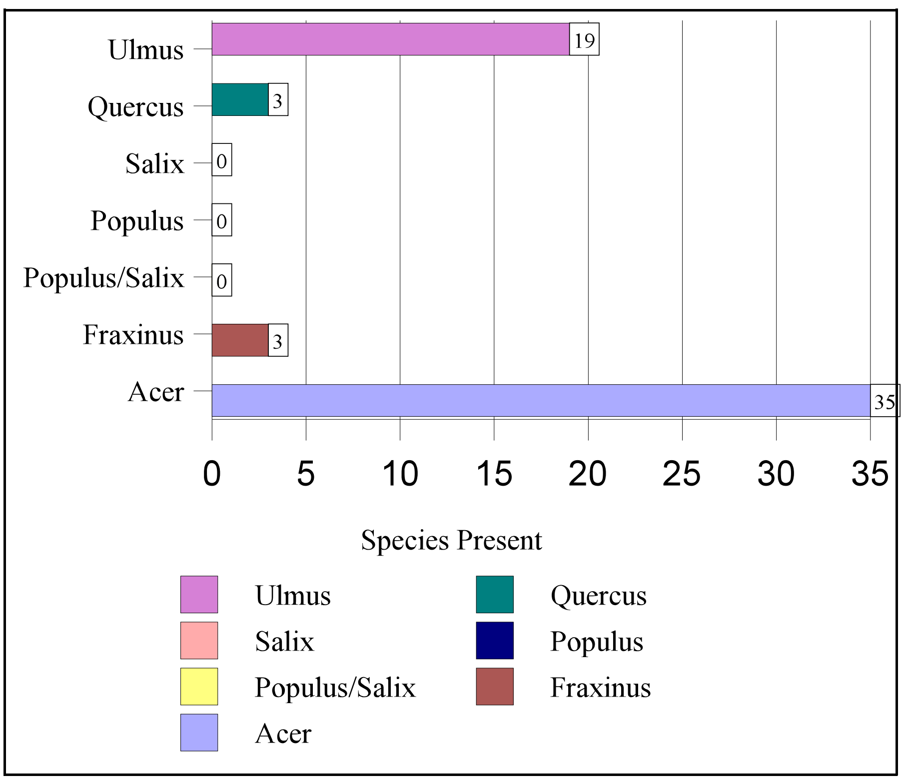


Figure 8.5-1: Frequency of Identified Taxa

HEARTH	C12	G17
NUMBER OF SAMPLES	1	8
Ash (*Fraxinus*)	-	-
Elm (*Ulmus*)	-	5
Maple (*Acer*)	1	5
Oak (*Quercus*)	-	2
Poplar/Willow	-	-
Willow (*Salix*)	-	-
Diffuse Ring Pattern	1	2
TOTAL	2	14

Table 8.5-2: Frequency of Identified Charcoal Recoveries at Hearth Locations

An incomplete charred American hazelnut shell (DlLg-33:08A/22955) (*Corylus americanus*) was present in Unit H17. A fragment of uncharred coniferous wood (DlLg-33:08A/13716) was found in Unit G5. This specimen is probably intrusive and would derive from wood used during the project for walkways or stakes.

8.6 Mammal, Avian, and Reptilian Remains

8.6.1 Mammal Butchering Remains

There was considerably less material recovered from Level 2C. A total of 230 artifacts, weighing 138.5 grams, were recovered. The undetermined category is predominate in both quantity (Figure 8.6-1) and weight (Figure 8.6-2). The larger elements among the medium and medium/large mammals results in the frequency by weight being greater than that by quantity.

Most of the materials from Level 2C are located from Rows F-H and Columns 15 East - 22 East. There are a few outlying areas where Level 2C was isolated, but these represent the smaller portion of the materials.

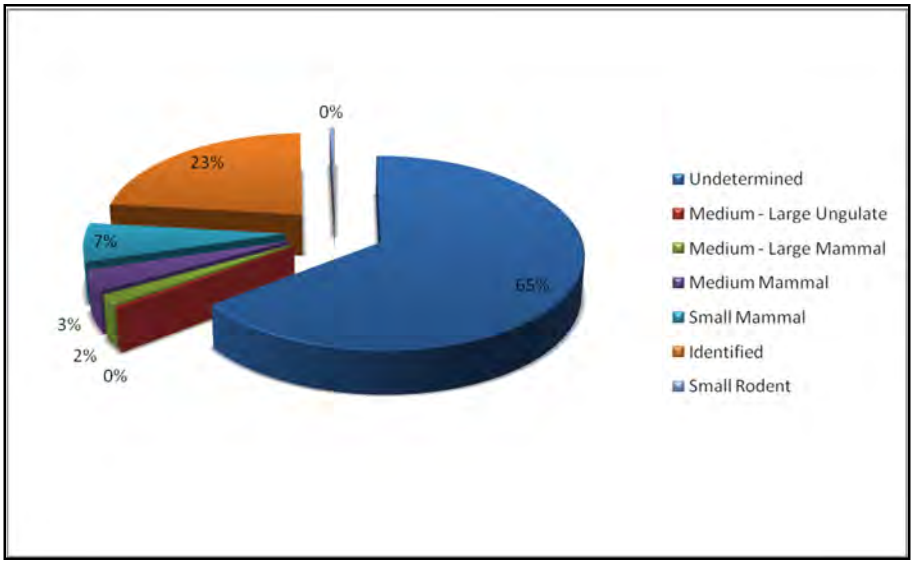


Figure 8.6-1: Frequency of Mammal Remains by Quantity

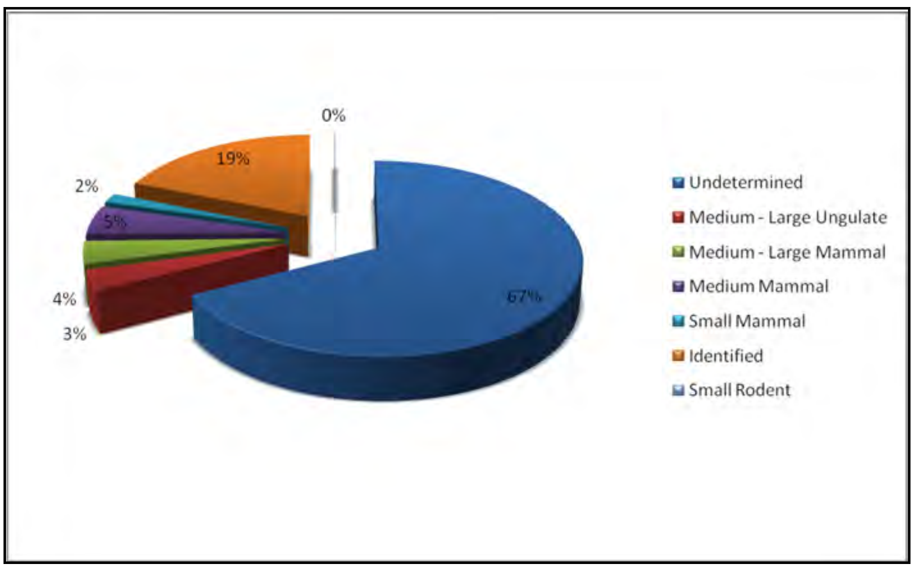


Figure 8.6-2: Frequency of Mammal Remains by Weight

There appears to be two distinct areas of activity being shown. Both are located around the two hearths in this level (Figure 8.6-3). The hearth in the northeastern portion of the excavation area is surrounded by the majority of the faunal materials in Level 2C. The characteristic drop-off, similar to Levels 2, 2A, and 2B, occurs at the eastern edge of the excavation.

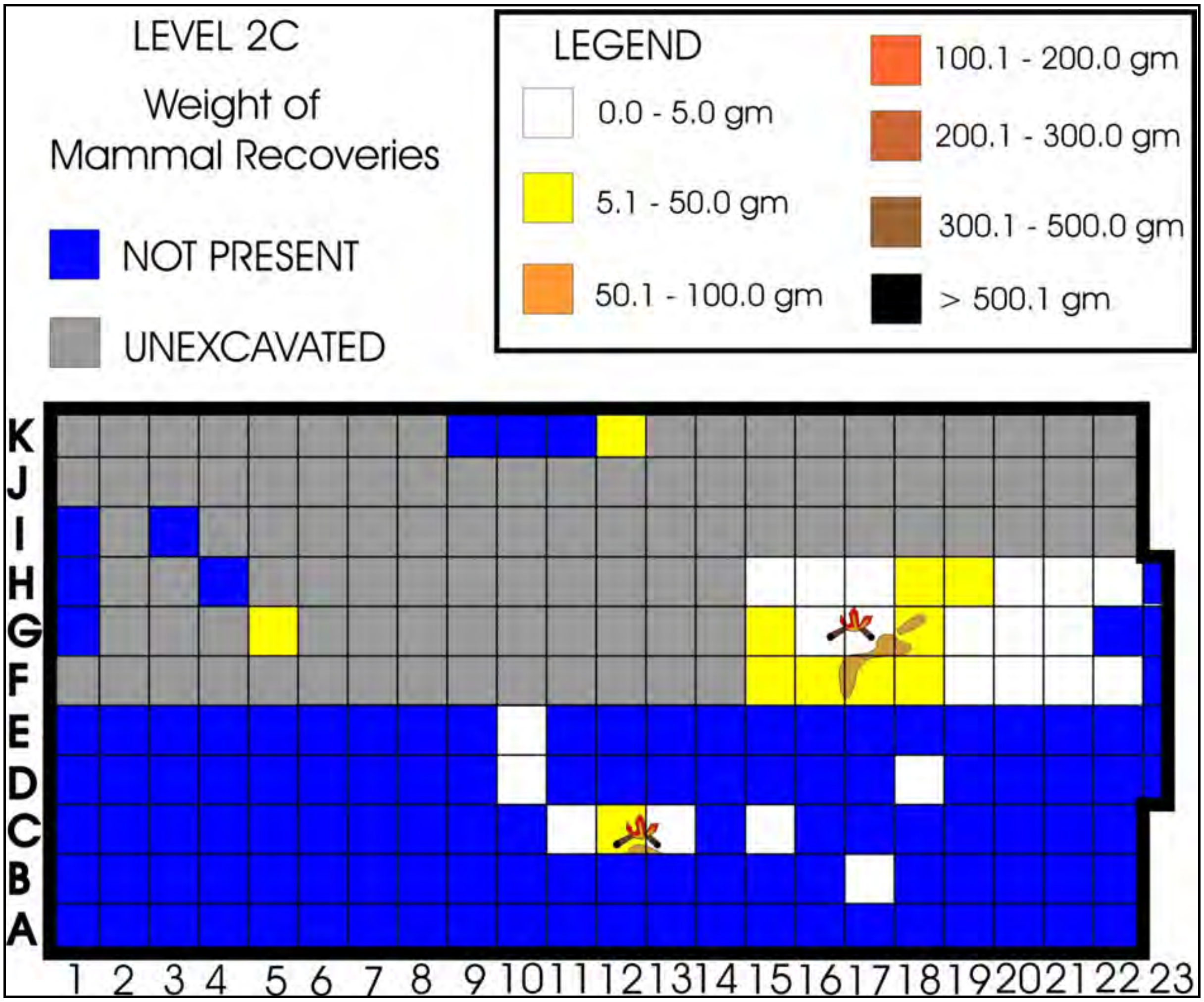


Figure 8.6-3: Distribution of Mammal Butchering Remains in Level 2C in Relation to Hearths

There does not appear to be any particular distribution of the mammal remains between the two hearths (Figure 8.6-4). Both areas have some of everything.

Within remains that could not be identified to species, there are some medium/large mammal specimens. All of these elements were vertebra and rib bones. Rabbit appears to have been on the menu with 90% of the identified materials having come from them both by quantity (Figure 8.6-5) and by weight (Figure 8.6-6). Muskrat ranks second by either criterion.

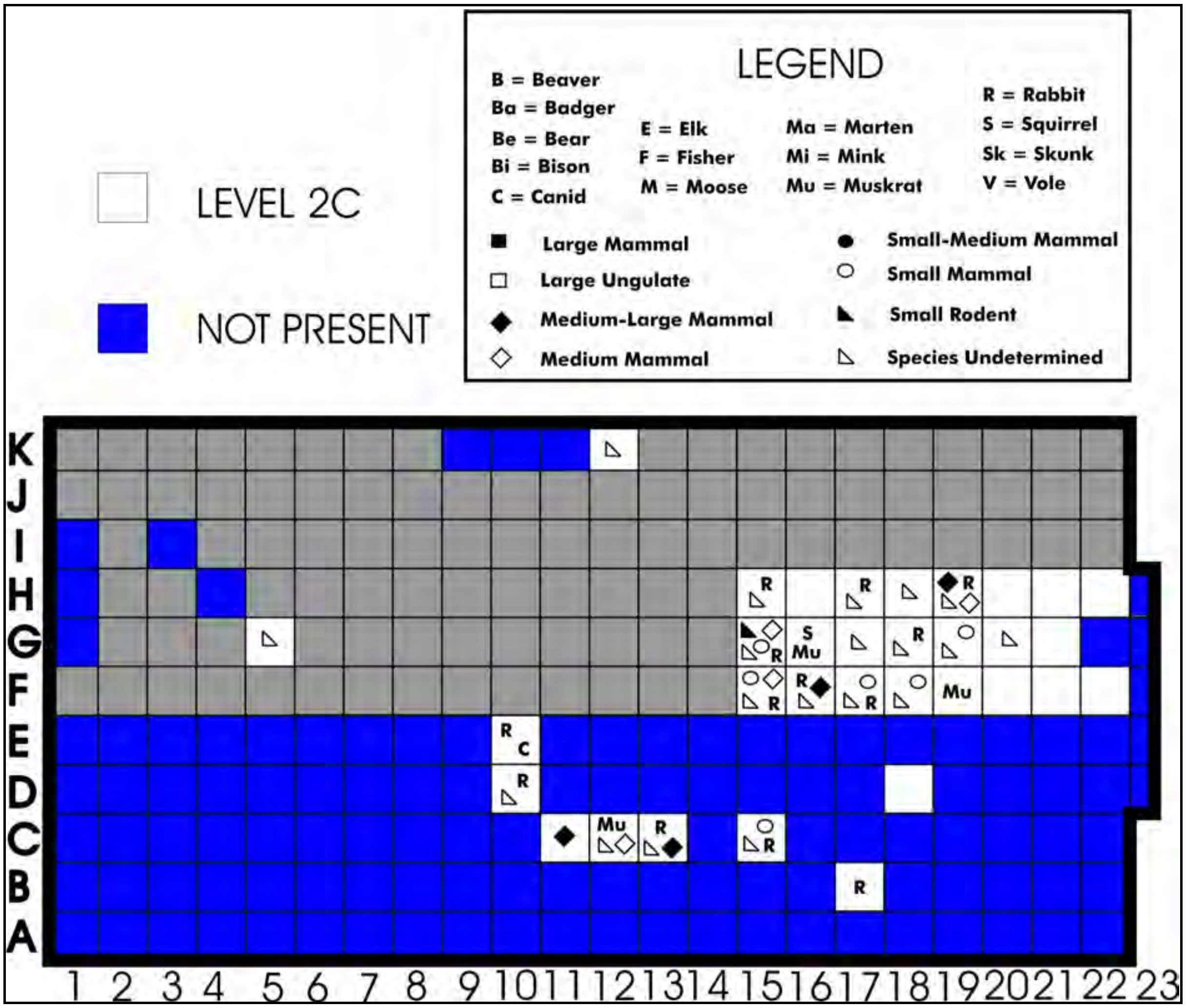


Figure 8.6-4: Distribution of Identified Taxa in Level 2C

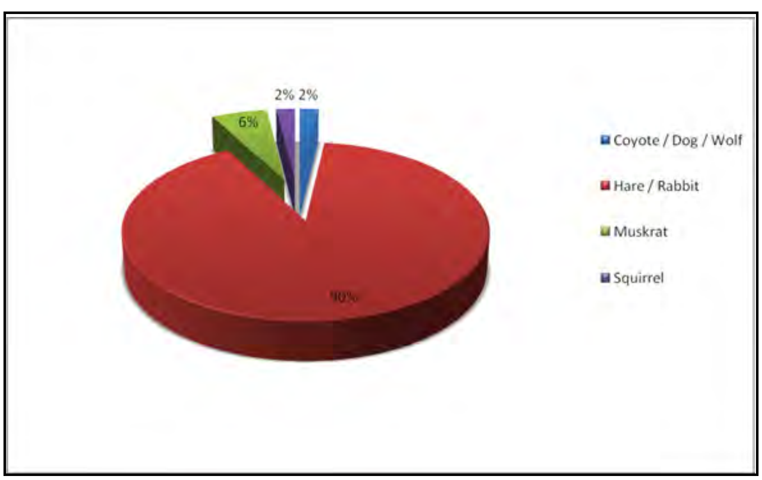


Figure 8.6-5: Frequency of Mammal Remains by Quantity

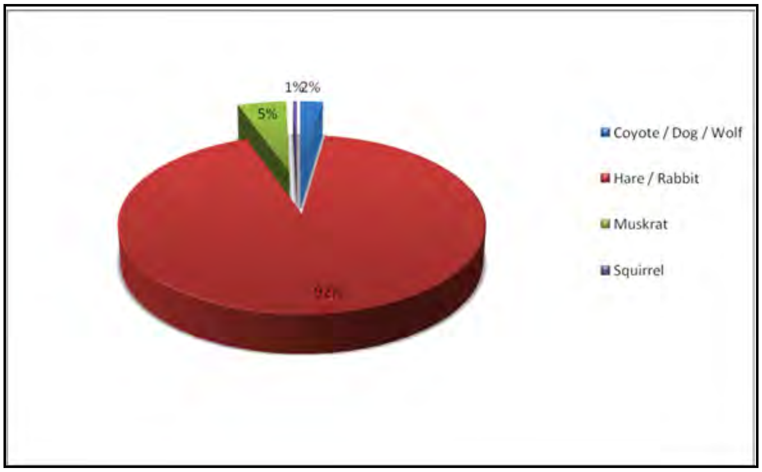


Figure 8.6-6: Frequency of Species by Weight

As can be seen in Table 8.6-1, the remains represent at least four different rabbits. There are trace elements of canid and squirrel.

SPECIES	MNI
Coyote/dog/wolf (Canidae)	1
Hare/Rabbit (Lagomorpha)	4
Muskrat (*Ondatra zibethica*)	1
Squirrel (*Sciurus* sp.)	1
Total	7

Table 8.6-1: Minimum Numbers of Identified Species

8.6.2 Avian Butchering Remains

The avian remains from Level 2C have a similar distribution as the mammal remains (Figure 8.6-7). Most of the remains are in close proximity to the hearths. As usual, many of these pieces are small and fragmented. It was possible to determine the species on some materials in Level 2C. There were three elements identified to swan, all located in Unit B17. There are no other signs of Level 2C in this area so it is difficult to gain any understanding for the context of these materials. These materials do coincide with some mammal specimens and may indicate an isolated spot where materials were dropped.

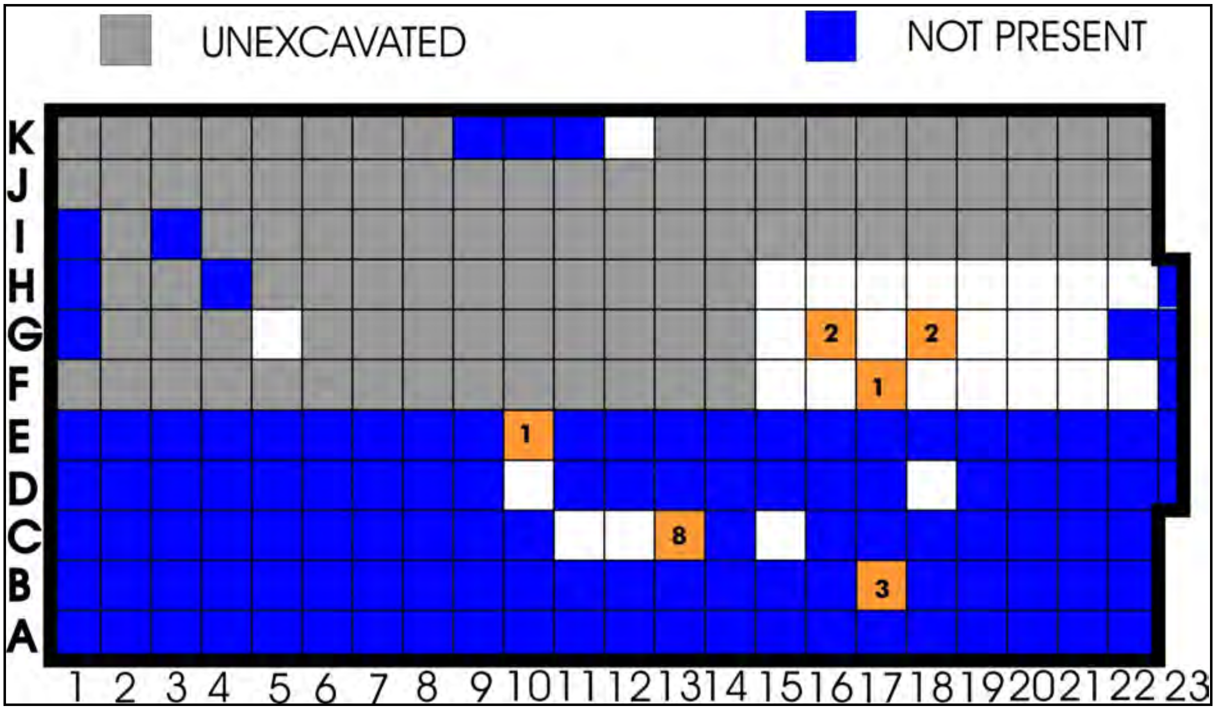


Figure 8.6-7: Distribution of Avian Butchering Remains in Level 2C

8.6.3 Summary

There is very little in the mammal and avian assemblages to provide any real discussion on the nature of this occupation. The vast majority of the level is limited to one particular area around the northern hearth. It is interesting that there are no tools within Level 2C. It is possible that the two hearths areas excavated were only actually peripheral camp areas and most of the major activity occurred in a location that was not excavated or might be represented, to a degree, by some of the materials from the western block (five metres by 5 metres square) where the sub-levels were stratigraphically combined. Another possibility is that this particular level represents only a very short occupation and that the people at this camp soon moved on to another location and left only a few isolated traces behind.

8.7 Fish Remains

8.7.1 Artifact Recoveries

There are 98490 artifacts (619 catalogued assemblages) in Level 2C which have been identified as fish remains. Of this sample, 97499 specimens (99.00%) were identified as to their element, excepting undetermined bone (N = 386) and unidentified bone (N = 605). However, 96726 of those specimens (i.e., 98.21% of the entire artifacts from this level) were either scale (N=95638), rib/ray/spine (N=533), or vertebra (N=555) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

8.7.2 Species Determination

The remaining 773 specimens (0.78%) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 8.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

8.7.3 Analysis

There are eight different taxa present in the sample. Because of the gross similarity between certain elements within Order Perciformes and its Family Percidae, identification of those elements could only be made to those higher taxonomic levels. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 8.7-2. The results are further illustrated in Figure 8.7-1. The most significant species is *Aplodinotus grunniens* (freshwater drum) with respect to MNI frequencies, followed by Ictaluridae spp.(catfishes) and Catostomidae spp. (suckers) and in lesser numbers by *Lota lota* (burbot), *Sander* sp. (sauger/walleye), *Acipenser fulvescens* (sturgeon), and *Hiodon* sp. (goldeye/mooneye). The one Perciformes could be any of the Order, including sauger/walleye, freshwater drum, yellow perch among other species; and the one Percidae could be sauger/walleye, yellow perch, or some other species in the Family. However, neither element would drastically alter the MNI counts for any of the possible species, save yellow perch, which is not represented in this level.

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Perci-formes	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Lota lota	Fish	Total
Angular	1										1
Angular; Articular; Retroarticular	1										1
Angular; Retroarticular	18								2	5	25
Articular	3										3
Articular; Dentary; Retroarticular	1										1
Basioccipital	3										3
Ceratohyal	11						7				18
Cleithrum	35	24								3	62
Cleithrum; Coracoid	1										1
Coracoid	29										29
Dentary	24	7			1	1	2				35
Epibranchial										1	1
Epihyal	5										5
Exoccipital	1										1
Frontal	9										9
Hyomandibular	18	15			2						35
Hypohyal	6									1	7
Interoperculum	3										3
Lateral Ethmoid	4										4
Maxilla		15					2			3	20
Metapterygoid	9										9
Operculum	8	16				2				1	27
Otolith							106				106
Palatine	3										3
Parasphenoid	5			3							8
Pharyngeal Arch		11									11
Pharyngeal Plate, Lower							4				4
Pharyngeal Plate, Upper							12				12
Posttemporal							4			5	9
Premaxilla					1		17				18

ELEMENT/TAXON	Ictalur-idae	Catosto-midae	Perci-formes	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Lota lota	Fish	Total
Preoperculum	12										12
Preoperculum; Quadrate	5										5
Prootic	2										2
Pterotic	4										4
Quadrate	5	3	1	1	2					1	13
Ray, Branchiostegal										2	2
Rib / Ray / Spine										533	533
Scale										95638	95638
Scapula										3	3
Scute								8			8
Sphenotic	8										8
Spine	6						1			1	8
Spine, Dorsal	33						49			29	111
Spine, Dorsal; Pterygiophore							1				1
Spine, Modified First	1										1
Spine, Pectoral	21						12				33
Spine, Pterygiophore	1						51				52
Spine, Second Dorsal	9										9
Suboperculum										1	1
Supracleithrum	9										9
Supraethmoid	7										7
Supraoccipital	11										11
Undetermined Bone	2									384	386
Unidentifiable Bone										605	605
Urohyal	2										2
Vertebra	4									551	555
TOTAL	340	91	1	4	6	3	268	8	2	97767	98490

Table 8.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	340	47.03	6	8.22
Catostomidae (2)	91	12.59	6	8.22
Perciformes (3)	1	0.14	1	1.37
Percidae (4)	4	0.55	1	1.37
Sander (5)	6	0.83	1	1.37
Hiodon (6)	3	0.42	1	1.37
Aplodinotus (7)	268	37.07	54	73.97
Acipenser (8)	8	1.11	1	1.37
Lota (9)	2	0.28	2	2.74
TOTAL	723	100.02	73	100

Elements Used for MNI Determination

1. Angular; Retroarticular (Right)
2. Maxilla (Right)
3. Quadrate (side Undetermined)
4. Quadrate (Right)
5. Dentary (Left)
6. Dentary (Right)
7. Otolith (Right)
8. Scute
9. Angular; Retroarticular (Left)

Table 8.7-2: Species Determination

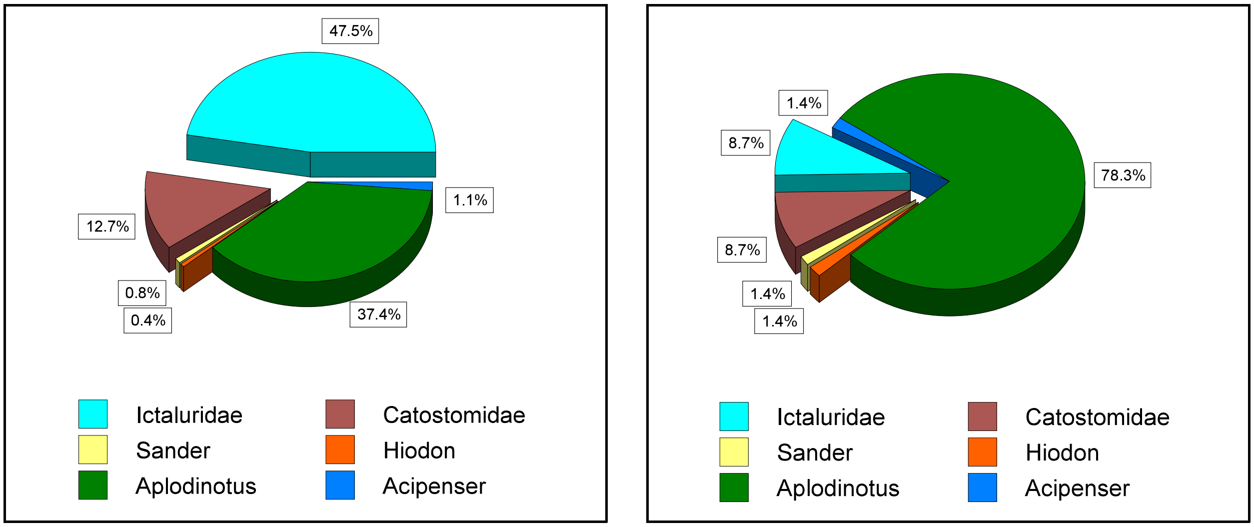


Figure 8.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The NISP counts do suggest that some species may have a greater significance, but it is possible that this represents more of a bias in the archaeological record due to different deterioration rates, and thus better preservation of certain species' elements, as well as the fact, particularly with respect to catfishes (the most frequently identified specimens), that the large, more diagnostic elements are easier to identify during the laboratory analysis phase and therefore tend to be over-represented in the sample. This is borne out in the MNI counts where the catfishes are equal in numbers to the suckers (six individuals each), but catfishes have almost four times as many elements identified as the suckers. Furthermore, freshwater drum is represented in greater quantities with respect to the number of individuals and has a significantly higher number of specimens (elements) identified than most of the other species.

The distribution of the fish remains by species is shown in Figure 8.7-2. No fish remains were found at all in Unit H20. No explanation can be given at this time for the unusual absence here when fish remains are found elsewhere throughout this entire level, including the surrounding units. Not unusual, though, is that freshwater drum, catfishes, and suckers, the most prominent fishes represented in the NISP and MNI calculations, are identified in almost every unit in this level, save for a couple of interesting variances. For example, only catfishes can be positively identified in Units F20, G17, and H22. Yet, other species could possibly be represented in the undetermined elements that were catalogued in some of these units but were not identified as to species and/or element due to the limitations in the study of the fish remains as previously discussed. Only freshwater drum was identified in Unit G21, but of the seven (7) elements recovered there, only two (2) are undetermined bone and the rest are all freshwater drum. It is reasonable to assume that the two undetermined bone (DlLg-33:08A/22156), with a weight of less than 1gram, are likely from that species as well.

Not surprisingly, most of the variation in the species present is found in the immediate area of the large hearth feature in Units F16, F17, G17, and G18. The sturgeon remains (with an MNI count of 1) are concentrated in adjacent Units F15, F16, and G15, suggesting a localized deposit of the individual. Similarly, the burbot remains are only found in Units H18 and H19, which would account for the two individuals represented in the MNI calculation. Goldeye/mooneye are found in three units: F17, G15, and H15. Only one individual was counted for this species, but because Unit F17 is separated from the other two adjacent units by the hearth, there may be more than one individual present that would account for this distancing. This may also be the case for sauger/walleye which too had an MNI of just one, but some remains were found on one side of the hearth, in Unit F18, and more in Units H17, H18, and H19. The Perciformes remains in Unit H16 could have come from the sauger/walleye individual in the next units over, or even the freshwater drum in the same unit. The Percidae elements in Unit H16, on the other hand, could be only from sauger/walleye, or from yellow perch but, as that species was not identified elsewhere in this level, it is reasonable to assume they are most likely from the sauger/walleye.

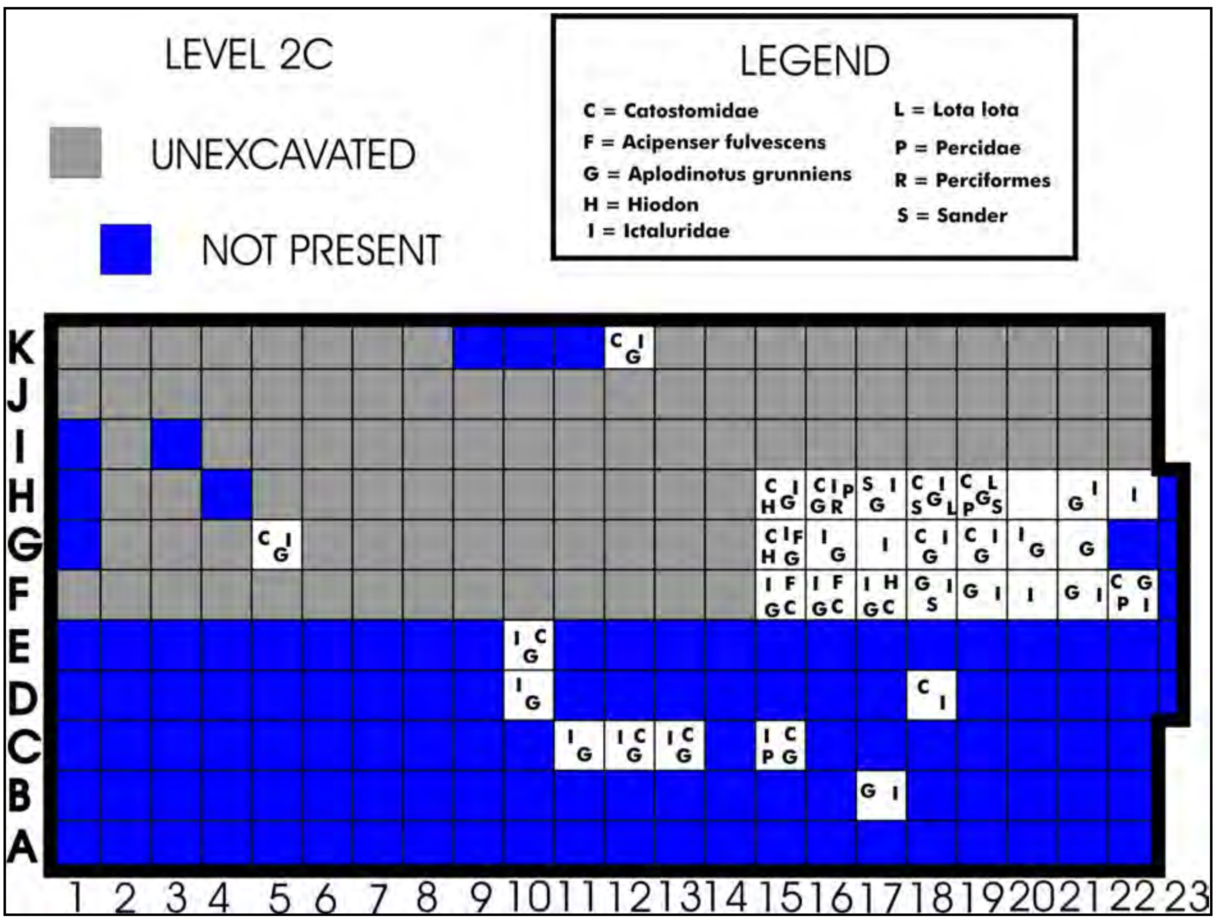


Figure 8.7-2: Distribution of Fish Remains by Species in Level 2C

8.7.4 Interpretation

Figure 8.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 2C. Although Unit E10 appears to have an enormous quantity of fish remains, it includes a collection of scales (DlLg-33:08A/7627) that contains a quantity of 87138 (estimated) specimens, weighing 697 grams. If this one assemblage is excluded, then the weight would only be marked as twenty (20) grams for that unit, which is comparable to the remaining units in this level. Unit F15 also has a scale sample (an estimated quantity of 8500 based on weight, which is 68 grams), and so it too would be reduced from 164 grams to a comparative weight of 97 grams. Having adjusted the weights accordingly, it can be seen that the most dense units by weight are centered around the two hearths in this level. Units C12 (53 grams) and C13 (127 grams) contain the one small hearth feature and also have all three major species in this level (freshwater drum, catfishes, and suckers).

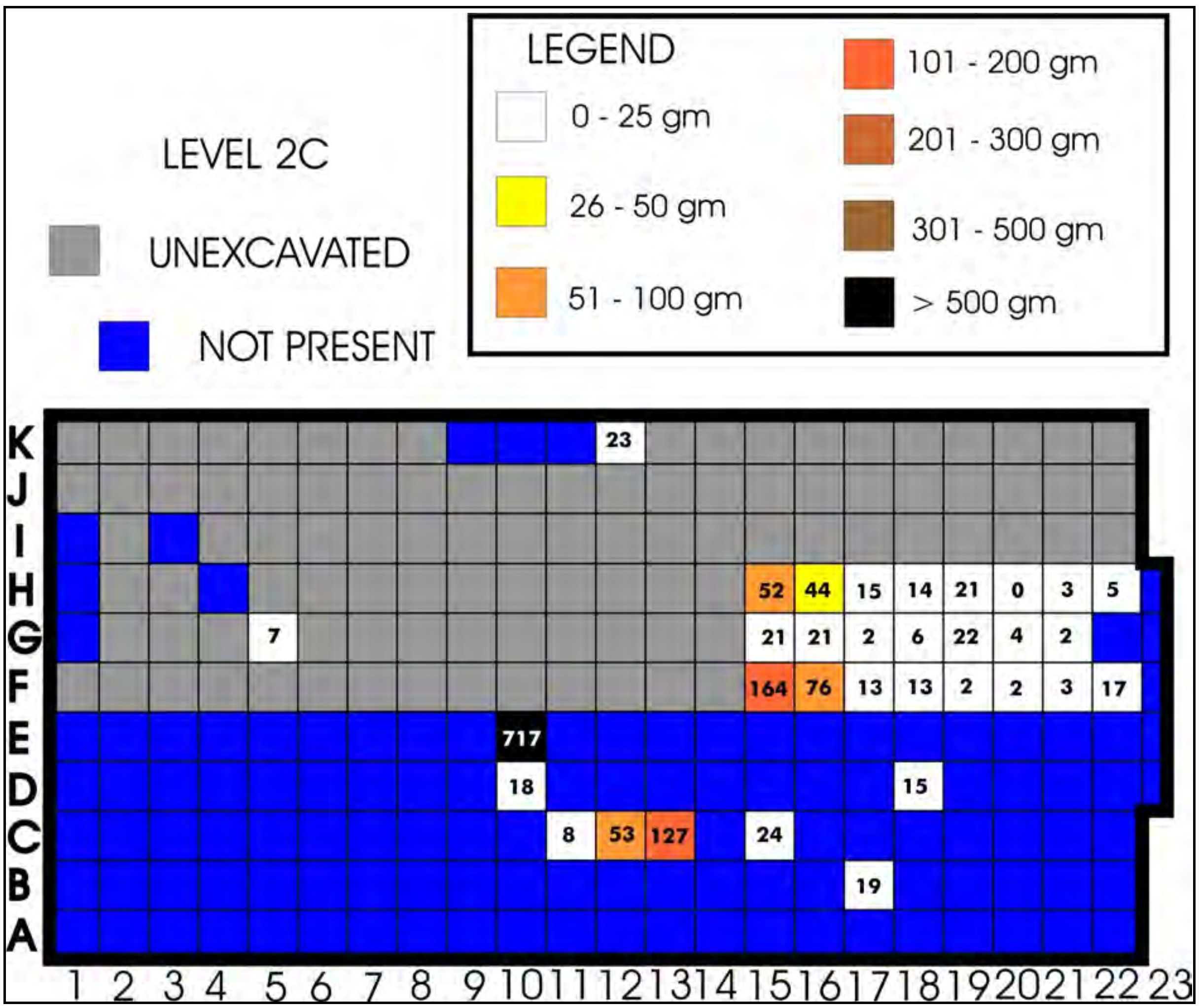


Figure 8.7-3: Distribution of Fish Remains by Weight

No cut marks or other cultural modifications were recorded on any specimens. However, five (5) artifacts were found to be charred by fire, but this represents a mere 0.01% of the total number of fish remains and therefore is not statistically significant. It is worth noting, though, that three (3) of these specimens are identified as freshwater drum elements (one otolith and two spines), while the other two (2) are unidentified fish bone. Two of the freshwater drum elements are from Unit G15 and the other is from the adjacent Unit G16, very near the large hearth feature excavated in Units F16, F17, G17, and G18 (Figure 8.2-1). The two unidentified fish bone that are charred come from

Units C11 and E10, close to a small hearth documented in Units C12 and C13. Because of the lack of any other charring, burning, or calcination of more of the fish remains, it is most likely that these five specimens were charred from incidental heat treatment and not as a result of intentional or direct firing of the fish during the processing stage.

8.8 Shellfish

There were 54 shell artifacts, recovered from Level 2C, representing butchering remains and naturally deposited specimens.

8.8.1 Butchering Remains

Seven of the 31 butchering remains were identifiable to species (Table 8.8-1). The remainder were identified as Unionidae.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	1	14.29	5.6	8.89
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	2	28.57	23.1	36.67
Pink Heel-Splitter (*Potamilus alatus*)	3	42.86	26.0	41.27
Maple-Leaf (*Quadrula quadrula*)	1	14.29	8.3	13.17
Pig-Toe (*Fusconaia flava*)	-	-	-	-
Three-Ridge (*Amblema plicata*)	-	-	-	-
	7	100.01	63.0	100.00

Table 8.8-1: Frequency of Identified Butchering Remains by Taxon

The distribution map, Figure 8.8-1, indicates no major concentrations in this level, with only a minor concentration occurring in the northeast portion of the excavation. This does coincide with a hearth that crosses over Units F17 to G18.

Four species were present in Level 2C. These are Black Sand-Shell, Fat Mucket, Pink Heel-Splitter, and Maple-Leaf (Figure 8.8-2). This assemblage contains the same species as those recovered from Level 2A. In Level 2C, Pink Heel-Splitter was predominant, with three specimens, while Fat Mucket had two valves. The two other species were represented by a single specimen.

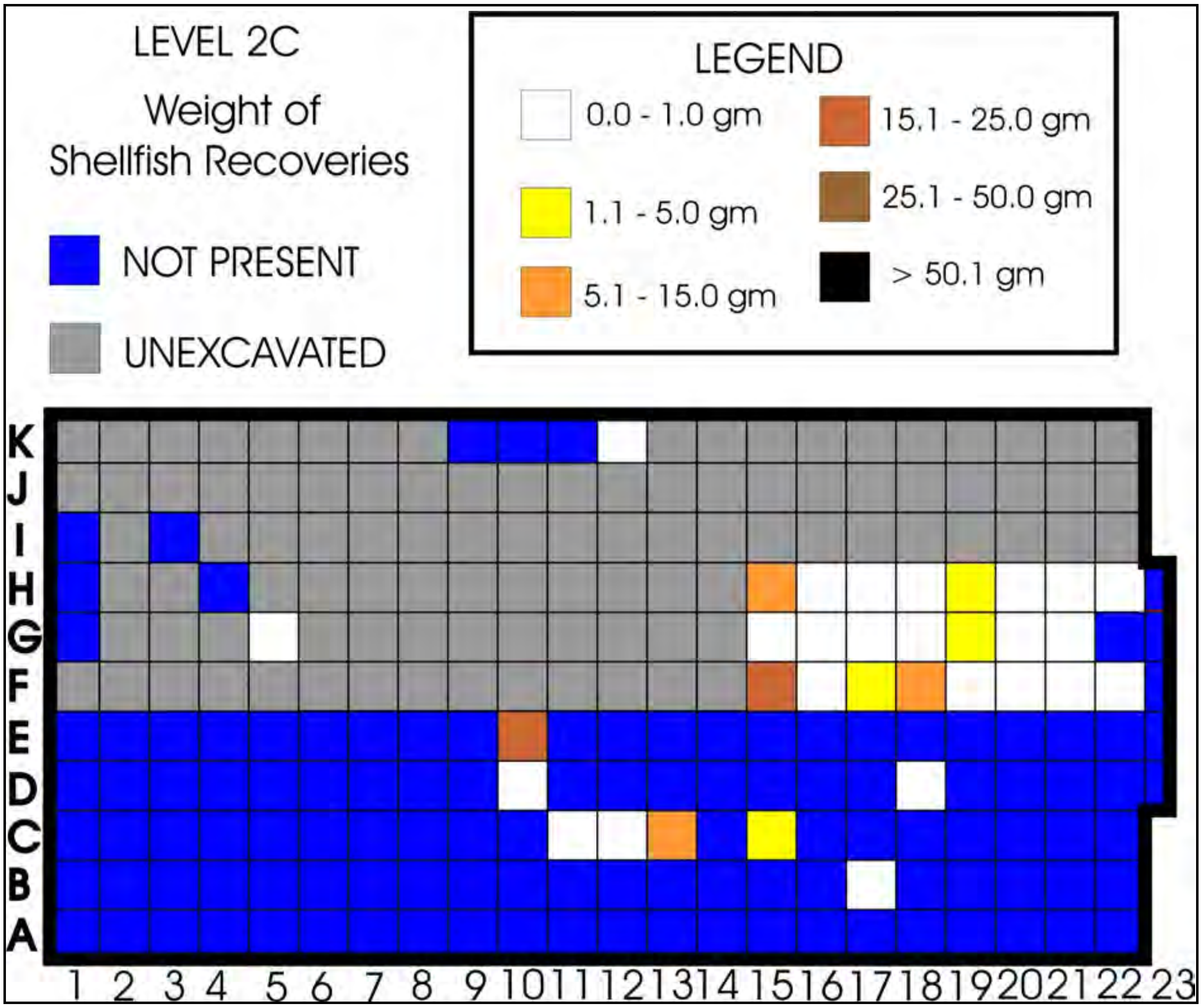


Figure 8.8-1: Density of Shellfish Recoveries

Four valves had evidence of charring. DlLg-33:08A/8923 consisted of three specimens that could only be identified to the Unionidae level. These artifacts were recovered from Unit C12. DlLg-33:08A/22214, from Unit H15, was a single Pink Heel-Splitter valve. The Unionidae were on the periphery of a hearth, while the Pink Heel-Splitter was a few units away from a hearth. None of the recovered shell specimens in Level 2C had hematite staining.

The Minimum Number of Individuals (MNI) is portrayed in Figure 8.8-3. Pink Heel-Splitter constitutes 49.2% of the assemblage, with Fat Mucket being second at 28.6%.

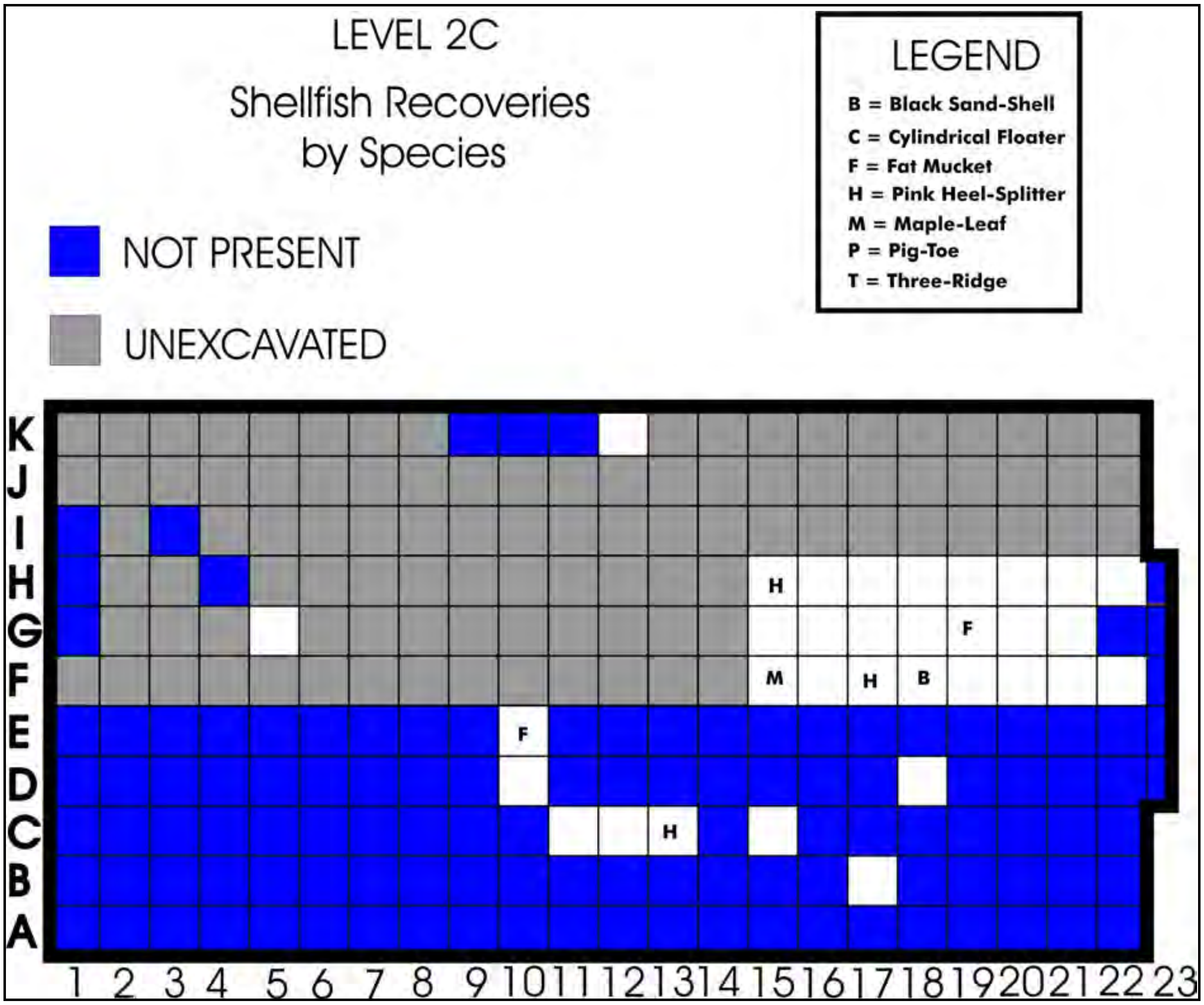


Figure 8.8-2: Frequency of Shellfish Recoveries by Species

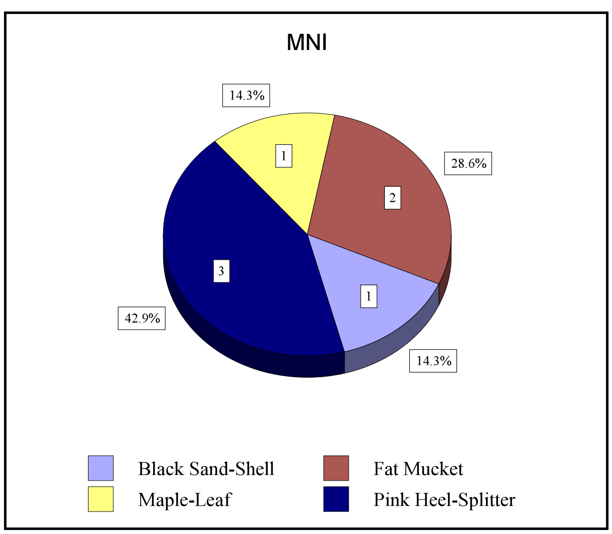


Figure 8.8-3: Frequency of Identified Taxa of Shellfish

8.8.2 Natural Shellfish

Twenty-three naturally deposited specimens (Table 8.8-2) were recovered from Level 2C. The recoveries are very sparse with the majority of the specimens occurring in the northeastern portion of the excavation area, again adjacent to the hearth that covers Units F17 to G18 (Figure 8.8-4).

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	11	47.83
Ramshorn Snails (Planorbidae)	9	39.13
Pea Clams (Sphaeriidae)	3	13.04
TOTAL	23	100.00

Table 8.8-2: Frequency of Naturally Deposited Shellfish

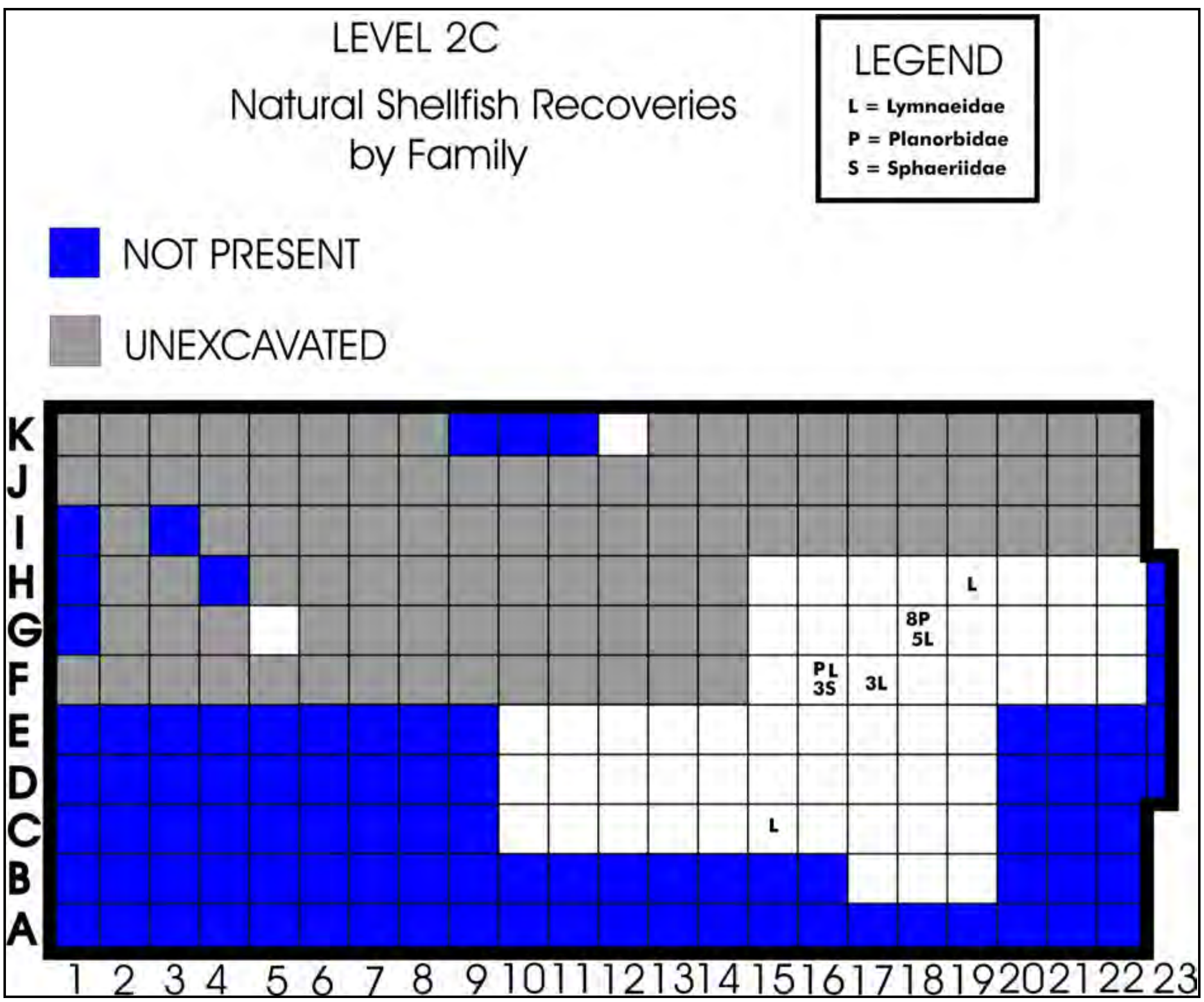


Figure 8.8-4: Location of Recoveries of Natural Shellfish in Level 2C

8.8.3 Summary

The number of recovered shell dropped in Level 2C, down to 54. The density is 1.64 artifacts per square metre. Only seven of the 31 butchering remains could be identified (22.58% of the butchering remains, 12.96% of the total shell). The same four species types recovered in Level 2A, Fat Mucket, Black Sand-shell, Pink Heel-Splitter, and Maple-Leaf , were also recovered in Level 2C. A minor concentration occurred in the northeast area of this level and it was associated with a hearth. The remainder of the density was scattered throughout. Lymnaeidae was the predominant species of natural shellfish, 11 of the 23 specimens recovered. Again, as with Level 2A and Level 2B, Level 2C may be a short-term habitation site.

8.9 Miscellaneous Recoveries

8.9.1 Soil Samples

A total of 33 soil samples were recovered. In addition to the soil matrix samples, samples were taken when circumstances warranted. These include four hearth samples. In addition, one sample of hearth clay and three samples of heat-modified clay were recovered.

8.9.2 Coprolites

The presence of domesticated dogs is inferred from the presence of numerous coprolites. Four coprolite samples were collected.

8.10 Level 2C Summary

Level 2C is has a much smaller footprint than the upper levels, occurring only in 33 units, mainly in the northeast corner of the excavation area. Only two hearths were identified, one of which is a sprawling elongated feature in the northeast and the other a small hearth in an isolated area.

The ceramic recoveries are scattered across the level with portions of six vessels being identified. All but one derive from higher levels. The sole vessel assigned to this cultural horizon was located in an isolated unit in the northwest portion of the area. Only five lithic tools were present—a projectile point, a biface, a retouched flake, and two utilized flakes. This could indicate that the campsite was primarily used during food procurement activities. The composition of the flake assemblage differs from the later occupations in that minimal different types of material are present. Swan River Chert dominates, followed by Selkirk Chert. Knife River Flint is scarce.

The faunal remains are sparse in comparison with the subsequent levels. As with the lithics, the butchering remains (mammal, avian, fish, and shellfish) are clustered in the northeast sector of the excavation area. Within the mammal assemblage, no large mammals were identified, although unidentifiable large ungulate bone was present. Only small mammals, rabbit, muskrat, and squirrel, were identified along with minimal bird and shellfish. The fish remains had a MNI nearly comparable with Level 2B, suggesting that the primary focus of the campsite was fishing.

9.0 LEVEL 2D

9.1 Introduction

Level 2D was encountered in a very limited number of units (Figure 9.1-1). Most of the presence of this level was in the northeast corner, accounting for ten of the twelve units where it was recorded. The presence of this level as a distinct cultural occupation zone is questionable. The possible taphonomic events that could have given rise to its presence are discussed in Chapter 2. The recoveries are very sparse.

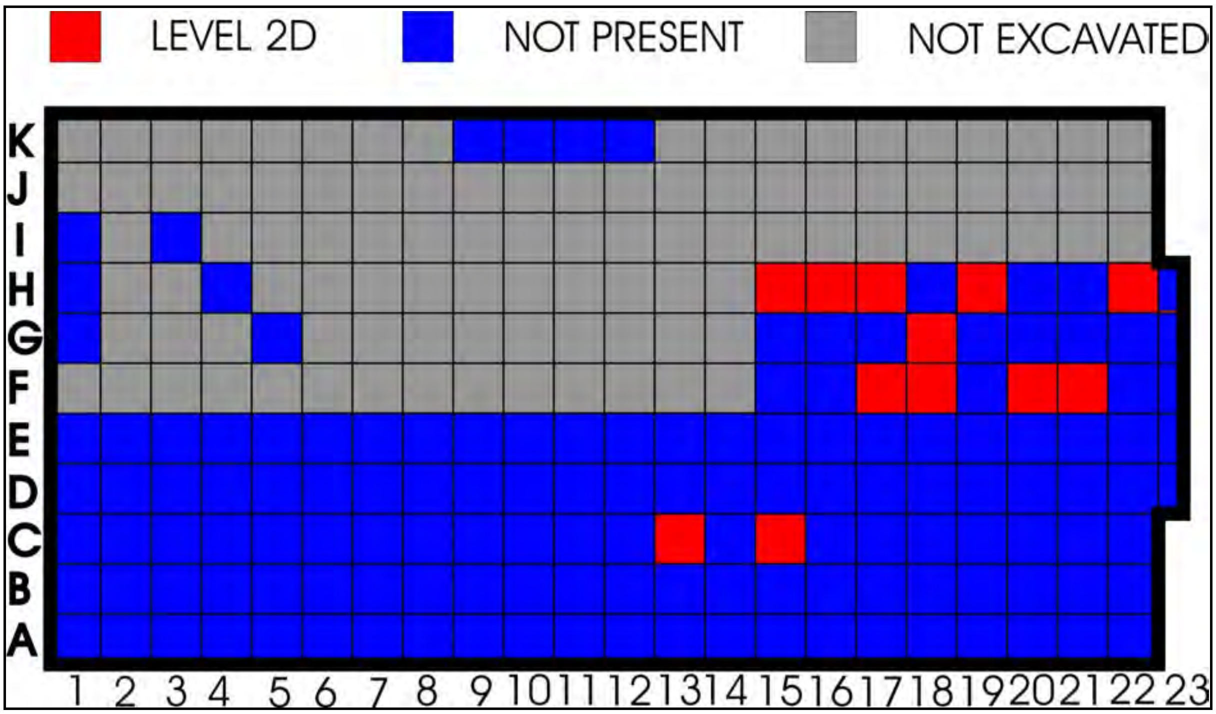


Figure 9.1-1: Map Showing Presence of Level 2D

9.2 Features

No hearths were recorded for this level. The primary aspect was the disjunct nature of the deposits.

9.3 Ceramic Artifacts

9.3.1 Artifact Distribution

Level 2D is scant, occurring in only 12 units, seven of which had no ceramic recoveries (Figure 9.3-1). The accumulated totals for this level are 31 sherds weighing 88.3 grams. Of this total, 22 sherds with a weight of 67.9 grams were found in Unit F17.

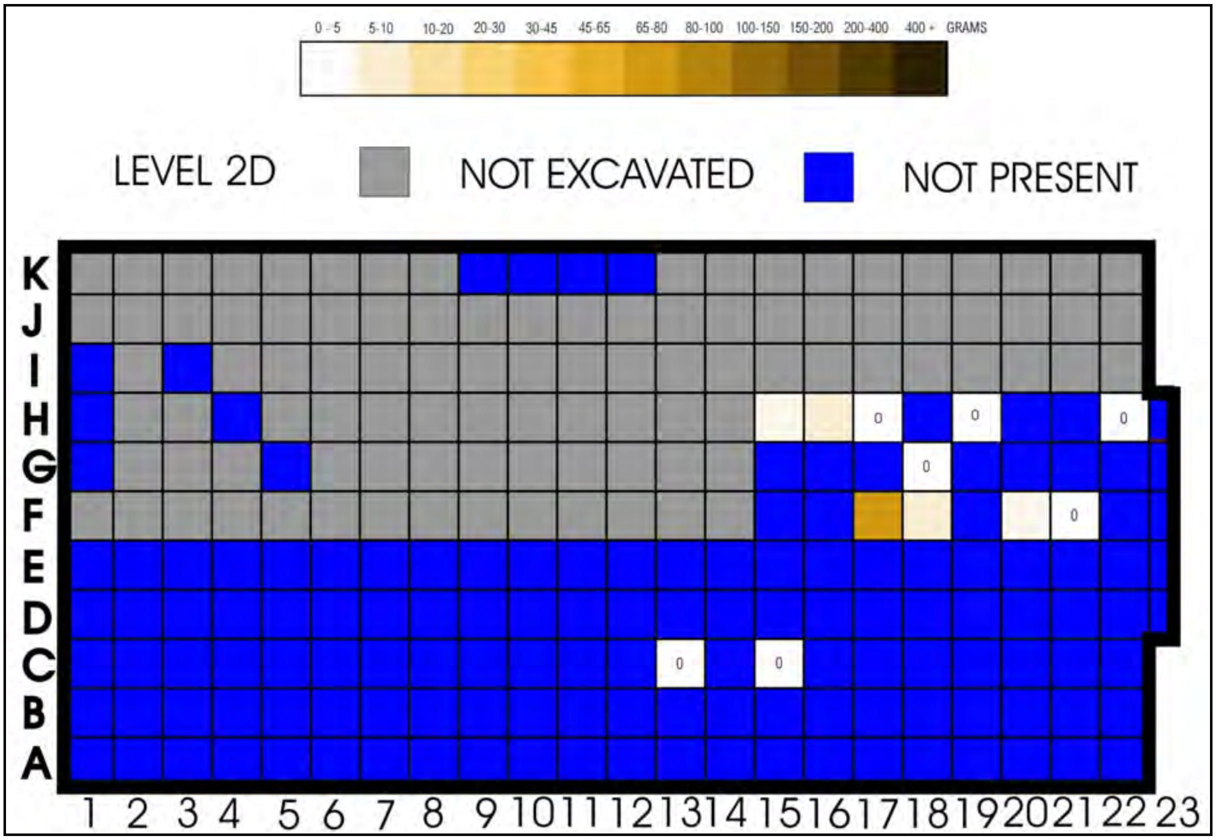


Figure 9.3-1: Distribution of Ceramic Recoveries from Level 2D

9.3.2 Artifact Recoveries

As mentioned above, Unit F17 is where the bulk of the ceramic material from this level was located. The majority of the weight, 62.6 grams of the total 88.3 grams, is from a single vessel, Vessel 62 in Unit F17 (Figure 9.3-2). This same vessel also occurred in Levels 2A, 2B, and 2C in Unit F17 and adjacent units.

Eleven rim sherds and sherdlets comprise 75.2% of the total ceramic recoveries in Level 2D with body sherds making up the remaining 24.8%. This is an inversion of the typical pattern. For all of the other levels excavated this proportional split is the reverse, more body sherds than rim sherds. Due to the very limited recoveries and sporadic definition of this level, no scatter tendencies were observed. The average sherd weight for rim sherds was calculated at 6.0 grams.

9.3.2.1 Identified Vessels

No vessels were defined as originating on Level 2D, and only one vessel was identified from the ceramic material recovered. That was Vessel 62, which as discussed in Section 5.3.3.1, was distributed evenly enough between all levels as to remain uncommitted to a particular level. It does appear in Level 2D in the highest quantity, but sherd size is smaller than on other levels. Taphonomic factors are a major influence on this vessel.

9.3.2.2 Body Sherds

The 20 body sherds and sherdlets accounted for 24.8% of the total ceramic recoveries. The average sherd weight is 1.1 grams.

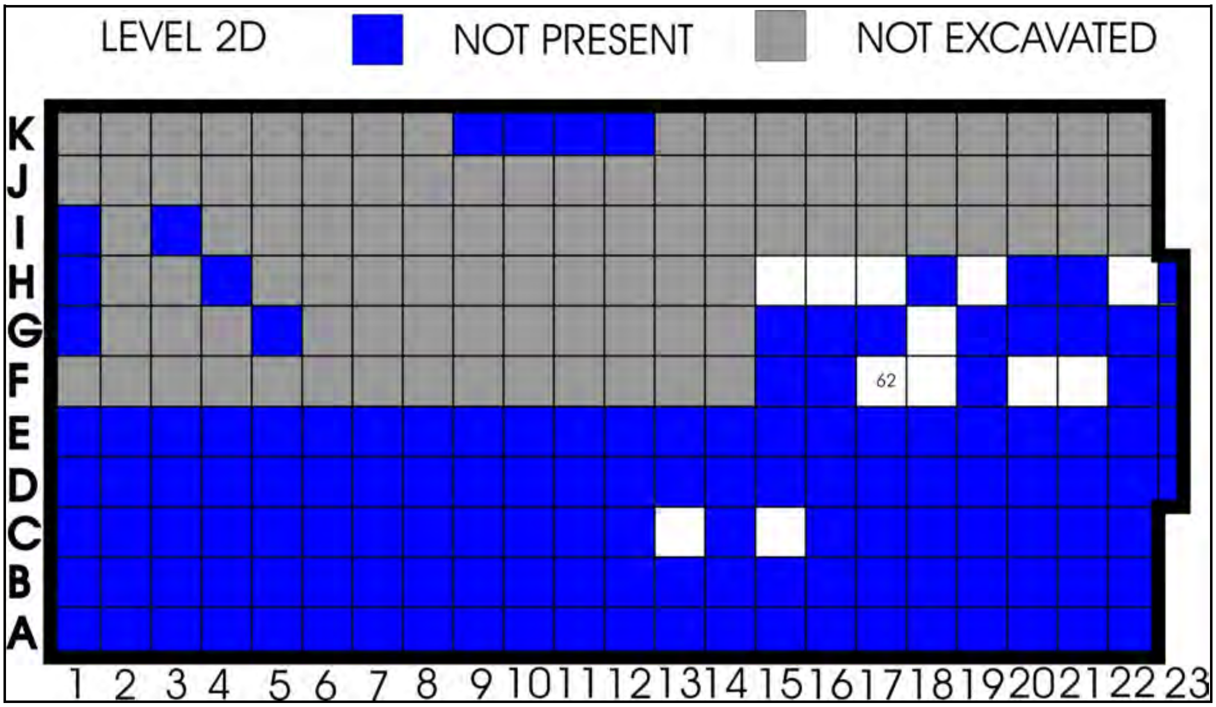


Figure 9.3-2: Distribution of Identified Vessel in Level 2D

9.3.3 Manufacturing Characteristics

The thickness of the body sherds was thin to medium-thick with the majority identified as thin. Colour was recorded as light brown-buff or buff-grey. Sprang impressed exterior dominates statistically, pointing to bag-formed vessels. Paste consolidation is generally well to very well consolidated.

9.3.3.1 Surface Treatment

By weight, 98.4% of sherds were sprang weave impressed (Table 9.3-1) and 0.9% were identified as textile impressed. One obliterated sherd produced a weight percentage of 0.3% as did a single sherd with no recorded surface treatment.

LEVEL 2D	12 units	WT (grams)	QTY	%
SPRANG		86.9	27	98.4
TEXTILE IMPRESSED		0.8	2	0.9
OBLITERATED		0.3	1	0.3
VERTICAL CORD		-	-	-
SMOOTH		-	-	-
No Recorded Surface		0.3	1	0.3
TOTAL		88.3	31	99.9

Table 9.3-1: Types of Surface Treatment Recorded in Level 2D

9.4 Lithic Artifacts

Only six flakes were recovered from Level 2D. These flakes are from two units, F17 and H16. Minimal information can be abstracted from such a small assemblage. The different types of flakes are detailed in Table 9.4-1 and Figure 9.4-1.

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Secondary decortication	1	4.0
Secondary shaping	1	1.4
Tertiary	1	0.1
Thinning/sharpening	3	2.5
TOTAL	6	8.0

Table 9.4-1: Frequency of Types of Recovered Flakes from Level 2D

Only four types of material are represented in the lithic assemblage from this level (Table 9.4-2, Figure 9.4-2). Little else can be obtained from the analysis of the small lithic assemblage of this level.

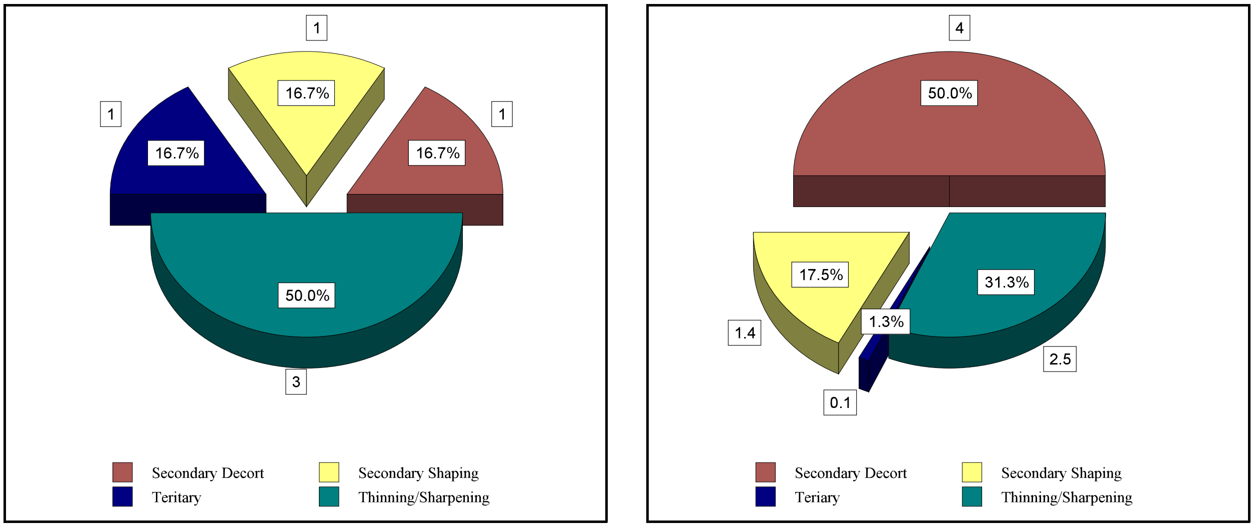


Figure 9.4-1 Frequency of Types of Flakes by Quantity (left) and Weight (right)

MATERIAL	QTY	%	WT	%
Knife River Flint	3	50.00	1.4	17.50
Chert (Undifferentiated)	1	16.67	1.2	15.00
Quartzite	1	16.67	4.0	50.00
Swan River Chert	1	16.67	1.4	17.50
	6	100.01	8.0	100.00

Table 9.4-2: Frequency of Level 2D Flakes by Material Type

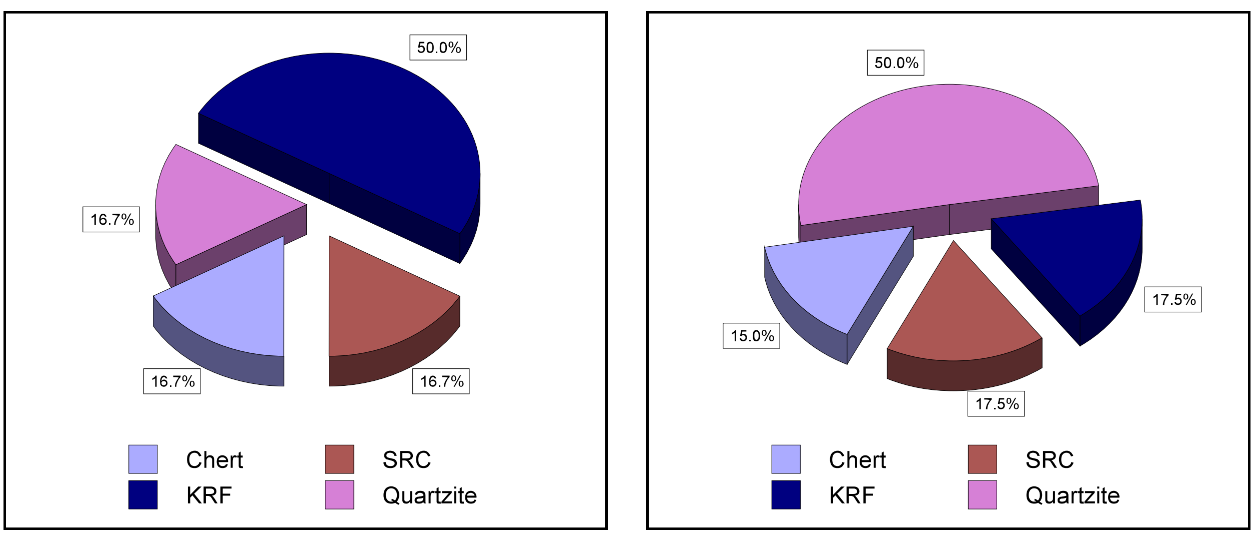


Figure 9.4-2: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

9.5 Botanical Remains

Eleven charcoal samples, comprising 65 specimens, were collected from Level 2D (Table 9.5-1). No species was particularly abundant with maple and poplar/willow the most frequent of the three identified species. Ash was the other taxon. Oak and elm were not present. No hearths were identified in this horizon. The frequency of the identified taxa is depicted in Figure 9.5-1.

TAXON	SAMPLES	QUANTITY	PERCENTAGE
Ash (*Fraxinus*)	1	1	11.11
Elm (*Ulmus*)	-	-	33.33
Maple (*Acer*)	2	3	33.33
Oak (*Quercus*)	-	-	-
Poplar (*Populus*)	-	-	-
Poplar/Willow	2	2	22.22
Willow (*Salix*)	-	-	-
Diffuse Ring Pattern	2	3	
Semi-ring Porous	-	-	
Hardwood	-	-	
Unidentified	4	56	
	11	65	

Table 9.5-1: Frequency of Charcoal Recoveries

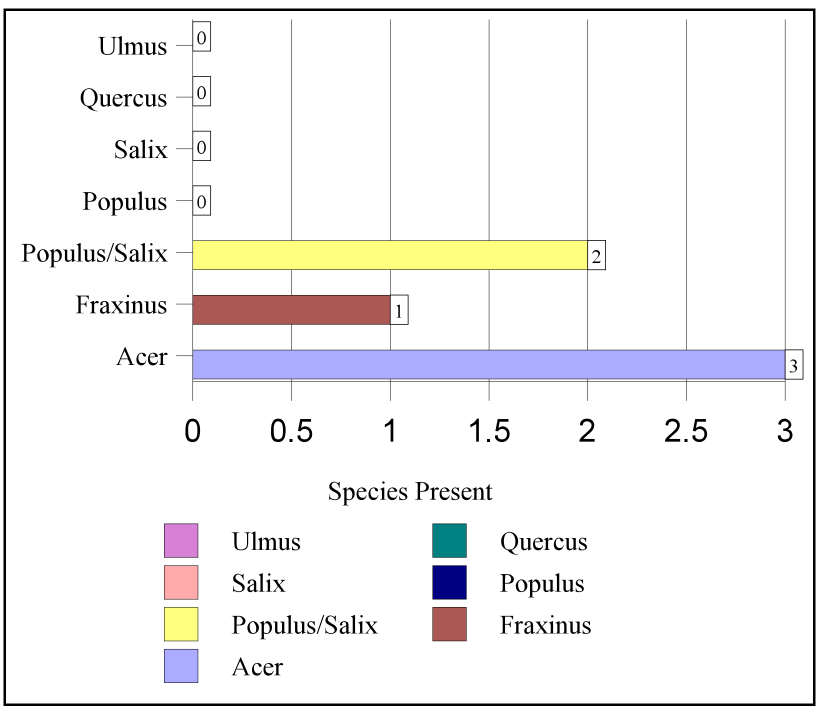


Figure 9.5-1: Frequency of Identified Taxa

9.6 Mammal, Avian, and Reptilian Remains

9.6.1 Mammal Butchering Remains

There are only minimal mammal and avian faunal remains within Level 2D. There were 26 specimens with a combined weight of 17.3 grams. Due to the small nature of many of the bones it was difficult to determine the species in most cases (Figure 9.6-1). However, there were a number of elements identified as being from a rabbit or hare. There is a single fragment determined to be from a medium/large mammal, but this single rib section only stands out due to its large size and weight (Figure 9.6-2).

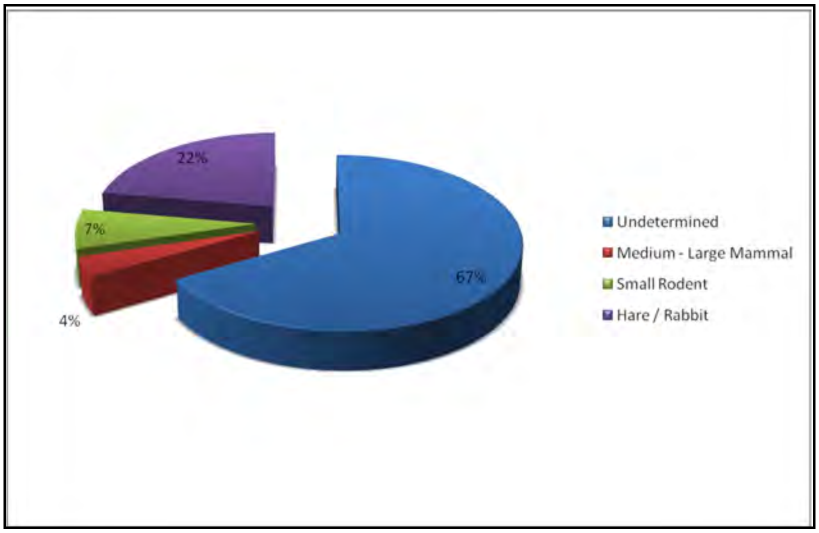


Figure 9.6-1: Frequency of Identified Taxa by Quantity

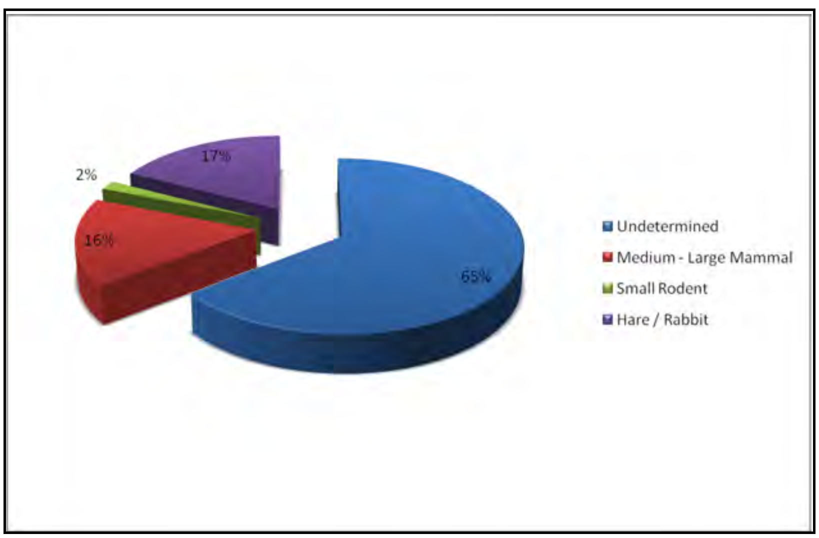


Figure 9.6-2: Frequency of Identified Taxa by Weight

Half of the units had no mammal at all and the rest each had only a few traces. The largest concentration of mammal remains was in Unit H16 with a total of 10.3 grams of bone (Figure 9.6-3). Most of this weight was from a single bone tool.

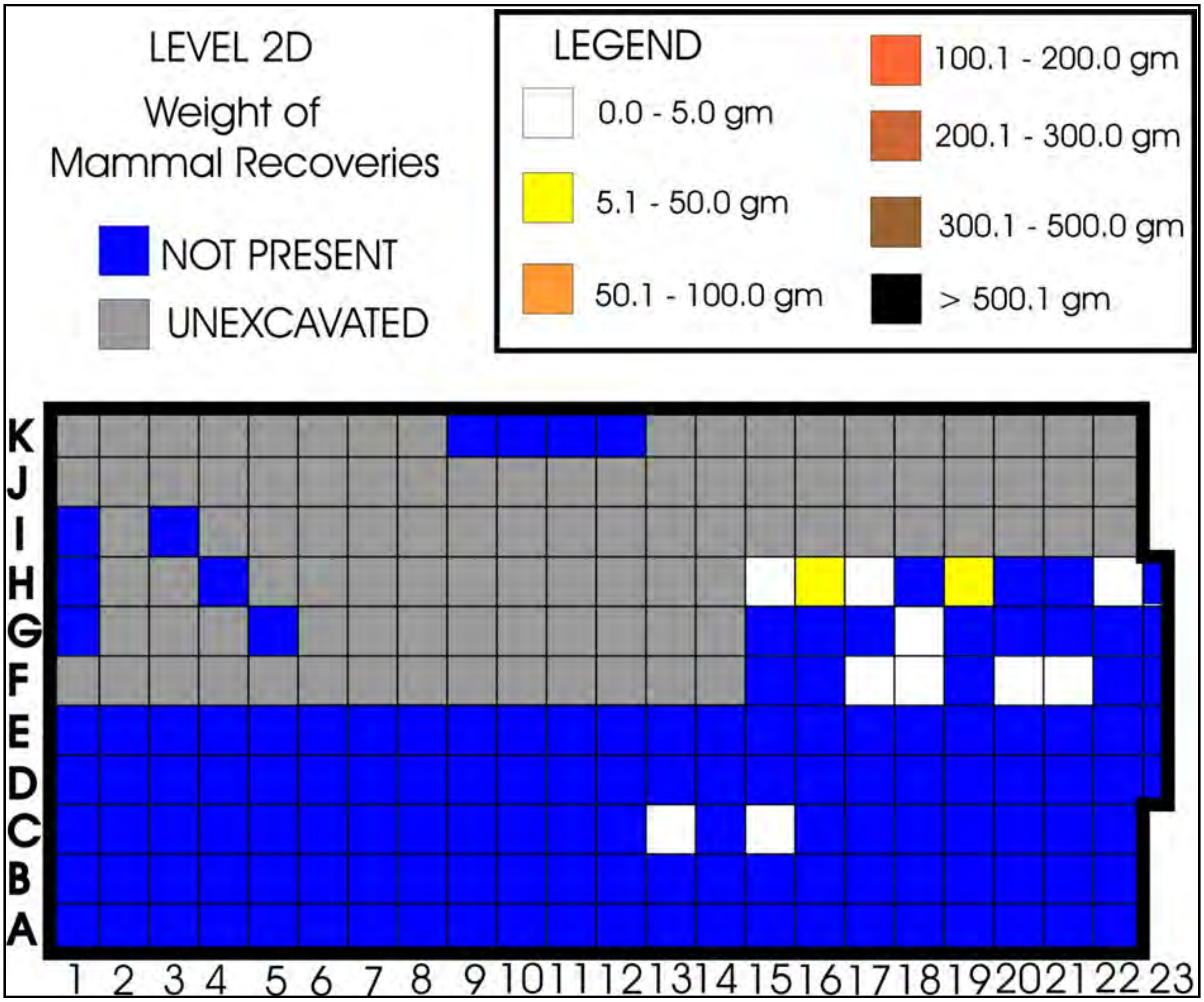


Figure 9.6-3: Distribution of Mammal Butchering Remains in Level 2D

All of the identified taxa, excepting the one medium/large mammal element, were from smaller animals. Rabbit was the only species that could be identified in the assemblage. It occurred in several of the units (Figure 9.6-4).

Based on the calculation for minimum number of individuals, the rabbit remains might account for a single rabbit.

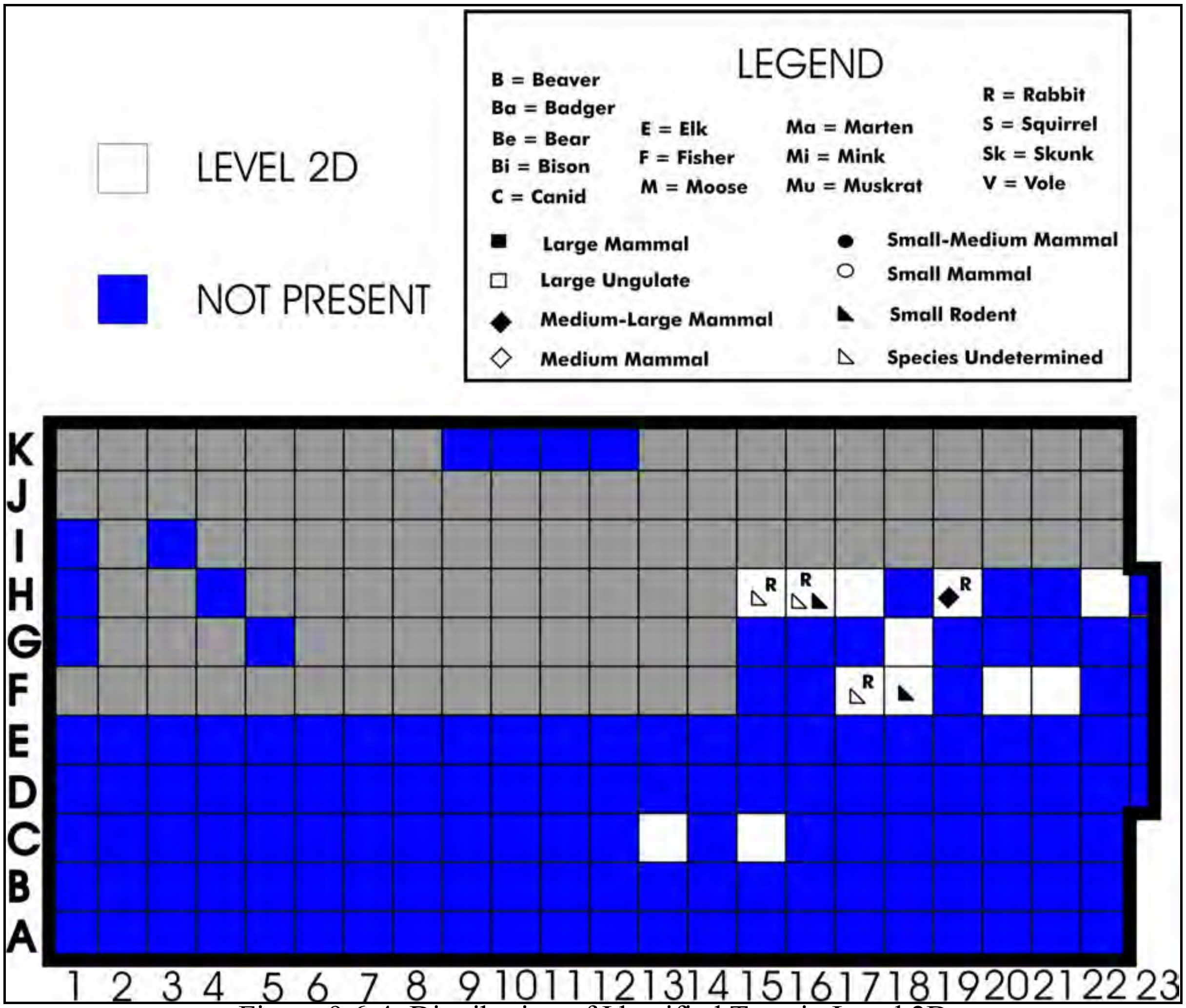


Figure 9.6-4: Distribution of Identified Taxa in Level 2D

9.6.2 Bone Tools

The single tool is a bone spatula, DlLg-33:08A/22327, recovered from Unit H16. The artifact (Plate 9.6-1) measures 10.0 cm in length, 1.6 cm in width, and 0.5 cm in thickness. It weighs 6.4 grams.

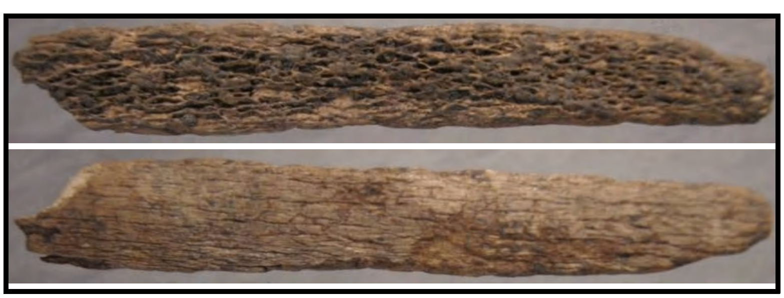


Plate 9.6-1: Dorsal and Ventral Faces of Bone Spatula (DlLg-33:08A/22327) (actual size)

9.6.3 Avian Butchering Remains

There were a total of three bird bones excavated from Level 2D. One specimen was found in each of Units C15, F20, and H16. Two of these specimens are small fragments that could not be identified and the third is a section of a tibiotarsus from a larger bird. The species of bird could not be determined.

9.6.4 Summary

Level 2D is a highly fragmented level with only traces of mammal or avian remains. Based upon the material available, there is very little to suggest that this level represents an occupation of any size or duration. There are three possible scenarios that could explain the paucity of recoveries:

a. the level represents only the briefest stop on a journey to another location;
b. this level is a segment of one of the previous levels that was isolated from it due to some unknown taphonomic event which would therefore link these materials to a previous level; or
c. the level was more extensive, but that much of it was removed due to some major flood event.

Without the presence of the tool, it would almost be possible to see the faunal assemblage as natural animal death rather than evidence of human activity.

9.7 Fish Remains

9.7.1 Artifact Recoveries

There are 1772 artifacts (93 catalogued assemblages) in Level 2D which have been identified as fish remains. Of this sample, 1667 specimens (94.07%) were identified as to their element. However, 1578 of those specimens (i.e., 89.05% of the entire artifacts from this level) were either scale (N=1475), rib/ray/spine (N=51), or vertebra (N=52) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

9.7.2 Species Determination

The remaining 194 specimens (10.95%) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 9.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

9.7.3 Analysis

There are six different taxa present in the sample. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 9.7-2. The most significant species is *Aplodinotus grunniens* (freshwater drum), both in terms of NISP and MNI frequencies, followed by Ictaluridae spp.(catfishes) and Catostomidae spp. (suckers) and in lesser amounts by *Sander* sp. (sauger/walleye), *Acipenser fulvescens* (sturgeon), and *Hiodon* sp. (goldeye/mooneye) (Figure 9.7-1).

ELEMENT	Ictalur-idae	Catosto-midae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Angular	2						2	4
Ceratohyal					3			3
Cleithrum							10	10
Coracoid	1							1
Dentary	2	1	1				1	5
Frontal							1	1
Hyomandibular		3		1				4
Maxilla		3						3
Operculum		2					1	3
Otolith					6		1	7
Pharyngeal Plate					2			2
Preoperculum	1							1
Pterotic	1							1
Quadrate			1					1
Rib / Ray / Spine							51	51
Scale							1475	1475
Scute						2		2
Spine, Dorsal					21			21
Spine, Pterygiophore					14			14
Spine, Second Dorsal					1			1
Suboperculum							1	1
Supracleithrum	2							2
Supraethmoid	2							2
Undetermined Bone							41	41
Unidentifiable Bone							64	64
Vertebra							52	52
TOTAL	11	9	2	1	47	2	1700	1772

Table 9.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	11	15.3	2	20
Catostomidae (2)	9	12.5	2	20
Sander (3)	2	2.8	1	10
Hiodon (4)	1	1.4	1	10
Aplodinotus (5)	47	65.3	3	30
Acipenser (6)	2	2.8	1	10
TOTAL	72	100.1	10	100

Elements Used for MNI Determination

1. Angular (Right)
2. Maxilla (Left)
3. Dentary (Left)
4. Hyomandibular (Left)
5. Otolith (Left or Right)
6. Scute

Table 9.7-2: Species Determination

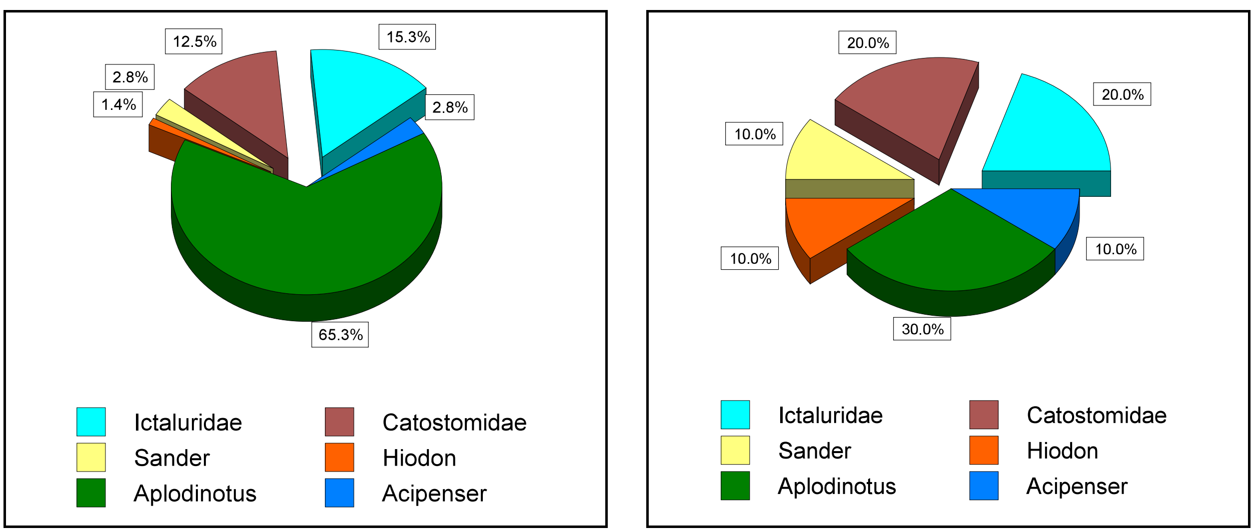


Figure 9.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The distribution of the fish remains by species is shown in Figure 9.7-2. No fish remains were found at all in Unit G18. Of the few remains in Units C14 and C15, no identifiable species could be determined from the elements found there. Not all identified species are found in every unit, suggesting some localized deposition of individuals in a unit area. For the most part, freshwater drum, the most frequent species both in NISP and MNI, are present in almost every unit that species are identified in, save for Unit H17 where it is absent. Similarly, the suckers and catfishes are distributed over most units in this level, with some conspicuous absences in certain units. For example, sucker is not present in the two adjacent southeastern units of F20 and F21 but found most elsewhere, while catfishes are absent from the isolated northeastern Unit H22 as well as intermediate Units F18 and F20. However, catfish is the only species identified in Unit H17. Sauger/walleye are identified in only two units, Unit F20 and Unit H19, although only a single individual was determined to be present overall in this level. The sturgeon remains are isolated to just one unit (Unit F18), as are the goldeye/mooneye remains (Unit H19), which makes sense in light of the fact that they each have MNI counts of only a single individual.

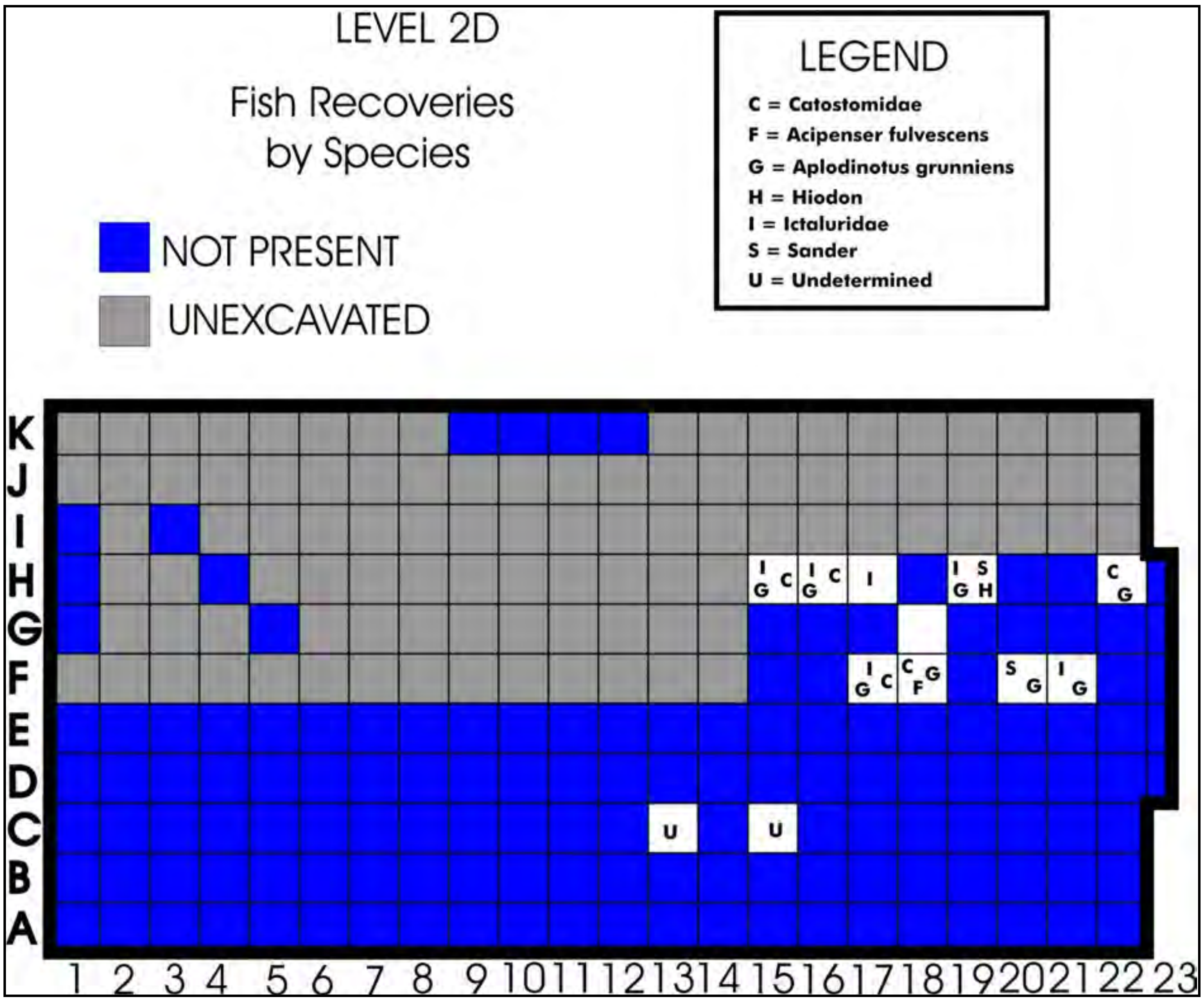


Figure 9.7-2: Distribution of Fish Remains by Species in Level 2D

9.7.4 Interpretation

Figure 9.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 2D. Although Unit H19 appears to have an enormous quantity of fish remains, it includes a collection of scales (DlLg-33:08A/23176) that contains a quantity of 1000 (estimated) specimens mixed with soil, weighing 446 grams. If this one assemblage is excluded, then the weight would only be marked as eleven (11) grams for that unit, which is comparable to the remaining units in this level. However, this same unit (H19) does have the most diversity in species (N=4), as noted above. Unit H16, then, would be the most dense unit by weight (35 grams), but it is also one that contains interesting characteristics that reflect the nature of fish remains and the bias in the archaeological record. If the breakdown between species present in this unit sample is examined, and the weights are compared, it is found that suckers have a quantity of two and a weight less than 1 gram, freshwater drum have a quantity of ten and a weight of about 6 grams, whereas catfishes have a quantity of five, half as many as the freshwater drum but a weight of about 23 grams (the unidentified elements have a weight of about 6 grams, making up for the total of 35 grams in this unit). This shows how the difference in fish size can make up a disproportionate representation based on weight, and illustrates further how catfishes, given their size and live weight, as well as the nature of their bones being more durable and thus preserving better, can bias the results in the quantification of the data.

No charring (or burning or calcination for that matter) of any specimens was found, nor were any cut marks or other cultural modifications noted.

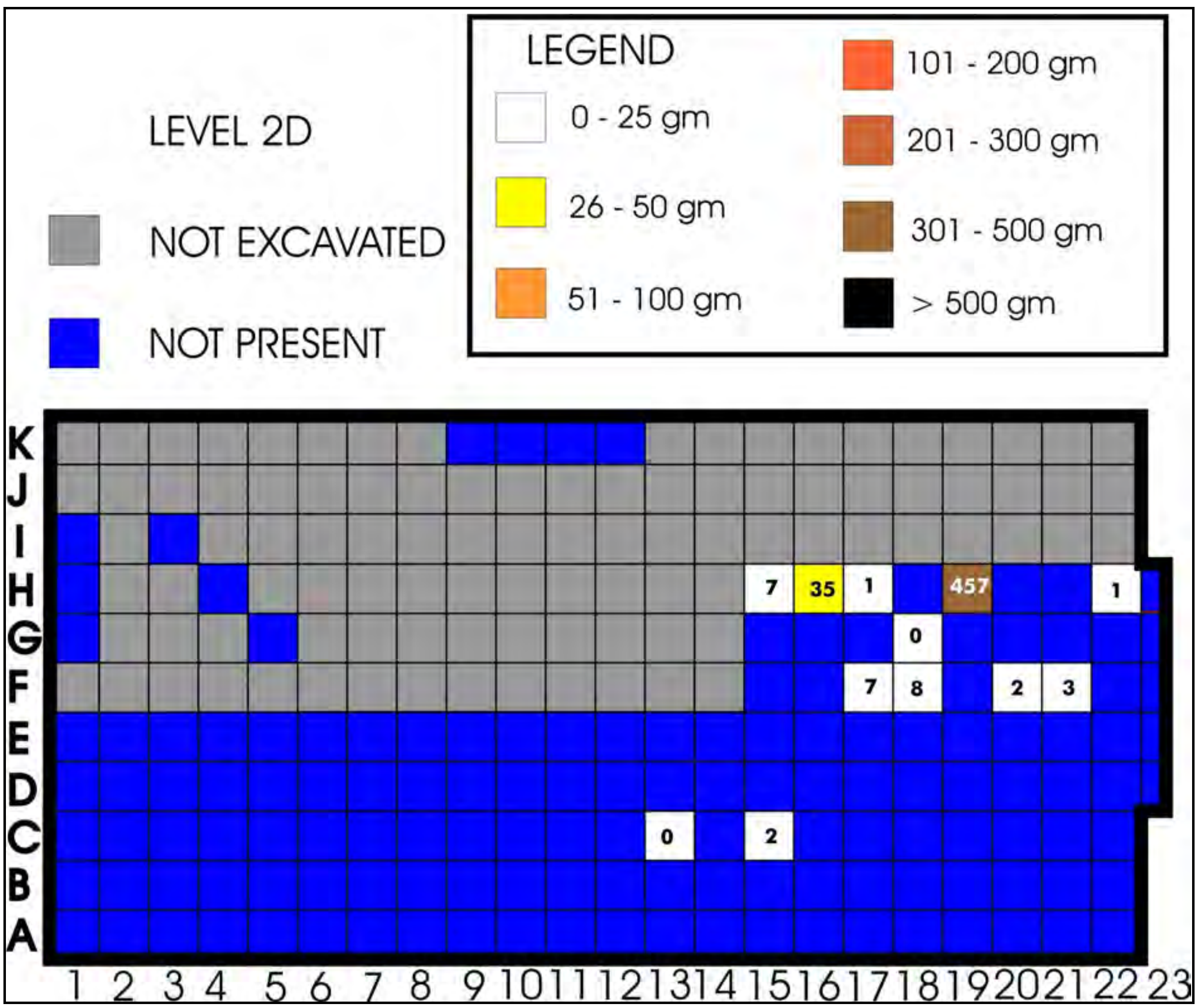


Figure 9.7-3: Distribution of Fish Remains by Weight

9.8 Shellfish

There were five shell artifacts recovered from Level 2D. These consist of four butchering remains and one naturally deposited specimen.

9.8.1 Butchering Remains

Three of the four butchering remains were identifiable to species (Table 9.8-1), while the fourth was identified only to the Unionidae level. The distribution map, Figure 9.8-1, shows that the majority of the weight of the shell occurs in Unit F17. The single valve in Unit H16 is a heavy specimen.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	-	-	-	-
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	1	33.33	3.0	3.44
Pink Heel-Splitter (*Potamilus alatus*)	-	-	-	-
Maple-Leaf (*Quadrula quadrula*)	-	-	-	-
Pig-Toe (*Fusconaia flava*)	-	-	-	-
Three-Ridge (*Amblema plicata*)	2	66.67	84.3	96.56
	3	100.00	87.3	100.00

Table 9.8-1: Frequency of Identified Butchering Remains by Taxon

Only two species, Three-Ridge and Fat Mucket, were recovered from Level 2D (Figure 9.8-2). This level had the lowest number of identified shellfish species.

The Minimum Number of Individuals (MNI) is portrayed in Figure 9.8-3. Three-Ridge is the most common (66.7%) with Fat Mucket being second (33.3%).

9.8.2 Natural Shellfish

Only one naturally deposited specimen was curated from Level 2D. This was a single freshwater snail of the Lymnaeidae Family recovered from Unit H15.

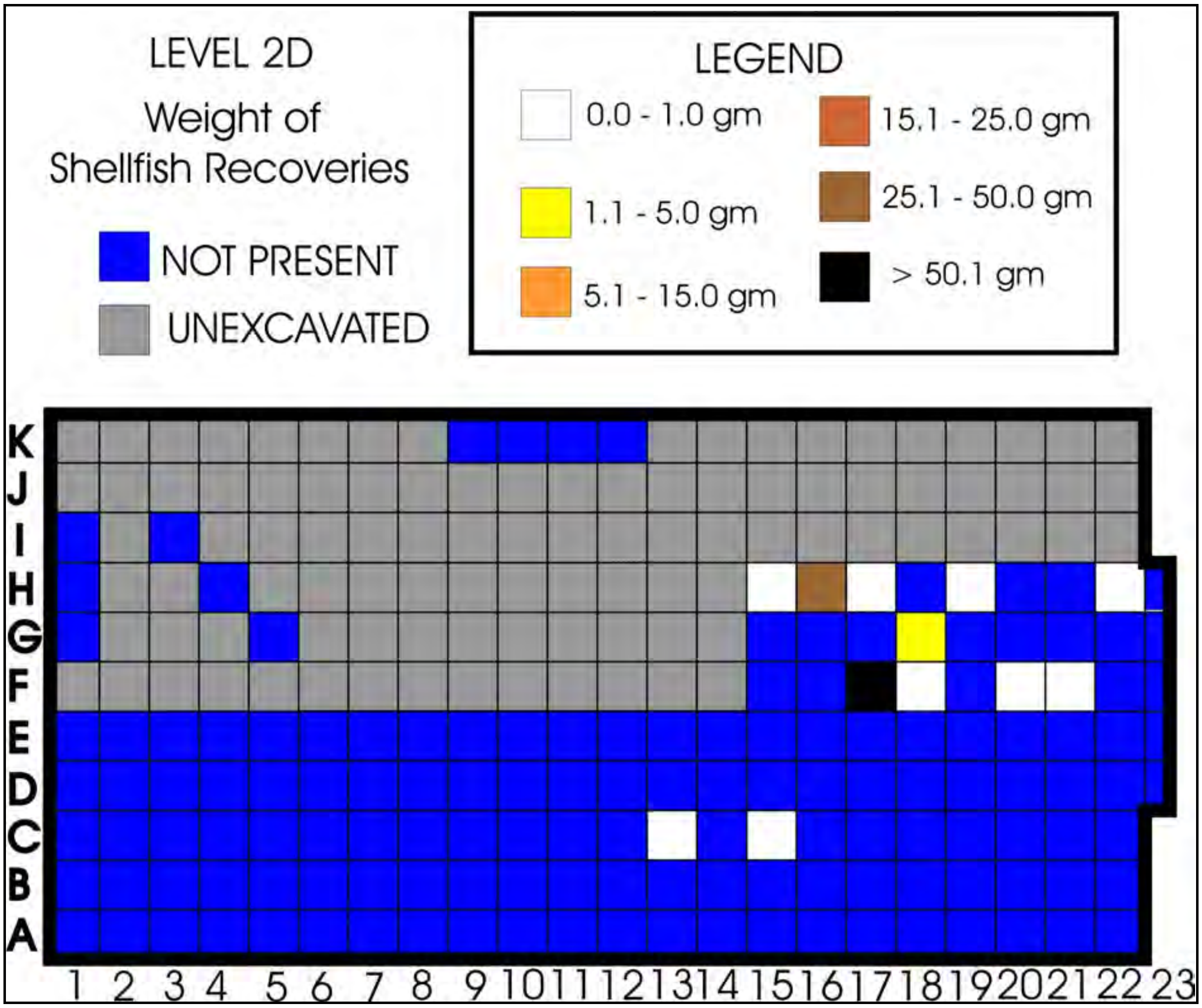


Figure 9.8-1: Density of Shellfish Recoveries

9.8.3 Summary

Level 2D was the sparsest level in terms of shellfish recoveries with a total of five, four of these being butchering remains. The density was 0.42 artifacts per square metre. Three of the butchering remains could be identified to Fat Mucket (1) and Three-Ridge (2). The density was concentrated in two units, Unit F17 and Unit H16. There were no shellfish which exhibited charring or calcination which is not surprising as no hearths were present in Level 2D. In addition, no hematite staining was observed on any specimens. Only one Lymnaeidae was recovered. The sparseness of all recoveries in Level 2D appears to be similar across all of the artifact types and it may be that this is not a true occupation horizon.

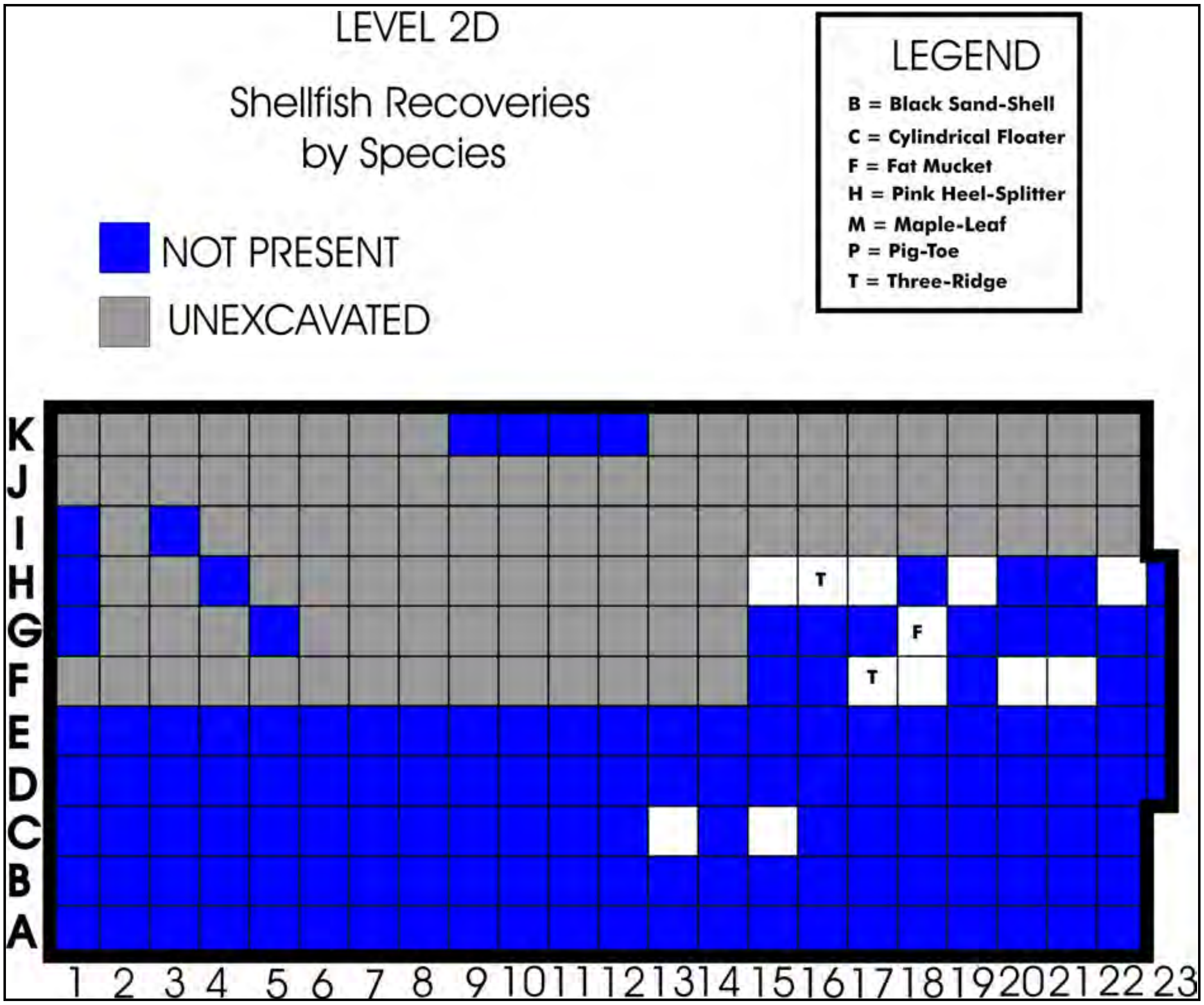


Figure 9.8-2: Frequency of Shellfish Recoveries by Species

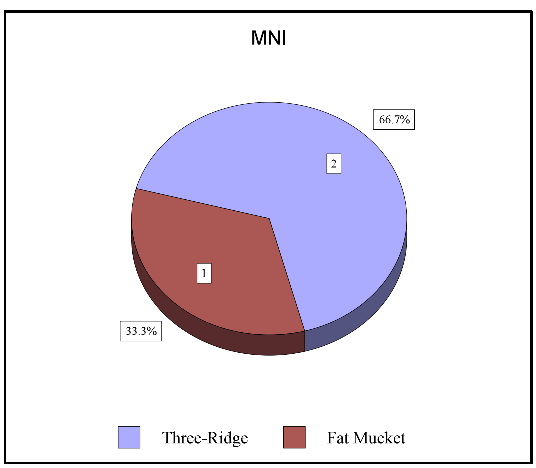


Figure 9.8-3: Frequency of Identified Taxa of Shellfish

9.9 Miscellaneous Recoveries

In this sparse level, only soil samples were recovered.

9.9.1 Soil Samples

There were ten soil samples collected. In addition, one hearth clay sample was curated.

9.10 Level 2D Summary

As discussed in Chapter 2, Level 2D probably does not result from an actual campsite occupation and is the result of taphonomic activities. It is present only in a very small number of units, mainly in the northeast portion of the excavation area. The recoveries are extremely limited. There are a few ceramic body sherds and one rim sherd from a vessel which has manifestations throughout the Level 2 Complex. The lithics consist of only six flakes. One bone tool was recovered along with a very sparse mammal assemblage. Shellfish was equally minimal. The dominant class within the faunal assemblage was fish, echoing the pattern observed in Level 2C.

It is quite probable that the recoveries designated as Level 2D are the result of activities by the occupants who are represented by Level 2C. A short-term, intermittent depositional event, like surface run-off flooding, could have relocated and partially buried some of the materials during the Level 2C occupation. Ths similarity of the faunal assemblages lends credence to this hypothesis wherein Level 2D is not representative of a discrete occupation but rather a disrupted portion of the higher level.

10.0 LEVEL 3

10.1 Introduction

Level 3 was encountered in every unit that was opened in the southwest portion of the excavation area as well as the two units in the K line that were deeply excavated (Figure 10.1-1). The layer ranged from very sparse to quite dense, reflecting activity areas.

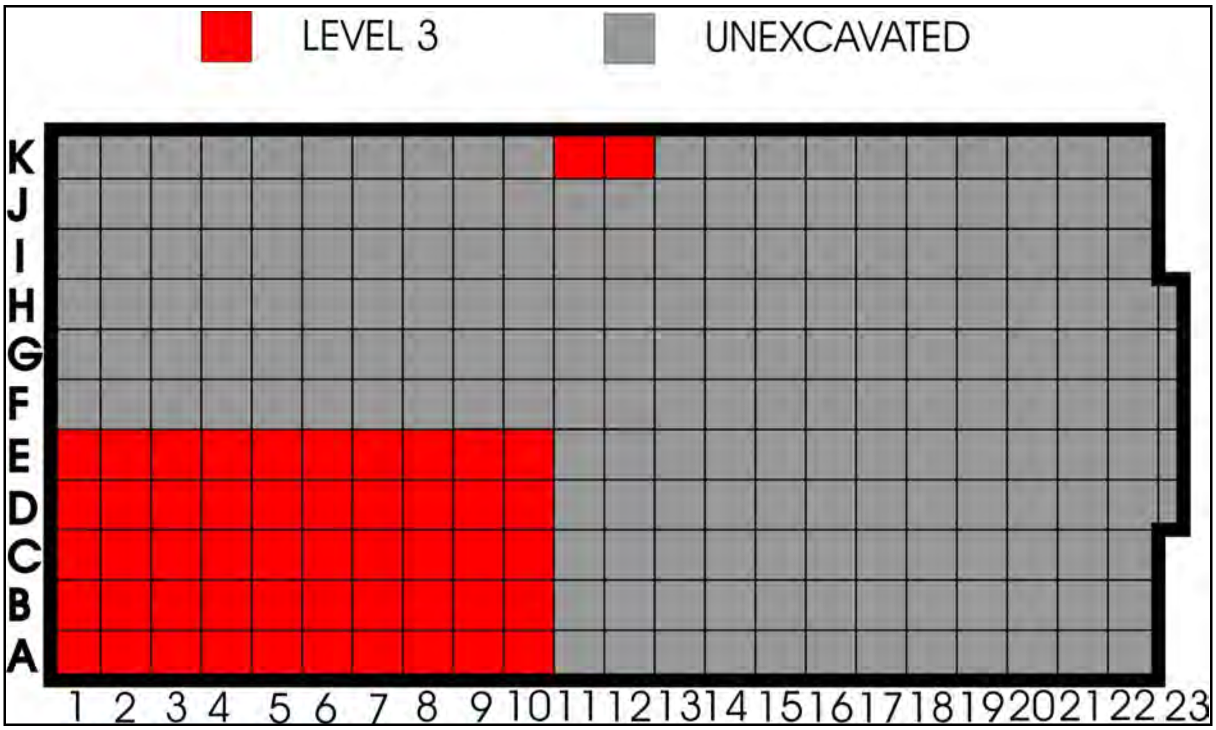


Figure 10.1-1: Map Showing Presence of Level 3

10.2 Features

10.2.1 Hearths

The primary feature that was recorded during the excavations was that of hearths (Figure 10.2-1). There are seven hearths, five of which are quite small. The two larger hearths in Units A1 and E10 each cover an area of approximately one square metre.

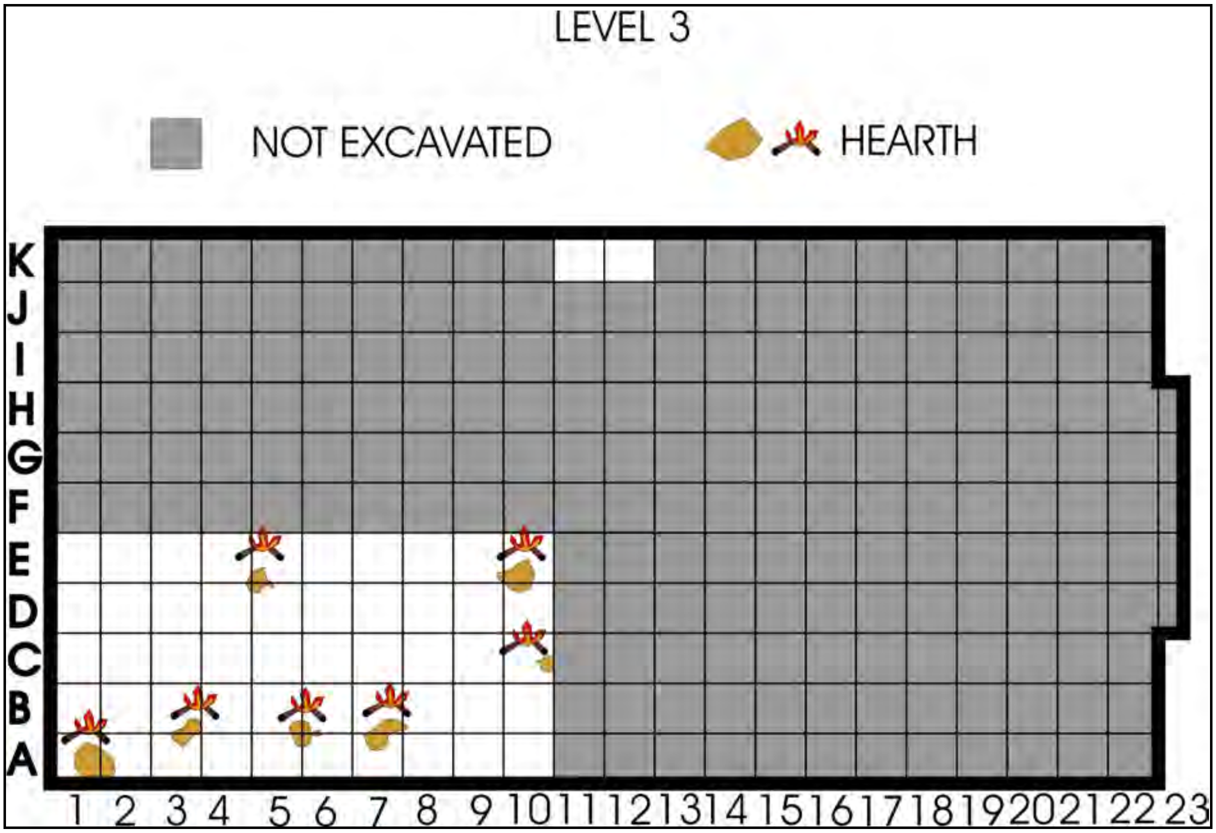


Figure 10.2-1: Distribution of Hearths in Level 3

10.2.2 Pit Feature

An anomalous sunken feature was found at the intersection of Units C3, C4, B3, and B4. The pottery that was encountered at that location slumped towards a central vortex at the unit intersection. It was initially thought that this feature may have a spiritual connection, perhaps as the central fire pit in a sweat lodge. An elder was consulted and he felt that there was no spiritual aspect to the feature as all of the necessary characteristics for a sweat lodge were not present.

Excavation continued and the archaeologist (Ernie Reichert) followed the artifacts down to a considerable depth, removing the silty clay matrix from the interior. A decision was made to do a cross-section excavation of the northern half of the feature and it was found that the ceramics continued downward on a constricting funnel (Plate 10.2-1). After the entire central matrix of the pit feature was excavated (Plate 10.2-2), an explanation of the formation of the feature became highly probable due to the presence of short, thin lateral extensions of the central matrix. Reichert determined that the feature was likely the result of the rotting of a stump and tap root of a tree. The pottery concentration at the surface of Level 3 was likely deposited immediately adjacent to a tree stump or directly over a buried stump. As the wood rotted—some evidence of decayed wood and root staining was present on the outer edge of the infill matrix(Plate 10.2-3)—the silty clay and the ceramic sherds slumped downward into the hole (Plate 10.2-4). As the wood continued to rot, material continued to move downward into the area that had been previously occupied by wood.

Plate 10.2-1: Cross-section of Pit Feature
(Tags indicate ceramic sherds)


Plate 10.2-4: Pit Feature Showing Slumpage

Plate 10.2-2: Excavated Pit Feature


Plate 10.2-3: Wall of Pit Feature Showing
Organic Stain from Decayed Wood

10.3 Ceramic Artifacts

10.3.1 Artifact Distribution

The weight distribution map illustrates two focussed but general concentrations of ceramics (Figure 10.3-1). Each of these showed the presence of 6 different vessels. The greatest density and sherd count was found in Unit E6, 653.1 grams for 418 sherds. The second highest density was recovered from Unit C3 with 534.1 grams for 357 sherds. Both are one excavation unit away from an identified hearth. Unit E6 consisted of multiple vessels in an overlapping deposit. In Unit C3 the deposit was a single vessel.

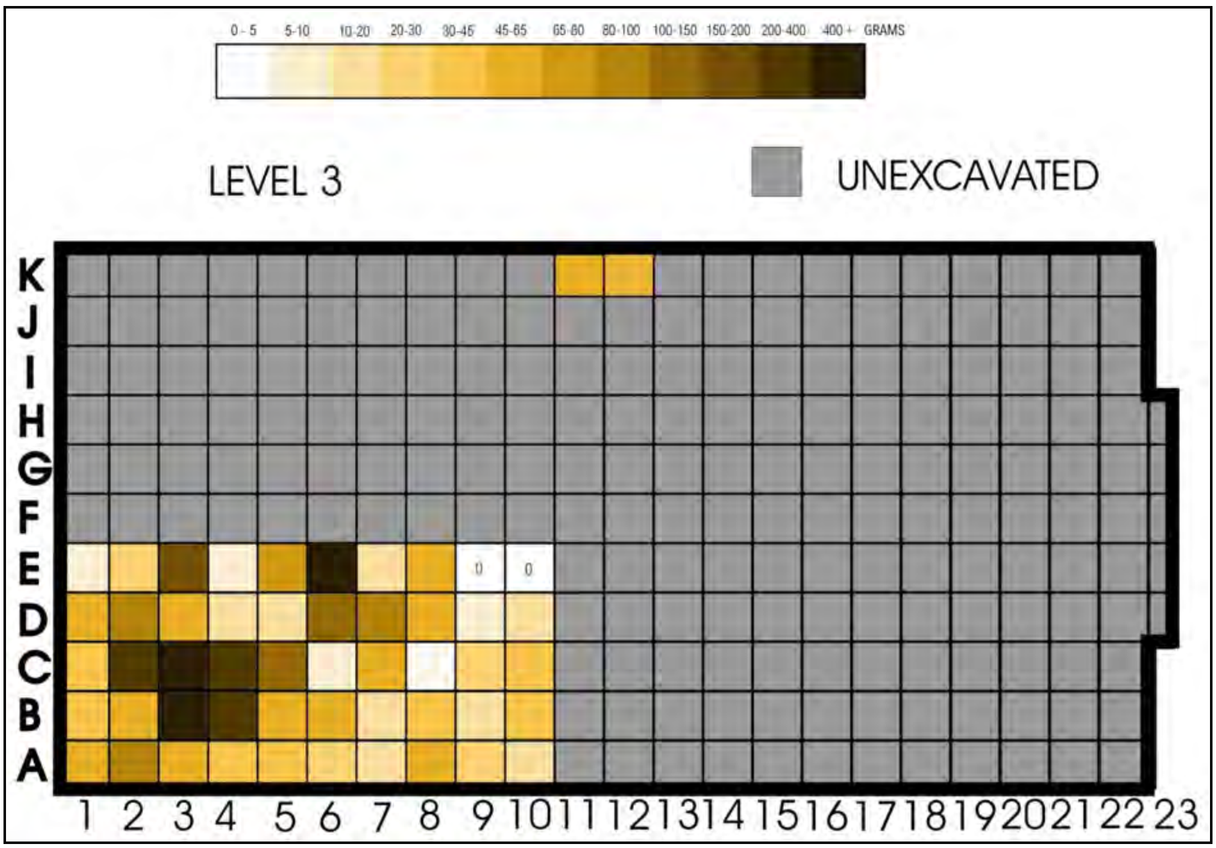


Figure 10.3-1: Distribution of Ceramic Recoveries in Level 3

Level 3 was present in all 52 of the units opened. The recovery of 2905 sherds, weighing 4487.4 grams, yields an average sherd weight of just over 1.5 grams. This is less than that for Level 3A.

A total of 52 units were excavated on Level 3, as compared to 149 units for Level 1 and the Level 2 Complex. Extrapolating on the recovery totals for Level 3 and Level 3A in order to equate the densities, a comparable size of excavation would yield 10090 sherds with a weight of 16867.7 grams.

This is a greater density than either Level 1 or the composite totals for the Level 2 Complex. The average sherd weight would be lower at 1.67 grams, calculated from the extrapolated totals.

Unlike Level 1 and Level 2, there is no apparent patterning of presence and absence. As the area is smaller, the distribution becomes more homogenous.

Two units in the northeast corner, Unit E9 and Unit E10, recorded zero ceramic recoveries. The weight distribution maps for Level 3 and Level 3A show the difficulties encountered with defining the occupational horizons, best illustrated on the E-line. The E-line densities flip-flop back and forth, alternating between Level 3 and Level 3A. Excavator error may possibly be the cause of this pattern. In Unit E9, Level 3A is most likely Level 3. In this corner of the excavation block, the horizons, poorly delineated, began to descend precipitously to the northeast, which likely complicated matters.

The identified vessel fragments are relatively evenly spaced, but units with multiple vessels present are mostly directly adjacent to hearths. The vessel fragment scatter appears to have a direction distribution along a roughly southwest to northeast axis.

The area around the hearth in the NW corner of the excavation area shows a very limited amount of ceramic deposition in both the weight distribution map and the vessel distribution map. However, if one draws a circle with a two metre radius around it, centred on the middle of the hearth, it is found that within this radius there are seven vessels present. The hearth directly to the west on the E-line has a higher density of vessels at ten. These two hearths represent the lowest and the highest number of vessels within an estimated general activity range. When this is done with each hearth there are typically eight to nine vessels encompassed by the circle. These observations add up to a picture of relatively even distribution, despite the two main densities.

Isolated on the K-line was a recovery found in an attempt to define the stratigraphy and depth of Level 3 in that region before it was abandoned. Because of this deposits significantly lower depth, it was interpreted in the field to be possibly Level 5. It has subsequently been re-evaluated and has been designated Level 3, although there is no physical linkage between the main excavation block and the K-line.

At this level in Unit K11, a rim section of a vessel was recovered, Vessel 73. No rim sherds of this vessel were identified elsewhere in the excavation. No distribution data has come from this unit other than the materials present. As pointed out in the Level 2 Complex discussion, the stratigraphy of the K-line has not been physically tied into that of the main excavation block making associations somewhat speculative.

10.3.2 Artifact Recoveries

A total of 344 rim sherds and sherdlets, with a total weight of 1301.5 grams, were recovered from Level 3. They account for 11.8% of the vessel ceramic objects. An average sherd weight for the rims was calculated at 3.8 grams. This is far lower than that of all the other levels. The general pattern for the Level 2 Complex was for the rim sherd size to diminish on the lower sub-levels, but Level 3A shows an increase in size at 4.7 grams.

As in the Level 2 sub-levels, Level 3 and Level 3A share cross-over vessels. Twenty-eight vessels were identified from Level 3 and Level 3A. Twenty-two of these were recovered entirely from Level 3 (Figure 10.3-2) with a further five vessels recovered from Level 3A. A single vessel (Vessel 104) was represented by one sherd from Level 3 and one from Level 3A.

10.3.2.1 Identified Vessels

Since the generally ambiguous character of the occupational horizons in the field and the observation that there was no appreciable difference between the materials from Level 3 and Level 3A, it was decided that the materials from each will be considered as one occupation, but discussed separately. Most vessels here do not slot easily into the current typology for this region. Taxonomically speaking, certain characteristics enable connection or at least association with our current cultural framework. Several general observations may help make links through shared traits which may assist further research, which is required to grasp the diversity exemplified by this assemblage. The decorative components are essentially the same as the succeeding levels previously discussed but different approaches range from the use of individual elements to decorative structure and vessel form.

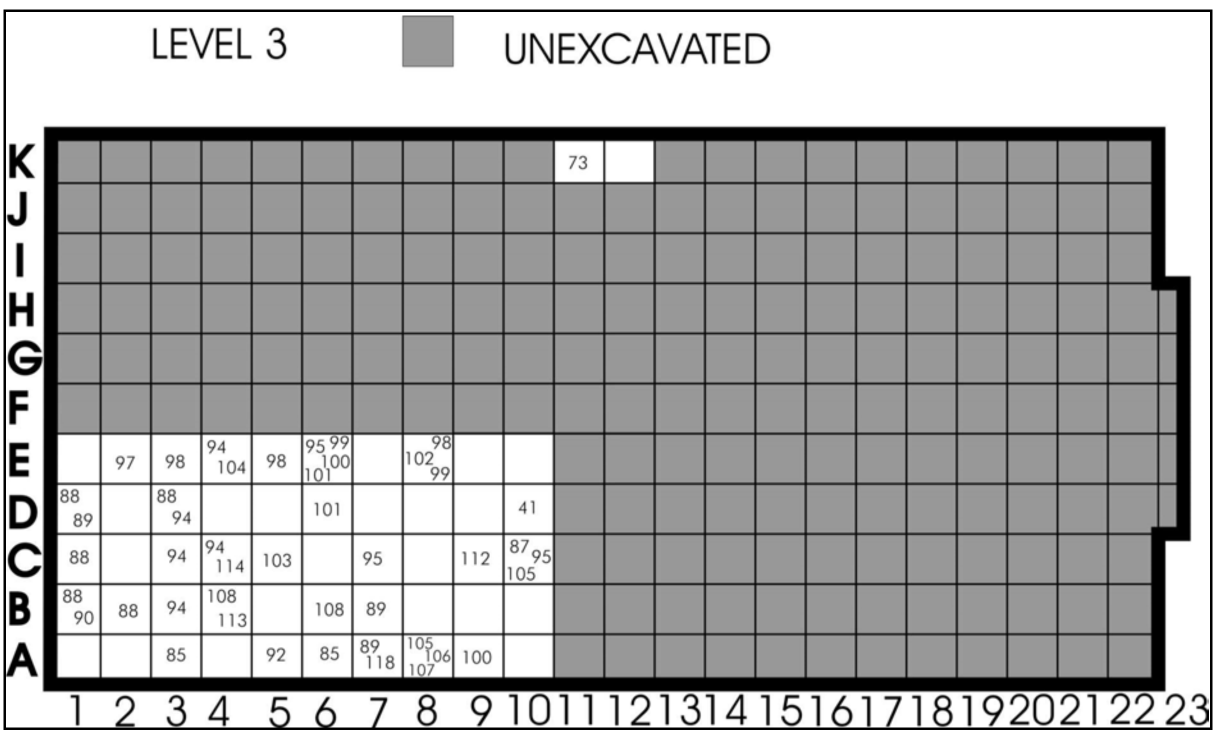


Figure 10.3-2: Distribution of Identified Vessels in Level 3

Vessel 41

This vessel was identified in Level 1 in Unit A14. Such a vertical and lateral displacement to Unit D10 in Level 3, is possible through taphonomic factors such as rodent burrowing. Another possibility is that excavation of a test pit in Unit D10 disturbed sherds from this vessel in the wall at Level 1 which were then displaced to the lower cultural level and curated with that designation.

Vessel 73

This is a Coalescent vessel of the mid-neck emphasis type (Kroker Mid-neck). This pot, recovered from Unit K11, exhibits combing and a tall Blackduck-like neck, but has CWO stamping in two rows, one above and one below the mid-neck and no horizontal CWOI.

Vessel 85

This vessel occurred in Units A3 and A6. Horizontal CWOI and ovoid stamps below them are all the decoration that can be seen on the incomplete profile. The distinctive contour of this vessel's type demanded that a name be ascribed so reference could be made to it in the stratigraphic higher levels that followed where its influence is seen. Unimaginatively referred to as the Soft Shoulder type, it is a Coalescent origin type. The poorly defined shoulder is considered a Laurel influence—a less globular form. Like most vessels in Level 3 and Level 3A, the surface is sprang impressed.

Vessel 87

This pot was recovered from Unit C10. This vessel is designated as originating from Level 3A.

Vessel 88

This vessel, located in Units B1, B2, C1, D1, and D3 is an undefined Coalescent variety, different but similar enough to the Otterhead type to be held up for comparison. The primary two factors that keep it isolated at this time are the neck thickness and the ovoid stamps (large for the type), but the CWOI below the exterior lip are much less oblique as well. Interestingly, it shares this and the combing with Vessel 98 (a vessel with the more typical neck thickness).

Vessel 89

This vessel, recovered from Units A7, B7, and D1, is part of the Otterhead group. It, along with Vessels 98 and 105, has round stamps in place of the more typical punctate. The interior of the sherds representing this vessel are not smoothed consistently and some roughness remains. Surface cracks are seen on the interior as well, likely due to rapid shrinking of the exposed surface during drying. This kind of differential drying would require desiccating conditions like sun and summer winds.

Vessel 90

This pot was recovered from Unit B1. This vessel is designated as originating from Level 3A.

Vessel 92

This Otterhead pot, occurring in Unit A5, has a more Laurel-like feel than many of the others, but is still considered a Rainy River Coalescent phase vessel. Vessel 92 has a distinctively high punctate and boss, as well as extremely short oblique CWOI on the interior and exterior lips as well as on the rim. Palpable Laurel character does not occur in the later levels.

Vessel 94

The specimens of this vessel were in Units B3, C3, C4, D3, and E4, showing a wide scatter. The decorating tool of this vessel was sharp-edged or bevelled which created a distinctive V-grooved impression, which added to the depth of the impressions and the distinctive appearance of this Rainy River DDC, Coalescent vessel. It is combed and the punctates and the corresponding bosses are very well defined. A row of crescentic stamps below the horizontal CWOI put it definitively into the Rainy River realm. This pot may be interpreted as the work of the same maker as that of Vessel 113.

Vessel 95

This Otterhead vessel, from Units C7, C10, and E6, is typical, but for the uneven heights of the punctates and the same angles used for the oblique CWOI placed on the rim and on the upper neck.

Vessel 97

This pot was recovered from Unit E2. The oblique CWOI on the rim and below the exterior lip are carefully aligned at the same angle, meeting at the exterior lip to produce a continuous line. This vessel has in inward bevel to the rim, as well, which is also unusual for Level 3.

Vessel 98

The less oblique CWOI and combing are shared with Vessel 88, but Vessel 98 has the more typical thickness for the Otterhead type. This pot also has very large round stamps. At 7.5 mm in diameter, they are roughly twice the size of the usual. It was located in Units E3, E5, and E8.

Vessel 99

Excellent execution and finish might be the way to characterize this vessel. It stands out amongst the Otterhead type. It seems as though the overall form may have been somewhat different as well, more globular and more defined shoulders. The decorative impressions are fine, made with a small diameter decorating tool with very fine wrapping. The punctates are the typical size, just under 4 mm. This vessel occurred in Units E6 and E8. It is also recorded from Unit D4 in Level 2 and Units E4 and E6 in Level 3A.

Vessel 100

This pot was located in Units A9 and E6. Vessel 100 combines merged characteristics of the Otterhead type and the DDC Coalescent vessels of Level 3 (Vessels 94 and 113). Because of this, it will remain as undefined as the relationship between the two is not fully understood, if there even is one. The CWOI are large dimension and open spaced. The punctates and bosses are high as are the horizontals. The neck is straight with an outward lean and expanding in thickness toward the interior. The pronounced neck and shoulder is not typical for the Otterhead type but it isn’t for the Coalescent DDC type either.

Vessel 101

This vessel was recovered from Units D6 and E6. Very fine CWOI, no punctates, and the thin vertical straight neck isolate this vessel from its contemporaries in this collection, as does the unsmoothed neck. The impressions are applied reverse to the typical, possibly a left handed decorator.

Vessel 102

The rim of this vessel, found in Unit E8, is all there is to work with, but it has some interesting characteristics. The rim was squared by compression and moulded flat. The decoration was applied to the rim and then it was smoothed and squared further, flattening the surface and leaving a very smooth finish. The interior lip expands inward, this is interpreted as being the result of the compression and modelling of the rim. The interior lip has horizontal striations which appear to be decorative but this cannot be confirmed conclusively.

Vessel 103

This tiny highly decorated sherd, from Unit C5, appears to represent a small pot. It is difficult to estimate how small but a diameter of less than 13 cm is likely. There are two rows of very small linear stamps on the interior below the lip. This is the only Little Owl vessel with interior decoration on Level 3, although Vessel 81 from Level 1 shares this attribute.

Vessel 104

This artifact was recovered from Unit E4. Vessel 104 was recovered from both Level 3 and Level 3A, one sherd from each and, thus, it is not committed to either. With the combination of combing and oblique ovoid stamps, this pot is placed in the Coalescent phase of Rainy River development. No rim or upper neck has been recovered, only lower neck. This portion suggests a steep shoulder and vertical neck profile.

Vessel 105

Like a few of the other Otterhead vessels, Vessel 105 has an essentially straight neck with a slight flare expressed only at the upper neck. It has round stamps instead of punctates, slight bossing is present. The rim appears to have been smoothed after decoration. It occurred in Units A8 and C10.

Vessel 106

Like Vessel 103, Vessel 106, recovered from Unit A8, is a proportionately small scale vessel when compared to the rest of the Level 3/3A materials. It is not as small as Vessel 103 however. Vessel 106 displays the balanced chevron typical of the Little Owl type. The neck profile is straight with a slight tendency toward incipient S.

Vessel 107

This pot, from Unit A8, is represented by an incomplete profile, missing most of the neck and all of the rim. The distinctively small stamps and very fine horizontal CWOI allow these two sherdlets to be declared a vessel, as no other vessel appeared to be a likely marriage.

Vessel 108

This pot was recovered from Units B4 and B6. Unique in the assemblage, Vessel 108 has a combination of decorative motifs which do not appear on any other vessel. Yet, when the individual elements are compared to the rest of the collection, each element is found elsewhere on one vessel or another, whether it is Level 3/3A, the Level 2 Complex, or Level 1. The peculiar neck profile, however, appears only on this vessel (except perhaps Vessel 118).

Vessel 112

This version of an Otterhead type vessel, located in Unit C9, has a few characteristics of note. The rim has pronounced interior and exterior lips. It is the only one of the group to have this attribute. Only the cord impressions are visible from the shallow CWOI. Two examples of secondary modification are observed, a punched boss to complete perforation and scraping to reduce the projection of the interior lip.

Vessel 113

Heavily impressed CWOI, with combing, punctates and bosses, and oblique stamps completing a pseudo-chevron are the suite of motifs and elements used to decorate this vessel. It is interpreted as being the work of the same individual as Vessel 94. The specimen was located in Unit B4.

Vessel 114

Little can be said about this small sherdlet located in Unit C4. It has oblique CWOI on the rim and short CWOI below the exterior lip, above horizontals. The rim and neck appear to have been smoothed after decoration. This may be an Otterhead vessel.

Vessel 118

This vessel, occurring in Unit A7, appears to be an Otterhead pot as well, but subtleties of the neck profile suggest some differences. Although the neck profile is incomplete, it looks as if this vessel may have had the same two-stage angular progression as seen on Vessel 108. If this is the case, then there are some interesting connotations regarding possible direct relationship between the proposed Otterhead type and Vessel 108.

10.3.2.2 Undesignated Vessel

Several shoulder sherds (DlLg-33:08A/15247, 24825, and 24885 from Units C1 and D2) with twinned parallel rows of small asymmetrical to roughly ovoid stamps were recovered (Plate 10.3-1). The surface treatment was identified as textile impressed, not sprang. This may be a case of default as the sherds are all small and sprang weave impression is not ruled out as a possibility.

10.3.2.3 Body Sherds

A total of 2561 body sherds and sherdlets were recovered from Level 3, a total weight of 3185.9 grams. This represents 88.2% of the total number of sherds in Level 3. The average body sherd weight is 1.2 grams. Similar to the rim sherds, this is lower than that of Level 3A.

Plate 10.3-1: Stamped Shoulder Sherds from Level 3

10.3.3 Manufacturing Characteristics

Paste quality ranged quite widely from very well consolidated to poorly consolidated. In general terms, the poorly consolidated material was much less common. Colour ranged from brown to tan, buff(neutral) to light grey, and dark grey/black. Differential colouring between interior and exterior surfaces was typical. Thickness was typically medium to thin, 2.5-6 mm. The dominance of sprang weave, as the identified surface impression, implies bag-built vessels were the norm. Vessel rim apertures ranged from under 15 cm to almost 30 cm in diameter.

10.3.3.1 Surface Treatment

Level 3 was 70.2% sprang, 17.7% textile impressed, 2.2% obliterated textile, and 9.7% was recorded with no discernable surface treatment (Table 10.3-1).

LEVEL 3	52 units	WT (grams)	QTY	%
SPRANG		3166.7	1940	70.6
TEXTILE IMPRESSED		784.7	661	17.5
OBLITERATED		98	43	2.2
VERTICAL CORD		-	-	-
SMOOTH		1.5	1	0.1
No Recorded Surface		436.5	260	9.7
TOTAL		4487.4	2905	100.1

Table 10.3-1: Types of Surface Treatment Recorded in Level 3

10.3.4 Residue Analysis

Varying degrees of residue were present in the materials recovered from Level 3. DlLg-33:08A/13291, from Vessel 73, was chosen for submission for analysis to Paleo Research Institute in Golden, Colorado (Appendix B).

The pollen recovered from the specimen provides a standard environmental profile with elevated frequencies of Chenopodiaceae/Amaranthaceae (pigweed family) and Poaceae (grass family). In addition, pollen from *Allium* (wild onion) suggests that these three groups were cooked in the vessel. The residue analysis indicated the presence of *Allium* (wild onion), *Atriplex* (saltbush) fruit, *Rosa* (rose) hips, *Cleome* (beeweed) seed pods, *Helianthus* (sunflower) seeds, and *Pinus* (pine) nuts. Strong positives were recorded for *Phaseolus* (beans) as well as signatures for cooked venison and fish.

10.4 Lithic Artifacts

10.4.1 Lithic Tools

The Level 3 lithic assemblage contains a total of 34 tools at weighing 145.7 grams (Table 10.4-1). The recoveries in the excavated area of Level 3 are constrained to a rectangle from Units A1 and E1 to Units A10 and E10 (Figure 10.1-1) The lithic materials are associated with hearth features, which is not an unexpected finding. It is interesting to note that the hearths in Units A1 and B3 have no tools associated with them at all. This may be an area that was associated with other activities. There are a wide variety of tools recovered in Level 3. There is one big change from the previous levels; whereas in Levels 1 to 2D, undifferentiated chert is the dominant material type, in Level 3, Knife River Flint is in the majority with 23 tools manufactured; chert by comparison has four tools manufactured from it (Table 10-4.2). This may suggest a change in trading patterns, or a change in the peoples using the excavated area in the time between Level 3 and Levels 2D to Level 1.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	4	11.76
Scraper	8	23.52
Biface	4	11.76
Knife	1	2.94
Retouched Flake	6	17.65
Utilized Flake	8	23.52
Drill	1	2.94
Whetstone	1	2.94
Palette	1	2.94
TOTALS	34	99.97

Table 10.4-1: Lithic Tool Types in Level 3

LITHIC MATERIAL TYPE	QUANTITY	%
Knife River Flint	25	73.53
Chert (Undifferentiated)	3	8.82
Selkirk Chert	3	8.82
Jasper	1	2.94
Granite	1	2.94
Sandstone	1	2.94
TOTALS	34	99.99

Table 10.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 3

The tools will be described by type on an individual basis. The measurements (the metrics) of these artifacts will be illustrated in tables following each tool type or within the artifact description for smaller groupings. The distribution of the tools is shown in Figure 10.4-1.

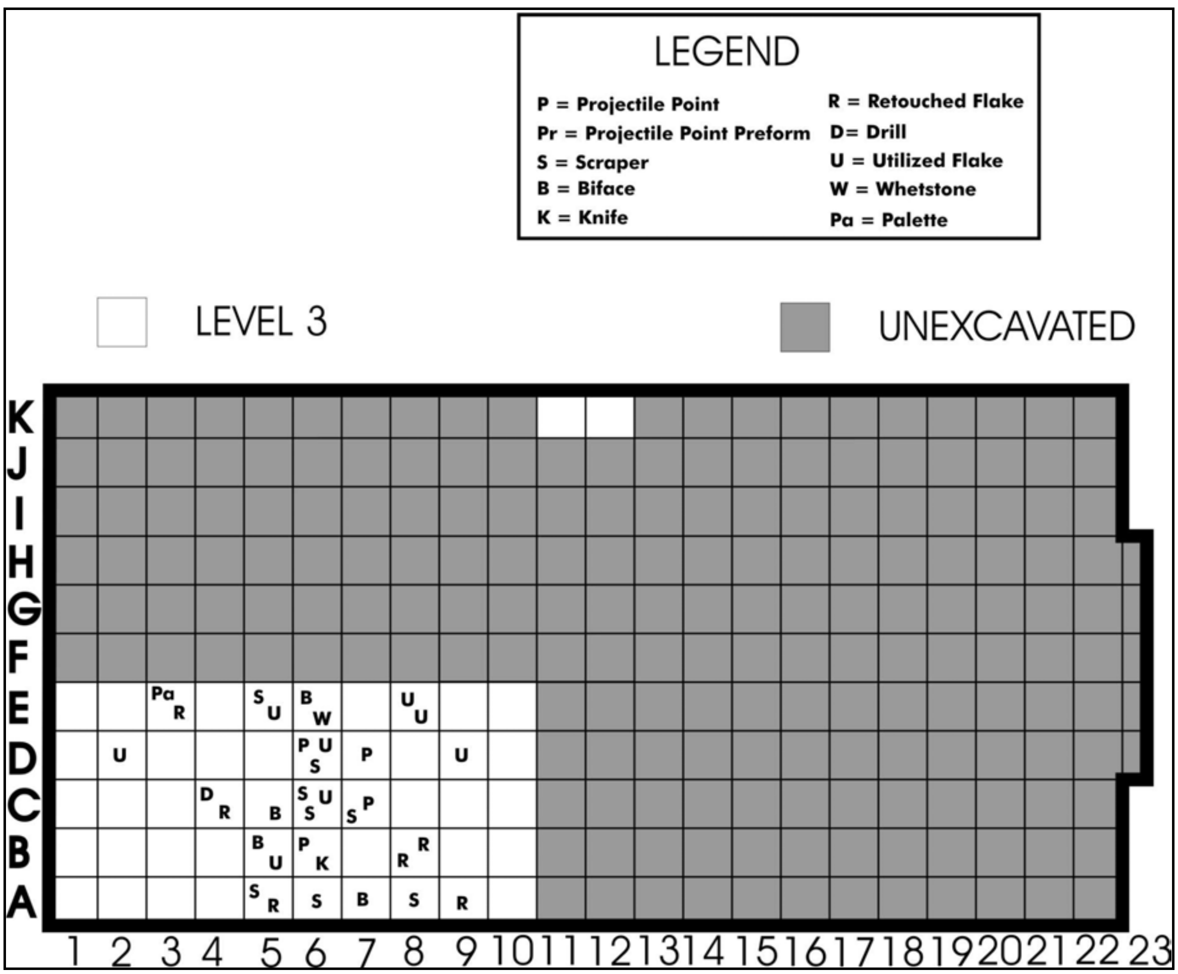


Figure 10.4-1: Distribution of Lithic Tools in Level 3

10.4.1.1 Projectile Points

Plate 10.4-1: Dorsal and Ventral Faces of DlLg-33:08A/15523

Four projectile points were recovered. The measurements are listed in Table 10.4-3 and the artifacts are depicted at twice actual size.

DlLg-33:08A/15523 is a jasper Prairie Side-Notched projectile point which was located in Unit C7. This point is very nearly complete; only the left shoulder is broken. It was created out of a preform (the ridge running down the center of the dorsal face is the indicator). The ventral face is heavily rippled and the curvature of the rippling indicates that the original proximal end would have been at the tip of the point. The base is thinned with eight flake scars on the ventral face and five on the dorsal, ranging from 1.0 mm to 2.9 mm on the ventral face and ranging from 0.6 mm to 4.6 mm on the dorsal.

Plate 10.4-2: Dorsal and Ventral Sides of DlLg-33:08A/17710

DlLg-33:08A/17710 is a KRF Triangular projectile point located in Unit D7. This lovely little piece has minimal working on its faces. Created from a single flake with a recognizable bulb of percussion, no shaping flaking was required for this point to be used. The edges of the point are serrated and some basal knapping has occurred, but none of the flake scars move more than 4.63 mm into the body of the point. On the ventral face's left edge, no knapping occurs at all from the base to 15.32 mm, where knapping for tip reduction and shaping begins. From the tip, this knapping measures 6.32 mm maximum and there are only three flake scars visible on that edge. On the opposite edge (still on the ventral face), fifteen flake scars run along that edge. The maximum depth of these flake scars is 1.66 mm. They range in size from 0.66 mm to 1.67 mm and are very regular and quite deep. Considerable pressure must have been used to create this regular, serrated edge. No basal thinning at all has taken place on this ventral face. On the dorsal face, considerable basal thinning has occurred. There are thirteen flake scars on the base, three of which terminate in step fractures. On the left edge, eight sharpening flake scars are visible, creating a serrated edge. There is a small gap (2.27 mm) between this group of flake scars and the tip shaping flake scars, of which there are only three. On the opposite (right) edge, fourteen flake scars have been created with high pressure flaking to create a serrated edge. Twelve of these flake scars are within .04 mm of 1.35 mm, which is remarkably consistent flaking. The remaining two flake scars are 2.0 mm and 2.3 mm.

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
15523	22.10	16.40	4.70	15.00	11.50	3.20	4.40	45	110	68
17710	21.00	14.57	2.87	11.30	n/a	n/a	n/a	n/a	n/a	77
18288	15.96	13.85	4.02	13.85	10.78	3.84	3.35	82	80	45
18570	24.74	14.14	5.16	14.24	9.48	3.31	4.59	51	84	52

Table 10.4-3: Measurements of Projectile Points from Level 3

Plate 10.4-3: Both Faces of DlLg-33:08A/18288

DlLg-33:08A/18288 is a chert Prairie Side-Notched projectile point from Unit B6 which has been heat treated/burnt. This point is roughly made, with one notch somewhat pronounced and the other barely notable, the tip off-centered, and the sides of the point unequal. It should be noted that this point has the smoky quality that often comes with being placed in or near a fire, which renders flake scar counts difficult. The tip appears to be shouldered in that there is a step on each edge. This may indicate that this is not a point but a hafted drill; two flake scars on the ventral face at the tip lend support to this. However, reuse is common, so what was once a point may have become a drill or the two flake scars creating 'shoulders' at the tip could be simply breaks. The basal thinning on the ventral face consists of two flake scars, 3.0 mm and 4.6 mm. On the left edge, one flake on the base prior to the notch indent is 2.48 mm. The notch itself is created from a single flake scar 3.84 mm wide. This notch is barely visible and very shallow. Five flake scars make up the remainder of this edge. These flake scars range from 1.38 mm to 2.81mm, three of which end in hinge fractures. Four flake scars on the right edge from the tip to the notch range from 1.89 mm to 3.76 mm. On the dorsal face, the basal thinning consists of four flake scars, ranging from 1.12 mm to 2.55 mm. The left edge consists of one flake scar at the base prior to the notch point and is the same size as the base itself. Above the notch are four flake scars, ranging from 1.74 mm to 3.41 mm. This last flake scar is one of the two 'shoulder-creating' flake scars. The other shoulder creating flake scar is just below the tip on the opposite (right) edge and is 4.86 mm. There are hints of use wear striations in this flake scar, however these could be naturally occurring defects in the material itself. Following this flake scar down to the right side notch is one flake scar at 4.52 mm. The notch is, as mentioned above, more a tendency toward a notch than a clearly defined notch. Two flake scars make up the base , both are 0.82 mm.

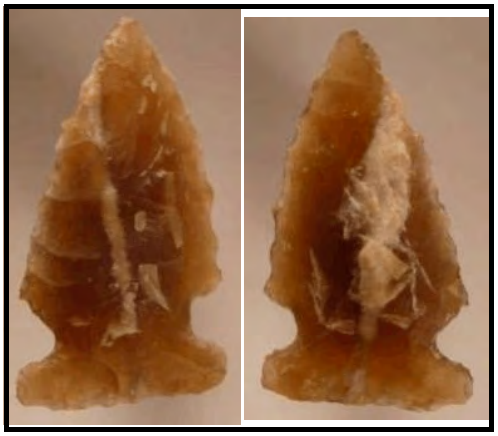


Plate 10.4-4: Dorsal and Ventral Faces of DlLg-33:08A/18570

A complete Knife River Flint Plains Side-Notched projectile point, DlLg-33:08A/18570, was recovered from Unit D6. This beautifully made projectile point is complete with a lower-quality inclusion running at an angle across the dorsal face (it can be seen from the proximal face due to the material's natural translucency). The base of the point has been thinned with one large flake scar on the dorsal face, which terminated in a strong step-fracture 6.85 mm up from the base. On the ventral face, two flake scars exist, one from each side of the large dorsal flake scar. These are 3.73 mm and 4.59 mm wide. The ventral face is covered with invasive knapping. The central ridge normally only seen on the dorsal face of a blank is visible on this face due to the invasive knapping. Nine flake scars are visible on the left edge, ranging from 1.3 mm at the tip to 3.13 mm at the base, with most closer to the 3.13 mm range. Three flake scars terminate in step fractures on this edge. On the opposite (right) edge, nine flake scars are visible, ranging from 1.51 mm at the tip to 3.36 mm at the base. Again, the majority of flake scars are in the 3.36 mm range. On the dorsal face, the left edge has eight flake scars, ranging from 2.2 mm to 5.35 mm. There are seven flake scars on the right edge, five of which terminate in step fractures. The result of the hinge fractures at the base and on both edges is a comparatively large, off-center ridge 9.8 mm up from the base. The notches of this point are unequal, 3.58 mm on the right notch versus 4.79 mm on the left notch. Both shoulders appear to be complete. Grinding/crushing marks are visible in both notches. These marks could be intentional in order to prevent the notches from damaging the hafting material or unintentional if further reduction was attempted. The base of this point shows no signs of grinding.

10.4.1.2 Scrapers

Eight scrapers occurred in this horizon. Their metrics are provided in Table 10.4-4. Illustrations are at two times actual size.

DlLg-33:08A/14947 is a broken KRF end scraper recovered from Unit A5. This end scraper has a steep working edge and was most likely broken during use and discarded. The proximal end of the tool has three flake scars. However, this is more likely one stress fracture event that broke the tool. Twelve flake scars across the working edge range from 0.7 mm to 4.0 mm. There is some polish on the ventral face in high spots and more on the edge itself. The working face has step fractures consistent with use wear, resulting in a 0.5 mm step. As this could have been removed fairly easily by a skilled knapper, this tool's edge was still able to be used prior to its discarding.

Plate 10.4-5: DlLg-33:08A/14947

CAT.#	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
14947	end	19.20	23.30	7.90	23.30	3.50	85
15451	end	32.50	32.90	7.40	29.60	5.10	58-67
16678	side	38.73	15.98	2.89	38.73	4.00	42
17617	side/end	25.22	29.44	5.17	E 27.56	E 3.80	E 82
					R 25.60	R 1.68	R 57
17880	end	38.67	16.60	5.90	12.42	2.76	77
18571	end	21.43	23.49	6.19	22.18	6.19	70
23688	edge	22.60	14.40	5.00	21.60	5.30	55
23694	edge	33.20	19.00	3.90	30.20	2.10	29

Table 10.4-4: Measurements of Scrapers from Level 3


Plate 10.4-6: DlLg-33:08A/15451

A broken chert end scraper, DlLg-33:08A/15451, was recovered from Unit C6. This scraper has a low working edge angle, 58°. The working edge is made up of one secondary shaping flake scar that has been further reduced at least twice; step-fracture scars terminate at the ends of steeply angled edge reduction flake scars. A total of fifteen flake scars make up the working edge, which is an average of 1.973 flake scars per millimetre. However, flake scars range in size from 0.5 mm to 5.8 mm across the edge.


Plate 10.4-7: DlLg-33:08A/16678

DlLg-33:08A/16678 is a broken KRF side scraper recovered from Unit E5. The Knife River Flint is high-quality material. The scraper is made from a long, thin blank. The striking platform and bulb of percussion are not present, however light rippling on the ventral face shows the original direction of knapping. It is broken in such a way that although there are the ripples from the removal of this flake from its core, the proximal/distal definition is not possible when it comes to analyzing the working edge. In other words, there are clear indications of how this tool was removed from the core, but no clear indications of which end of the tool could be called proximal or distal. Therefore, this tool will be described based on the evidence of a plunging flake scar at one end of the tool, consistent with the rippling patterns on the ventral face. The end with the plunging flake scar (the thinner end) will be regarded as the proximal end. The working edge is on the right and there are eleven flake scars ranging from 0.71 mm to 2.8 mm. These flake scars end at 20.33 mm (measuring from the base). There is a gap of 7.41 mm (no flaking on this face) followed by 5.54 mm of flaking with five flakes in that distance, then an unknapped area that terminates in one of the two breaks at the distal end of the tool. The worked edge is on the left. From the proximal end on that edge, 24 flake scars take up 29.44 mm. There follows a gap of 1.85 mm (no knapping), then 8.33 mm of flaking, which terminates at the aforementioned break. This last group of flake scars ranges from 1.33 mm to 3.01 mm. There is a medium polish all along the working edge, as well as numerous high polish areas on the ventral face of the tool. There is also some polish on the opposite edge, as well as some polish on the dorsal face near this opposite edge. This tool's knapping are all sharpening flake scars, the deepest any flake scar moves into the body is 2.70 mm.

Plate 10.4-8:
DlLg-33:08A/17617

DlLg-33:08A/17617 is a Knife River Flint side/end scraper which was located in Unit C5. This roughly triangular, multipurpose tool presents difficulties in analysis. Two edges have been extensively worked and knapped, yet one of them has a slight patination all along the working edge. The metrics on this edge are slightly misleading in that this edge slopes quite gradually from the opposite (proximal) end, yet the working edge consists of high-angled step fractures (77°) all across that working edge. The slight patination occurs below these step fractures, which means that there is a thin (0.62 mm) rounding all along that edge, rounding from the dorsal to the ventral face. Moreover, if the measurements of the working edge angle were not to take the step-fractures into account, this edge's working edge angle would be 41°. The dorsal face of this tool is very flat and seems to be mostly cortex. No knapping scars are visible on this face at all. All knapping appears to have taken place on the ventral face, and there the knapping is extensive and covers the entire face. The other working edge is adjacent to the edge delineated above, and is an edge more consistent with the metrics of scrapers; a steep working edge (77°) with consistent, overlapping knapping scars, which range from 1.91 mm to 3.41 mm, and some work-polish on the dorsal face and the working edge. The remaining edge consists entirely of a break which was the most probable reason for this tool's abandonment. It is not possible to discern if this tool was hafted or not due to the nature and angle of the break.

A complete KRF end scraper occurred in Unit A8. DlLg-33:08A/17880 has identifiable hafting wear at 17.05 mm from the proximal end. This hafting wear consists of a light polish along the ventral face and on each edge of the tool, also on the ventral face. Polish on the ventral face also is identifiable at 8.16 mm below the working edge. Some use wear polish is noticeable on the dorsal face, 16.59 mm from the working edge. There are three step fractures on this edge, which suggests that this tool was utilized after sharpening, but not for long as there is no real polish. The working abandoned after the edge was resharpened. The working edge has twelve flake scars ranging from 0.98 mm to 2.4 mm. The original bulb of percussion and striking platform edge itself has practically no use wear or polish on it, suggesting this tool was either lost or has been subsequently flaked away, but the rippling patterns on the ventral face strongly suggest that the tool was removed from the core at the opposite end from the working edge. There is one long, heavily rippled flake scar on the proximal end on the ventral face that is 24.01 mm long and terminates in a hinge fracture. The sides of the tool are steep, at 49° with sixteen flake scars removed from the left edge and eighteen flake scars on the right edge. On the ventral face, ten flake scars are on the right edge and eleven on the left. Flake scars on the edges range from 0.56 mm to 6.29 mm. The proximal end of the tool has been thinned with five flake scars on the ventral face and four flake scars on the dorsal. None of these flake scars end in step or hinge fractures and range from 0.81 mm to 3.31 mm. It should be noted that the majority of the flake scars on the proximal end are near the 8.1 mm size; the 3.31 mm flake scar is at the left edge and may have been as much reducing the left edge as thinning the base.

Plate 10.4-9: DlLg-33:08A/17880

Plate 10.4-10: DlLg-33:08A/18571

DlLg-33:08A/18571 is a broken KRF end scraper from Unit D6. This end scraper has been broken in at least two areas, one at the base of the tool, the other along the right side of the working edge. Most high areas on the rippling surface of the ventral face have medium polish on them, suggesting that this tool saw extensive use prior to its breaking and subsequent abandonment. There are some battering marks on the base (the point opposite the working edge) that suggest this might have been briefly used as a pièce esquillée, but the working edge has no battering consistent with such use. The dorsal face of this tool is (excepting knapped areas) cortex. The working edge is knapped entirely on the dorsal face; no knapping is visible on the ventral face at the working edge. Three flake scars on the ventral face's left side and four on the right are the only flake scars visible on this tool. The flake scars on the right edge could well have been done after the tool broke as their impact points have some battering on them, suggesting this may have been an opportunistic pièce esquillée. Twelve flake scars make up the working edge and these range from 1.52 mm to 4.39 mm. The right side of the tool, immediately below the working edge, has two large shaping/thinning flake scars; these are 2.74 mm and 4.44 mm, reaching into the tool as far as 10.93 mm. There is a break on the left side at the working edge, but below this are three shaping flake scars, 2.78 mm and 5.73 mm. The third is broken at the working edge and no dimensions are possible for this flake scar.

DlLg-33:08A/23688 is a KRF edge scraper recovered from Unit A6. This edge scraper is a classic 'clamshell' conchoidal flake. The unifacial knapping on this tool's dorsal face is purely edge sharpening as approximately 50% of the edge is unworked. There are eighteen flake scars in total on the ventral face. There are no flake scars showing so no material was purposefully removed from the dorsal face. There are use wear flake scars on the dorsal face, but no real polish on any surface of this tool. Overall, this tool has indications that it was either heat-treated or burnt. As this is a KRF flake (which is usually a higher quality than many cherts) and KRF is only infrequently subject to heat treating, it is most likely that this tool was lost, abandoned, or discarded near or in a hearth. The dorsal face of this tool is entirely cortex.

Plate 10.4-11: DlLg-33:08A/23694

DlLg-33:08A/23694 is a broken KRF edge scraper recovered from Unit C6. This edge scraper is broken obliquely across the face of the tool. At the working edge, the break has been reworked in a slightly hooked form which is very similar to some gravers. There is very light polish on this tip, but no scarring that would indicate graver use. The polish on the dorsal face at the tip runs along a ripple that would indicate this kind of work. The working edge is on the left edge and runs from the base of the tool to the tip. Knapping in shaping form, edge reduction, and sharpening forms can be seen along the working edge and is unifacially on the dorsal face. There are use wear flake scars visible on the ventral face as well, but these do not appear to be purposeful flaking patterns. Starting at the base of the tool, there are three shaping flake scars, 2.8 mm, 1.2 mm, and 2.9 mm in width, followed by an 8.0 mm edge reduction flake. The rest of the flake scars along the working edge are sharpening flake scars and range in size from 0.7 mm to 1.7 mm. There are several areas of polish on the dorsal face, most of which follow the ripples caused by prior flaking off the core from which this tool came. The ventral face has six use wear flake scars near the center of the working edge and medium polish moving from these use wear flake scars across the face of the tool up to 50% of the face.

10.4.1.3 Bifaces

Plate 10.4-12:
DlLg-33:08A/14838
(2x actual size)

Four biface fragments were recovered in this level. The metrics are listed in Table 10.4-5. A broken chert biface, DlLg-33:08A/14838, was recovered from Unit A7. The metrics on this tool are slightly misleading as the tool flares very widely from the base. Basal width is 10.1 mm and tool width at the break is 26.0 mm. There is a cortical presence on the dorsal face. The right hand edge consists of large shouldered flake scars, one of which is 8.8 mm.

A broken Selkirk Chert biface, DlLg-33:08A/16830, was recovered from Unit E6. This tool has eight flake scars on the dorsal face and three on the ventral. It is broken obliquely across the faces and was most likely broken in manufacture. It is also possible that the ventral face spalled off during manufacture. Flake scars range in size from 3.7 mm to 7.2 mm, resulting in a serrated edge.

DlLg-33:08A/17618 is a broken KRF biface from Unit C5. This artifact has been defined as a biface primarily because it is only a small section of a larger tool and is of a shape that would not lend itself to identification as the working edge of a scraper. It is not inconsistent with the base of a scraper, but there is no proof either for or against this. Suffice it to say that this is a bifacally flaked tool remnant. The shape is a parallelogram with two long sides, one is the base, the other the broken edge, and two sides that move from the base in an expanding line to the edge of the break. Flake scars range in size from 1.96 mm to 5.45 mm.

A broken biface made of Knife River Flint occurred in Unit B5. DlLg-33:08A/18212 is the broken end of a tool, most likely a scraper as there is some polish on one edge and some slight polish on one face near the working edge. However, as only 5.37 mm of the working edge exists on this artifact, no definitive identification can be given to it.

10.4.1.4 Knife

Plate 10.4-13: Obverse and Reverse Faces of DlLg-33:08A/18289 (2x actual size)

DlLg-33:08A/18289 is a KRF knife from Unit B6. Once tentatively identified as a projectile point preform, this artifact is a bit of a puzzle. It has the general shape of a large hafted knife and some work polish on the edges, but is extremely rough in form with step and hinge fracturing over both faces and at various spots along all edges. The material itself is medium to low quality, which may have been an influence in the creation of this tool. The overall width and length of this knife would make it a candidate for either the Plains or Prairie Side Notch traditions as even with reduction it would fit well within the limits of these types, but the presence of use wear polish points to utilization. There is a break at the base on one edge that may have been the reason for this tool's abandonment, but the break does not render this tool useless. The base of the knife has been thinned on one face with at least two large flake scars 3.0 mm and 5.4 mm in width. The 3.0 mm flake scar's length has been obscured, but the 5.4 mm flake scar is 11.24 mm long and terminates in a step fracture. Flake scar counts on this tool's edges have not been completed due to the random nature of the flaking, which completely covers both faces of the tool. One face has a step-fractured high point that would require major knapping surgery to reduce; this could have been another reason for this tool's abandonment. The overall metrics are listed in Table 10.4-5.

10.4.1.5 Retouched Flakes

A total of six retouched flakes occurred in this horizon. The measurements are listed in Table 10.4-5. DlLg-33:08A/15376 is a broken KRF retouched flake from Unit C4. Not much of this flake's original working edge remains; two separate breaks, one at the proximal end and one along the right edge preclude much information from being gained from metrics. Nine flake scars make up the entirety of the working edge on the ventral face and eleven on the dorsal face. Dorsal face flake scars range from 0.5 mm to 4.2 mm and the ventral face flake scars range from 0.5 mm to 2.9 mm. No discernable use wear or polish is present.

A KRF retouched flake, DlLg-33:08A/16594, was recovered from Unit E3. This thin KRF flake has very light knapping scars along one edge, ranging from 0.7 mm to 1.2 mm. The flake scars are at the distal end on the left edge and are taken off the dorsal face. They are uniform and dense in distribution, 24 flake scars in total along an edge that is 18.2 mm long. This is an average of 0.75 flake scars per millimetre, which is very fine work. These sharpening flake scars are on the face of six larger edge reduction flake scars. The longest of the sharpening flake scars moves 0.7 mm into the tool. The tool is broken at the distal end of the working edge.

DlLg-33:08A/19077 is a KRF retouched flake recovered from Unit A9. This flake has some unusual attributes to it. Its shape could easily be mistaken for a small triangular point preform, but there is high polish on at least two spots that suggest this tool was utilized as is. Polish indicates use and a preform would not have use wear on it. Furthermore, the flake is comparatively thick at its proximal end and slopes very sharply to a tip that has been knapped to further thin it. On the ventral face, only five small flake scars are visible. These are 1.4 mm below the tip and range from 0.79 mm to 2.9 mm. On the dorsal face, the base of this tool has been battered fairly heavily, suggesting that this artifact may have been used as a splitting tool. The sharp edge would be placed on the object to be split and then struck with a hammerstone to drive the split wider. However, the lack of damage at the tip and the polish on the dorsal face at the tip suggest otherwise. There are two areas on the right side of the tip that have extremely high gloss. These spots appear to have been worn away slightly as well. Beside and below it, there is an area of striations that run counter to the naturally occurring striata that KRF often has, suggesting that this area was worn during use. However, these striata do not move in the same way as the high polish areas. The knapped working edge of this tool consists of twelve flake scars; all of these are on the right edge of the tool and range from 0.75 mm to 2.34 mm. The central ridge of this face also has a medium to high polish on it.

DlLg-33:08A/23675 is one of two KRF retouched flakes occurring in Unit B8. At first glance they seem to refit, but each has a bulb of percussion, therefore there are two tools here. DlLg-33:08A/23675 has sharpening scars along the left edge. These scars are on the dorsal face. The flake scars range from 0.9 mm to 1.7 mm. The flake is broken at an oblique angle (110º) across the tool. There are hints of use wear along the opposite edge, but this is not definite. The dorsal face of this tool is cortex. There is hematite staining present.

A KRF retouched flake was recovered from Unit A5. DlLg-33:08A/23700 has the working edge on the left edge and has been retouched on the dorsal face. Sixteen overlapping flake scars along the

20.7 mm length of the working edge averages to 1.3 flake scars per millimetre. Polish on the ventral face is quite clear and follows the high ridges of the rippling pattern that resulted from this flake being removed from the original core with an average of 4.5 mm from the working edge. The working edge is slightly incurvate (-0.9 mm).

DlLg-33:08A/27304 is the second KRF retouched flake from Unit B8. This tool is unifacially flaked on both edges. The left edge is knapped on the dorsal face and the right edge is knapped on the ventral edge, although this does not make this tool a biface. Flake scars on the right edge range from 0.9 mm to 1.7 mm, which is very similar to DlLg-33:08A/23675. It may well be that these two flakes were worked by the same tools. The left edge has fifteen flake scars visible, all ranging again from 0.9 mm to 1.7 mm. There is hematite staining on this tool.

CAT. #	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
14838	biface	21.00	26.00	7.20	n/a	n/a	40-50
16830	biface	19.30	18.10	6.60	n/a	n/a	39
17618	biface	9.05	17.44	2.73	n/a	n/a	n/a
18212	biface	14.91	7.61	2.77	n/a	n/a	n/a
18289	knife	45.11	18.95	7.44	n/a	n/a	n/a
15376	retouch fl.	11.60	17.50	2.20	17.30	6.30	indeterm
16594	retouch fl.	32.50	24.50	2.70	18.20	2.30	indeterm
19077	retouch fl.	19.68	15.39	5.84	17.40	0.00	26
23675	retouch fl.	20.40	12.90	2.70	13.90	0.10	35
23700	retouch fl.	28.30	18.70	3.20	20.70	-0.90	37
27304	retouch fl.	15.20	14.30	2.90	11.40	-0.10	indeterm
15734	utilized fl.	19.32	17.51	2.01	17.55	2.64	43-47
16679	utilized fl.	46.14	27.81	8.23	46.18	6.11	39
18213	utilized fl.	38.15	13.07	4.51	12.55	2.75	25
18601	utilized fl.	27.62	26.19	9.40	20.50	-3.16	41
19487	utilized fl.	19.15	12.54	2.28	14.03	1.54	26
23691	utilized fl.	23.40	18.90	2.30	16.00	3.70	62
23695	utilized fl.	32.10	23.70	4.10	19.50	0.10	49
27305	utilized fl.	24.92	17.30	1.95	12.20	-0.01	26
23697	drill	14.70	12.60	2.40	31.60	10.70	indeterm

Table 10.4-5: Measurements of Flaked Lithic Tools (Excluding Scrapers) from Level 3

10.4.1.6 Utilized Flakes

Eight utilized flakes were recovered from Level 3. Their measurements are listed in Table 10.4-5. DlLg-33:08A/15734 is a Knife River Flint utilized flake recovered from Unit D2. This tool consists of a very thin flake with a visible striking platform and a bulb of percussion. It has flake scars that result from use wear along its working edge. This edge is more the result of a 'tool of opportunity', i.e., a flake retrieved and temporarily utilized, than as the result of any intentional knapping. This utilized flake is broken across the longitudinal axis.

DlLg-33:08A/16679, a Selkirk Chert utilized flake, from Unit E5, is a classical conchoidal flake; clamshell in shape with heavy rippling on the ventral face. The dorsal face of this tool is remarkably flat but the material is not of the highest quality. There is only a very mild amount of polish on the working edge and the edge itself consists of the kind of use wear fracturing normally found on working edges, the conchoidal type. The base of the tool appears to be broken off so it is possible that this tool was intended for hafting but the low quality of the material created a break that resulted in this tool's abandonment.

DlLg-33:08A/18213, a KRF utilized flake from Unit B5, saw light use at one end only. There is some slight polish at the edge and some on the ripples that result from this flake's removal from its core. Several conchoidal fractures along the working edge contribute to the evidence of this tool's use. This flake has a deep scoop effect that resulted from a prior blank being removed from the original core that was the result of a hard percussive hit. This flake, as well, was removed with the same technique. The striking platform is in the middle of the length of the flake and the working end is at the left extremity of the tool. Also, a small portion of the working edge's dorsal face may well be cortex; although it is right at the working edge. This area has such a sufficiently different quality of sheen that it can be safely called cortex and not work polish.

DlLg-33:08A/18601 is a Selkirk Chert utilized flake which occurred in Unit D6. This heat-treated flake has one large (23.11 mm) flake scar visible on the dorsal face to create a concave working edge. No other flaking is visible. The incurvate edge is work-battered and the edge is approximately 0.45 mm thick, suggesting that this tool was used until the edge was no longer sharp and the tool was then lost, abandoned, or discarded. No polish can be discerned, but there is considerable hematite.

A Knife River Flint utilized flake, DlLg-33:08A/19487, was located in Unit D9. This small flake has some knapping along one edge. The dorsal face has all knapping scars and the ventral face has no polish on it. With the dorsal face up, the knapped area is 13.5 mm long and consists of seven flake scars that range from 1.43 mm to 2.85 mm, with a maximum depth of 4.39 mm. Light to medium polish exists on the dorsal face. The flake scars on this artifact are the result of prior core reduction. This flake was used as a serendipitous implement as it had a sharp edge with existing undulating flake scars yielding a slightly serrated edge.

DlLg-33:08A/23691 is a broken KRF utilized flake recovered in Unit E8. This flake is actually two flake which do not refit. They will need to be dealt with separately. The larger of the two is what will be dealt with here. This flake is broken on both ends of the excurvate working edge. There is use wear along the edge and slight polish on the edge itself. There is some polish on the ventral face, but it is very light.

DlLg-33:08A/ 23695 is a utilized flake of KRF. It was recovered from Unit C6. This tool has a very flat working edge, which appears to be serendipitous (no knapping scars can be seen). There is some light polish along the edge. This tool probably underwent minimal use prior to its loss or abandonment.

DlLg-33:08A/27305 is a KRF utilized flake which occurred in Unit E8. This utilized flake is extremely thin at 1.95 mm and has use wear polish along one edge. The utilized edge is 12.2 mm in length and the use wear polish is evident along one face. The other face has no evidence of polish.

10.4.1.7 Drill

DlLg-33:08A/23697 is a broken Knife River Flint drill recovered from Unit C4 (Table 10.4-5). This tool has the end of the tip broken off which may have been the reason for its abandonment. The tip juts out of the left edge of the tool at an approximate 60º angle, so it is probable that this tool was a tool of opportunity. The dorsal face has a large ripple, the arc of which runs directly to the broken tip. Both edges of the tip are heavily impacted with conchoidal fractures and edge reduction fractures (which occur when the twisting action of drilling causes flakes to be removed under pressure). The tip itself is broken obliquely in a similar fashion as the flake scars which were removed from the working edge. There is some post-depositional patination near the shoulders of the tool as well. There are four small spots of high polish on the dorsal face, but as they are not associated with either the direction of the tool use or the area of useage, it is most likely that they are post-depositional.

10.4.1.8 Whetstone

DlLg-33:08A/16802 is a sandstone sharpening/whetstone from Unit E6. It measures 17.2 mm in length, 17.1 mm in width, and 9.4 mm in thickness. This tool is broken with a pronounced groove on the working face. The groove is 1.5 mm deep but uniform in its convex shape. Although nothing more can be gleaned from this tool in terms of its metrics, its existence is significant. Sandstone in this shape would not have been used as a sharpening tool for stone tools, but most likely would have been used for sharpening bone tools, such as needles.

Plate 10.4-14:
DlLg-33:08A/16802
(2x actual size)

10.4.1.9 Palette

DlLg-33:08A/16591 is a granite palette that was recovered in Unit E3. It has been shattered by heat. It is likely that this piece was thrown into or near a fire after it was no longer useful, although it is not possible to determine this for certain as the palette has crumbled into at least 20 pieces and will continue to undergo further degradation due to the nature of granite that has been pulverized. The main reason this piece is being defined as a palette is that there are several larger spalls that have two flattened faces. They are notably smoothened and the material overall (including the smaller spalls) have evidence of ochre staining scattered all over them, especially on the smoothened portions of the material.

10.4.2 Detritus

Detritus is a term used by archaeologists to define the waste material that results from the creation of a stone tool. Flakes are pieces struck off a suitable core that have not been further utilized (were they utilized they would be categorized as tools), and cores are the raw stone that flakes and tools are struck off of. After the core is too small to continue to flake off useful tools, it is abandoned.

10.4.2.1 Cores

DlLg-33:08A/15736 is a quartz core which occurred in Unit D2. This roughly triangular core has numerous inclusions in it (darker, more heavily crystalline quartz than the surrounding matrix) and is the probable reason for its abandonment. Loss, of course, is always possible. The center of this core is thinned across the hypotenuse of the triangle to 3.0 mm; two large flake scars on each face are responsible for this reduction.

DlLg-33:08A/18455 is a chert core recovered from Unit B8. This chert core has been reduced until it is exhausted; there is no evidence of bipolar reduction. One face has a very large hinge fracture. It is very roughly pyramidal in form and most faces have step and hinge fractures at their edges.

DlLg-33:08A/20323 is a Swan River Chert core from Unit D4. It has been exhausted; at least four large flakes have been taken off this core. One face only has a recognizable impact area. Not much more can be said.

A chert core, DlLg-33:08A/20835, from Unit B9 is roughly rectangular and flat in shape and has numerous flaking scars across both major faces. Both faces have deep hinge and step fractures across them. One face has two large flake scars, one of which terminates in a conchoidal step fracture. The other crosses the face of the core. The opposite face has five flake scars, two of which end in conchoidal step fractures, two end in hinge fractures, and one that appears to cross the face.

10.4.2.2 Flakes

Flakes are pieces of knappable stone that are struck off of either a core or struck off of a tool, either during the initial shaping stages of stone tool manufacture; primary and secondary decortication, secondary and tertiary shaping, or lastly as a thinning/sharpening flake. Very broadly speaking, flakes diminish in size from decortication to thinning/sharpening. This is not a hard and fast rule by any means. A hinge fractured flake scar may require a larger flake to be removed from the tool during tertiary shaping, for example, or a tool may have a section near a working edge that still has some cortex that may need to be removed late in its life. Further, a broken tool may be reshaped into another, smaller tool. It would essentially go through the process from secondary shaping to thinning/sharpening, and the resulting flakes would most likely be smaller than those that resulted from the tool's initial manufacture. Overall flakes can be cartegorized as to the phase of lithic tool manufacturing which they represent. The assemblage from Level 3 has representation of four of the five categories (Table 10.4-6, Figure 10.4-2).

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	14	25.8
Secondary decortication	89	45.8
Secondary shaping	24	33.8
Thinning/sharpening	380	52.3
TOTAL	507	157.7

Table 10.4-6: Frequency of Types of Recovered Flakes in Level 3

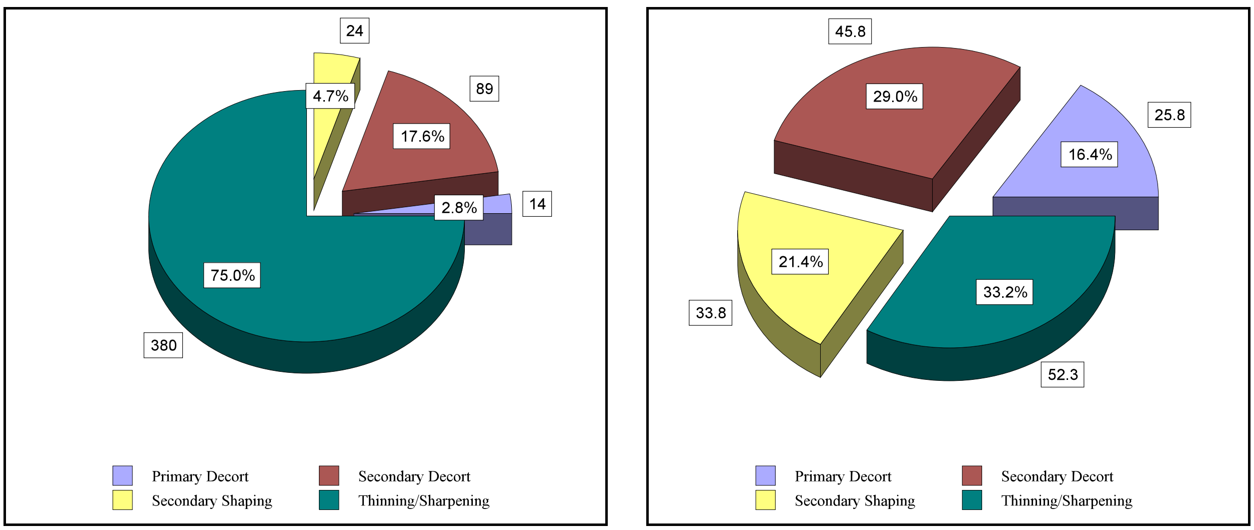


Figure 10.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

The category with the largest amount of flakes by both weight with 52.3 grams or 33.7% of the total and by amount with 380 flakes or 75.1% of the total is thinning/sharpening. Primary decortication flakes take up 2.8% of the total by amount and 16.6% of the total by weight. Secondary takes up 17.8% of the total by amount and 29.5% by weight. Although lithic tools were created in Level 3, much more thinning/sharpening flaking took place.

The flake distribution pattern is illustrated in Level 3 (Figure 10.4-3). The pattern associates clearly with the excavated hearth features. The highest concentration is directly associated with the hearths in Units B3 and B5 and the next highest concentration is associated with the hearth in Unit E5. Although Unit A10 has no associated hearth, it has the third highest concentration. It may be that excavations beyond the A line of units may reveal a hearth in the adjacent unexcavated area.

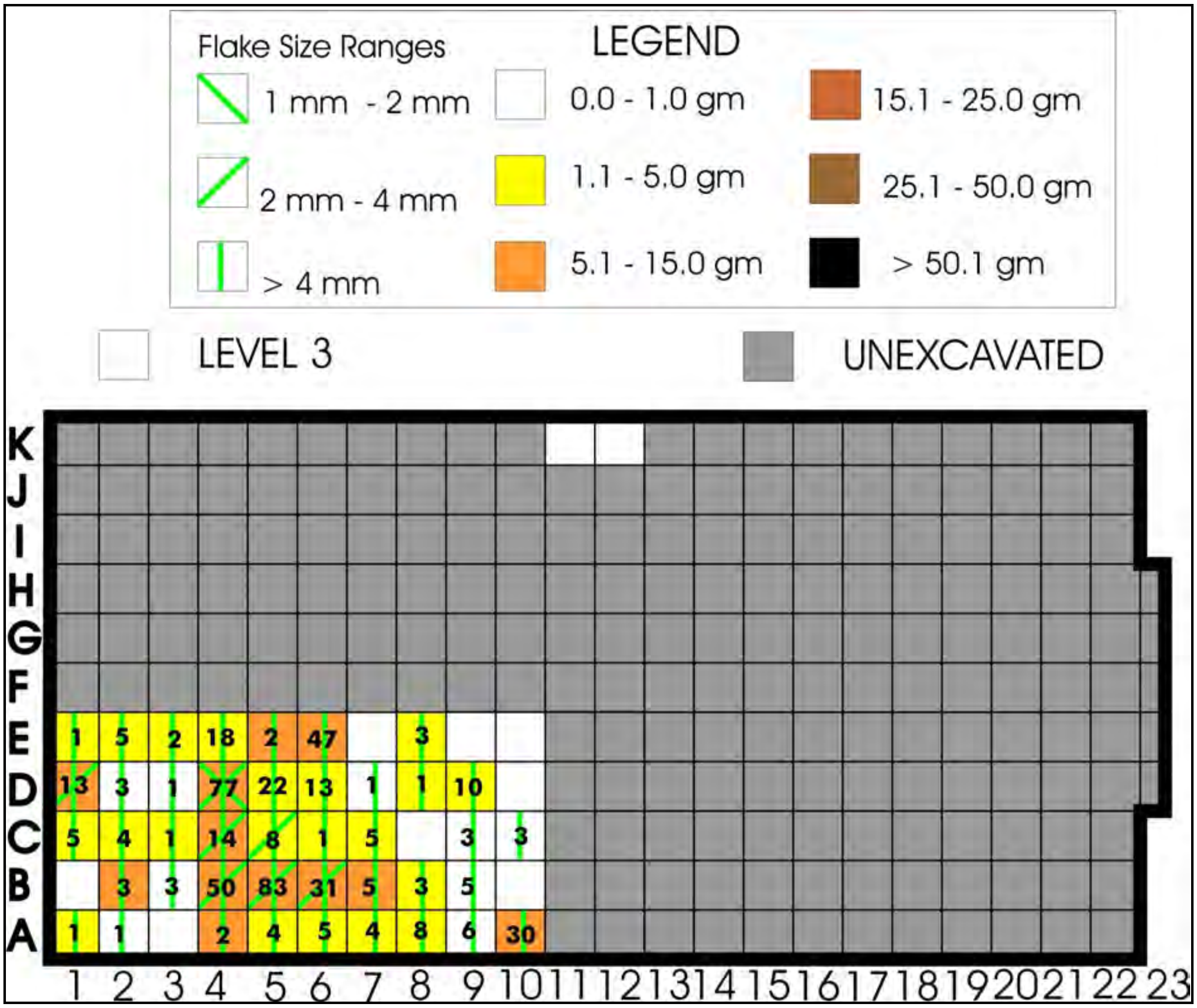


Figure 10.4-3: Distribution of Flakes in Level 3

There are 13 different types of stone among the flake assemblage for this level (Table 10.4-7, Figure 10.4-4). They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes.

The material type with the strongest representation in Level 3 is by far Knife River Flint, totaling 85.6% by quantity and 66.7% by weight. All other material types amount to 14.4% by quantity and 33.3% by weight. This is very different than Levels 1 to 2D, in which KRF was present, but undifferentiated chert was in the majority by weight and quantity. Knife River Flint is found in various places in what is now southwestern North Dakota and undifferentiated cherts can be found in a wide area ranging from the upper reaches of Lake Winnipeg to the banks of the Red River. This change in material type could suggest either a change in trading patterns, a change in the peoples who inhabited the living area excavated in Level 3, or a long trip by the peoples who inhabited Levels 1 to 2D, assuming that the peoples who used this site excluded its use by other groups. Knife

River Flint is often of a higher quality than chert (although chert is in itself an excellent knapping material) and may have been more desirable to the people who used this site. The Knife River Flint quarries in Dunn County, North Dakota are several days or longer by canoe and travelling this far may well cross over into other people's lands. Further research may reveal some of the reasons for this sharp change in material type. The single Hudson Bay Lowland Chert may suggest a trading pattern that wended its way from the Hudson Bay Basin as well.

MATERIAL	QTY	%	WT	%
Agate	1	0.20	4.6	2.92
Hudson Bay Lowland Chert	1	0.20	0.2	0.13
Jasper	1	0.20	4.9	3.11
Lake of the Woods Chert	1	0.20	0.1	0.07
Limestone	1	0.20	1.5	0.95
Schist	1	0.20	0.2	0.06
Selkirk Chert	1	0.20	0.3	0.21
St. Ambrose Chert	1	0.20	0.1	0.06
Swan River Chert	1	0.20	0.4	0.25
Denbeigh Point Chert	3	0.59	0.4	0.25
Quartz	7	1.38	15.1	9.58
Chert (Undifferentiated)	54	10.65	24.7	15.66
Knife River Flint	434	85.60	105.2	66.71
	507	100.02	157.7	99.96

Table 10.4-7: Frequency of Level 3 Flakes by Material Type

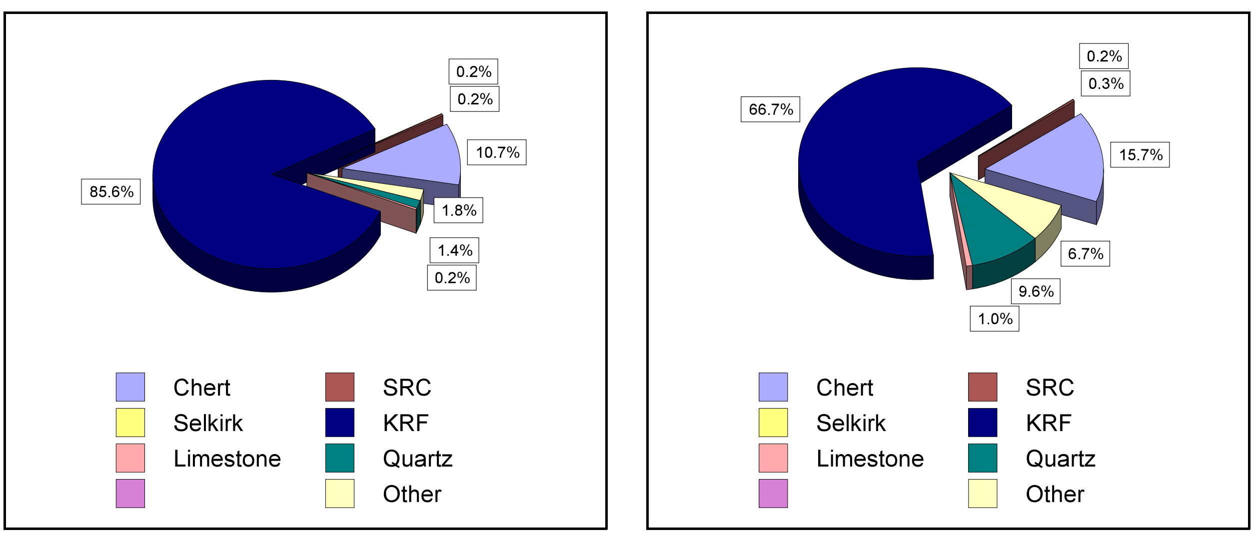


Figure 10.4-4: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

The distribution of material types across the excavation area (Figure 10.4-5) generally replicates the frequency distribution pattern.

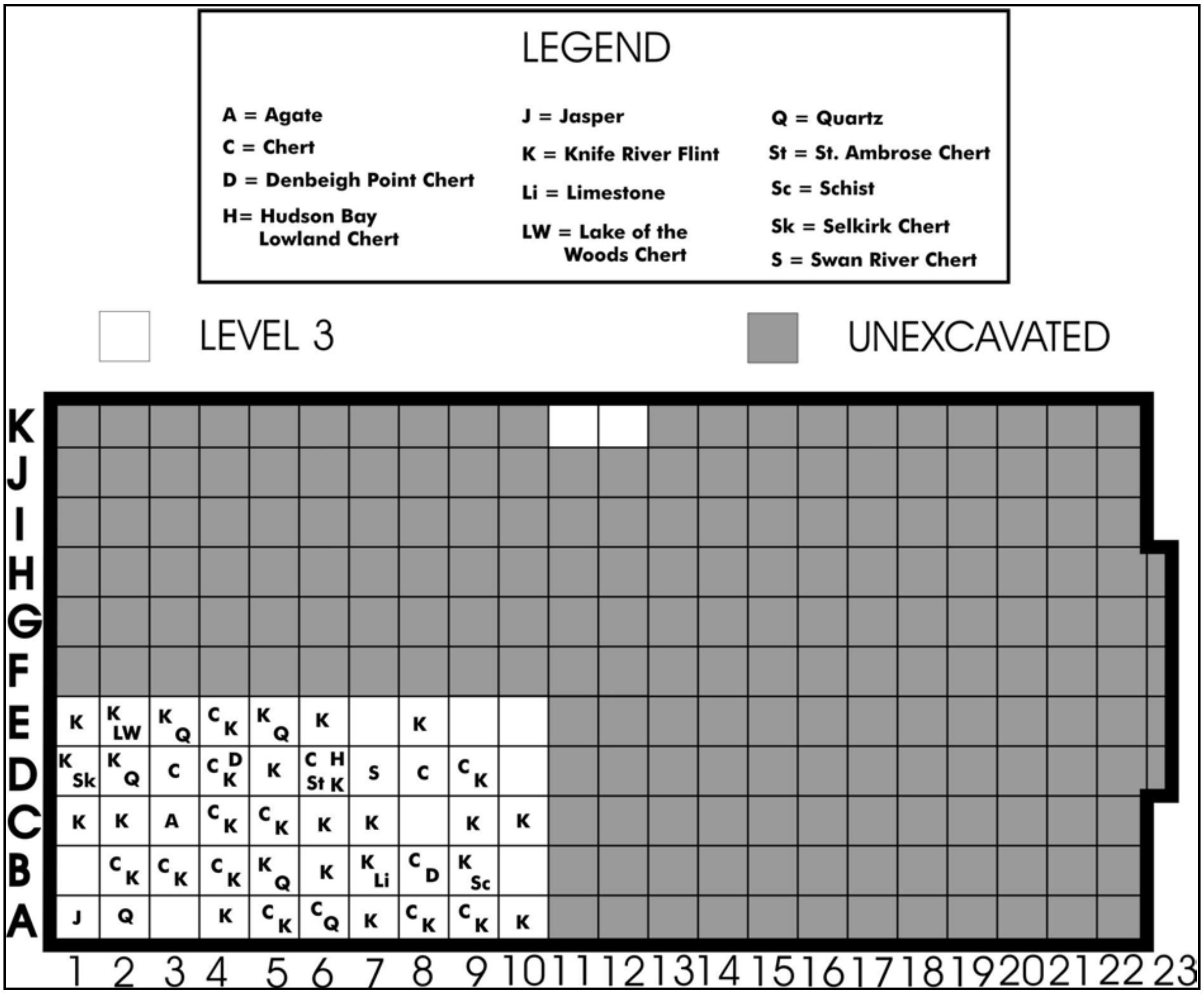


Figure 10.4-5: Distribution of Flakes by Material Type

10.4.3 Natural Object Modified

Two types of modified natural objects were recovered from Level 3: fire-cracked rock (FCR) and ochre. A cluster of 32 granite fragments of fire-cracked rock, weighing 63.4 grams, was recovered from Unit C3.

The second modified natural object is ochre. The ochre from Level 3 (Table 10.4-8) weighs in at a minute 1.5 grams, in 20 separate pieces scattered in rough uniformity across the excavated area. Ochre is a natural material that can be used as a short or long-term pigment. This may suggest that the people who inhabited this site either did not use ochre or did not use ochre in the excavated area, or even that a group different from those who inhabited Levels 1 to 2D inhabited Level 3. The ochre is distributed across Level 3 in association with the hearths uncovered in this level (Figure 10.4-6).

CAT. #	UNIT	QTY	WT	CAT #	UNIT	QTY	WT
15825	D5	1	0.1	18259	B5	1	0.1
16682	E5	5	0.1	18495	C8	1	0.1
17042	E6	3	0.1	18607	D6	1	0.2
17213	E8	1	0.1	19739	B4	3	0.1
17344	A6	2	0.1	20472	E10	1	0.1
17882	A8	1	0.4				
TOTAL						20	1.5

Table 10.4-8: Ochre Recovered from Level 3

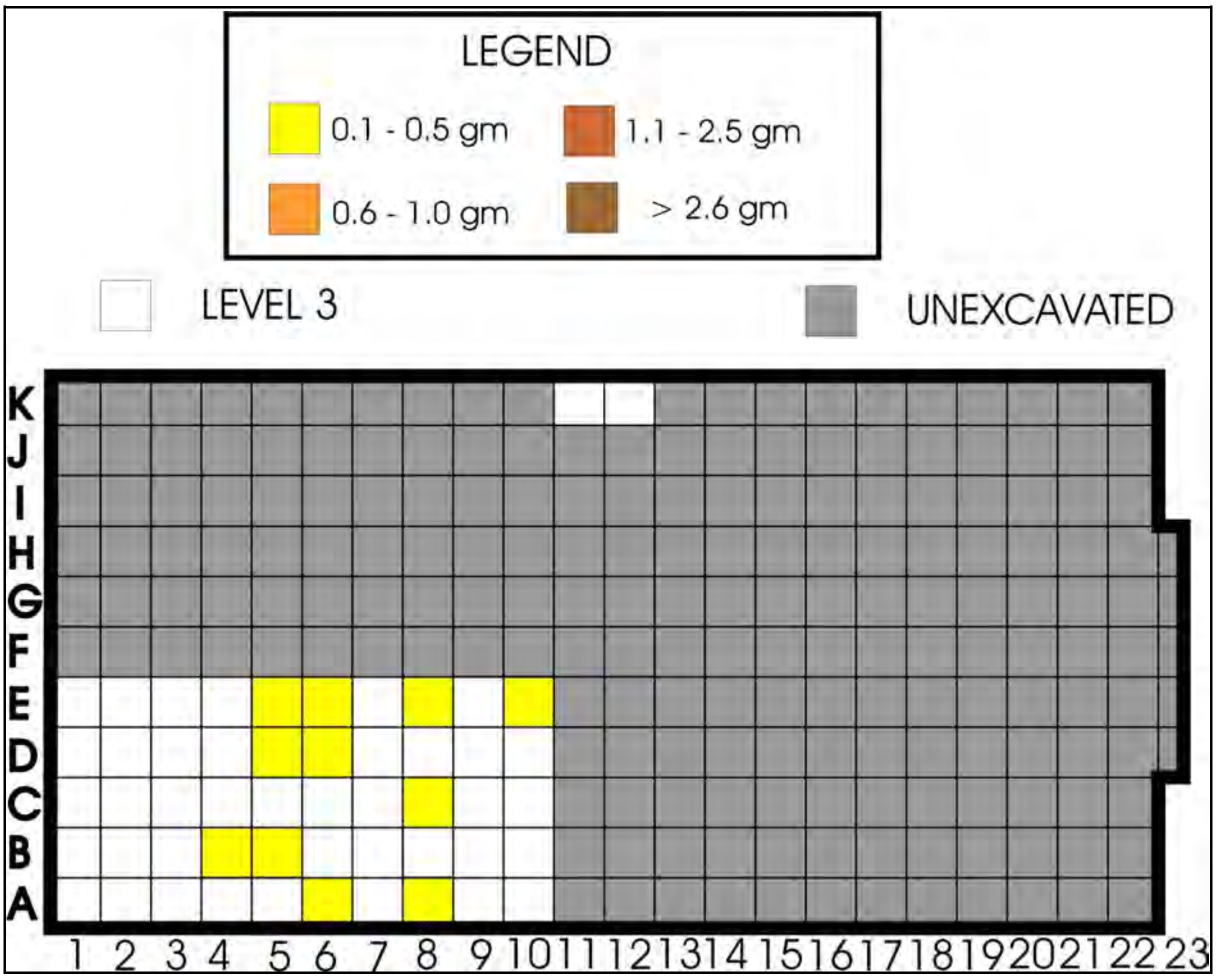


Figure 10.4-6: Distribution of Ochre in Level 3

10.4.4 Natural Objects Unmodified

Two pebbles, one quartzite and one limestone, were recovered in Level 3. They weigh a total of 21.9 grams. As well, thirteen spalls were curated and weigh a total of 854.3g (Table 10.4-9).

CAT #	OBJECT	UNIT	MATERIAL	QTY	WEIGHT
15738	pebble	D2	Quartzite	1	9.7
18425	pebble	A10	Limestone	1	12.2
TOTAL				2	21.9
14756	spall	A4	limestone	2	79.2
15737	spall	D2	diorite	10	364.5
19850	spall	B3	granite	1	410.6
TOTAL				13	854.3

Table 10.4-9: Unmodified Natural Objects in Level 3

DlLg-33:08A/14756 is a limestone spall from Unit A4. Chert is often found within limestone matrices, so it is possible that this spall was an attempt to find higher quality material within it. No chert remains within this spall. Limestone is also sometimes used as a chitho, but there is no evidence of this. It is broken into two pieces.

A heat treated/burnt diorite spall, DlLg-33:08A/15737 was recovered from Unit D2. It is breaking down quickly and has itself spalled off several smaller pieces of itself. This rapid degradation suggests that this artifact was placed in or near a fire (or used as a boiling stone) as diorite does not naturally degrade as rapidly as this object has degraded. This spall is covered in hematite.

DlLg-33:08A/15738 is a quartzite spall from Unit D2. This low-quality piece of quartzite has had a flat plate spall off of it. These two pieces refit and the faces of the split have some ochre staining.

10.4.5 Summary

Level 3 contains a total of 34 tools the majority of which are Knife River Flint, weighing 223.93g and 507 flakes (again, Knife River Flint is in the majority) weighing 157.7g. 32 pieces of FCR were recovered weighing 63.4 grams, and ochre weighed a total of 1.5g in 20 separate pieces. Spalls accounted for 13 objects weighing 854.3g and the two pebbles totaled 21.9g. The complete lithic assemblage for Level 3 by weight is 1519.83g and by quantity is 598 lithic objects. The difference between the upper levels and Level 3 is in the material source change. The tool types, especially the projectile point types, do not change between these levels. This suggests that the people inhabiting the excavated area of Level 3 were part of a culture that returned to the site frequently. It is still possible that a new group did inhabit this area, one that used sufficiently similar tool making techniques that no difference could be discerned.

10.5 Botanical Remains

A total of 55 charcoal samples contained 153 specimens (Table 10.5-1). Elm was abundant, ash was frequent while poplar/willow and oak were occasional. Graphically, the frequency of the identified taxa is depicted in Figure 10.5-1. Elm overwhelms the other taxa with ash a distant second. Maple is third in frequency with oak and poplar/willow tied for fourth position.

TAXON	CAT #'S	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	9	16	19.28
Elm (*Ulmus*)	17	47	56.63
Maple (*Acer*)	6	9	10.84
Oak (*Quercus*)	3	5	1.80
Poplar (*Populus*)	-	-	-
Poplar/Willow	3	5	6.02
Willow (*Salix*)	1	1	1.14
Diffuse Ring Pattern	4	5	
Semi-ring Porous	-	-	
Hardwood	-	-	
Unidentified	12	65	
	55	153	

Table 10.5-1: Frequency of Charcoal Recoveries

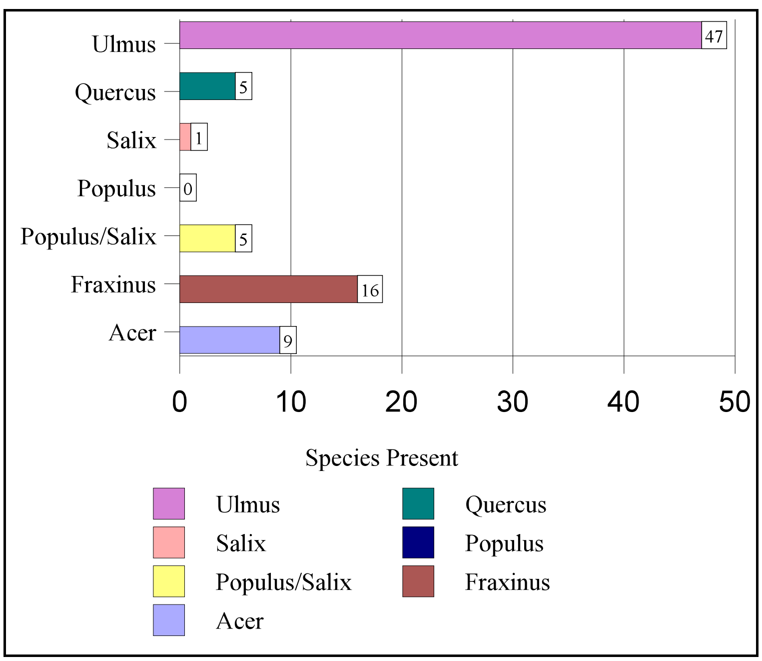


Figure 10.5-1: Frequency of Identified Taxa

Three of the seven hearths (Figure 10.2-1) had charcoal samples (Table 10.5-2). One hearth contained only elm, one had maple and elm, while the third had maple, elm and ash. The sample sizes from the hearth features ranged from 1 to 3.

HEARTH	A3-B3	A5-B6	E5
NUMBER OF SAMPLES	2	1	3
Elm (*Ulmus*)	2	1	1
Maple (*Acer*)	1	-	1
Ash (*Fraxinus*)	-	-	1
TOTAL	3	1	3

Table 10.5-2: Frequency of Identified Charcoal Recoveries at Hearth Locations

Two samples of wood were recovered, one of which could be identified as elm. A complete charred plum pit (*Prunus americanus*) was associated with a hearth feature that was not sampled for charcoal. Two uncharred Grass Family seeds and an unidentifiable seed were also curated. The grass seeds were likely intrusive.

10.6 Mammal, Avian, and Reptilian Remains

10.6.1 Mammal Butchering Remains

Compared to the previous levels, Level 3 has less mammal remains, 125 specimens weighing 190.6 grams. Some of this disparity is due to the fact that less units were excavated in Level 3 than in the higher levels. However, even taking this fact into account, the amount is drastically lower.

Figure 10.6-1 provides the frequency, by quantity, and Figure 10.6-2 provides the frequency, by weight, of the various taxa. Most of these materials are simply not complete enough to be identified.

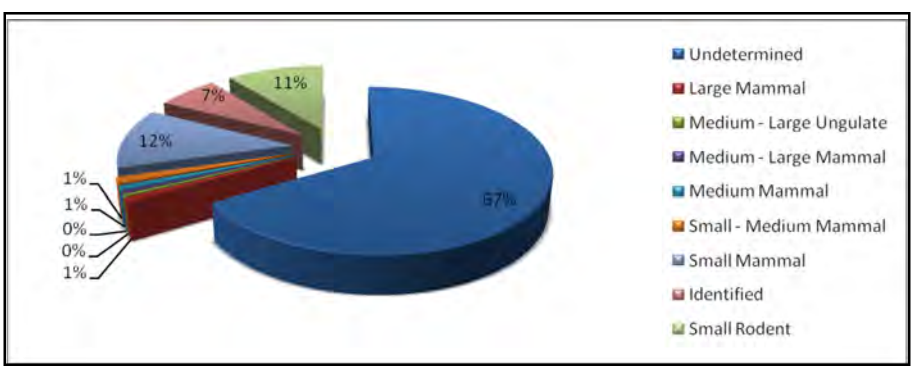


Figure 10.6-1: Frequency of Mammal Butchering Remains by Quantity

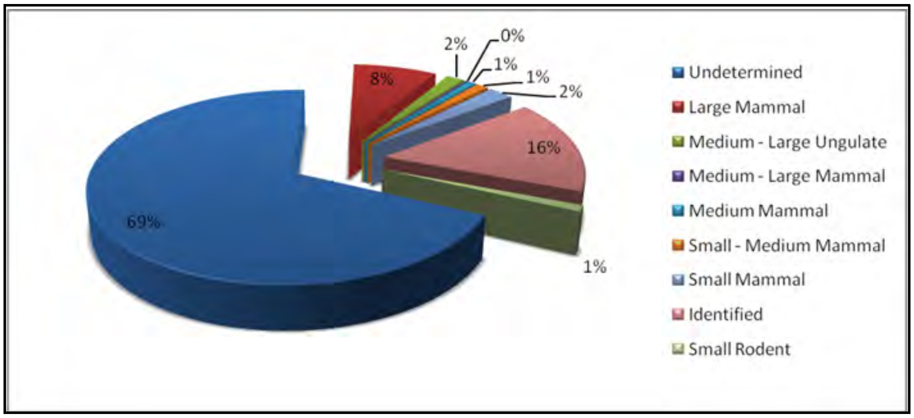


Figure 10.6-2: Frequency of Mammal Butchering Remains by Weight

The distribution of mammal materials by weight is depicted in Figure 10.6-3.

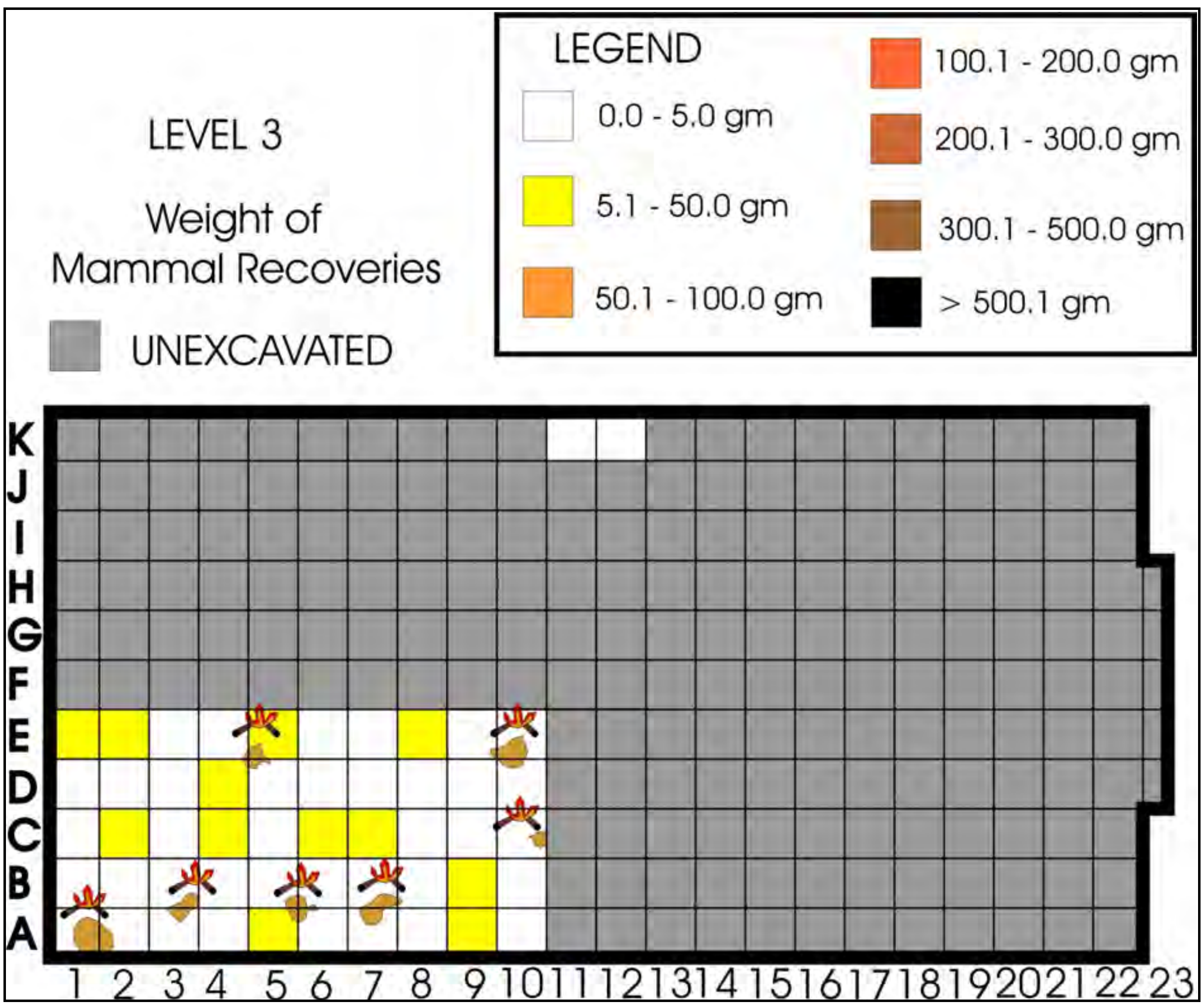


Figure 10.6-3: Distribution of Mammal Butchering Remains in Relation to Hearths

As can be seen in the distribution of mammal materials by weight (Figure 10.6-3), 58% of the units had no mammal bone whatsoever, 16% had from 0-5 grams, and only 26% had between 5-50 grams. The average across these units was only 11.4 grams. This suggests that at the time of this occupation there was a reduced dependency on the larger mammals.

The identified species are spread across the western portion of the excavation area (Figure 10.6-4) with a general scatter of unidentifiable elements.

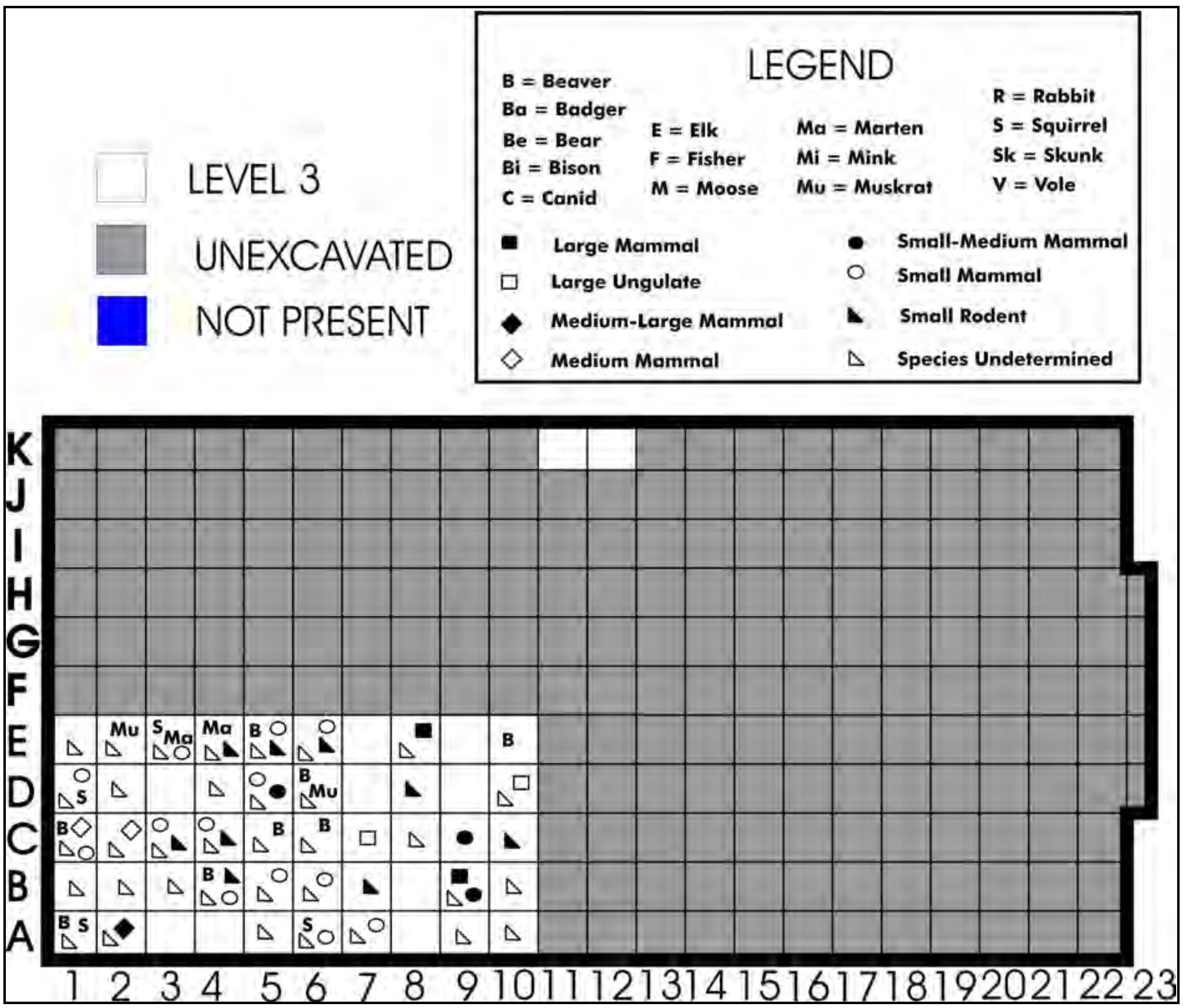


Figure 10.6-4: Distribution of Identified Taxa in Level 3

Based upon calculations of the minimum number of individuals, six different animals, representing five species are present (Table 10.6-1). Squirrel accounts for 33% of the species identified with muskrat, marten, red squirrel, and beaver each making up 17% of the total.

SPECIES	MNI
Beaver (*Castor canadensis*)	1
Marten (*Martes americana*)	1
Muskrat (*Ondatra zibethica*)	1
Red Squirrel (*Tamiasciurus hudsonicus*)	1
Squirrel (*Sciurus* sp.)	2
Total	6

Table 10.6-1: Minimum Numbers of Identified Species

As can be seen in Figure 10.6-5, beaver elements comprise slightly more than half of the remains identified to species. The beaver remains account for 92% of all the identified bone by weight (Figure 10.6-6). There are several different elements but there is still only evidence of a single individual being present.

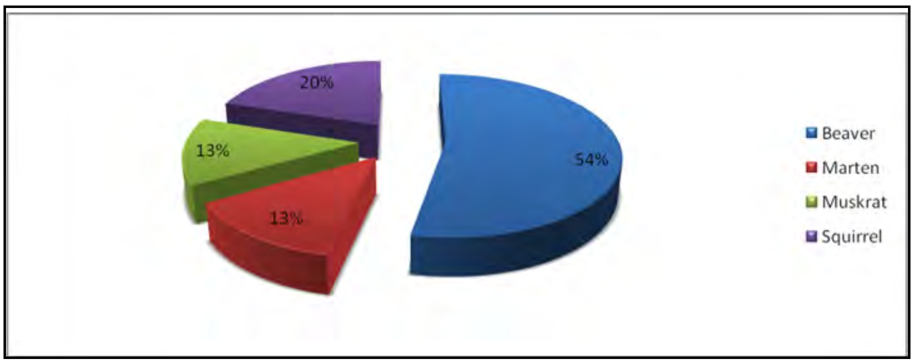


Figure 10.6-5: Frequency of Identified Species by Quantity

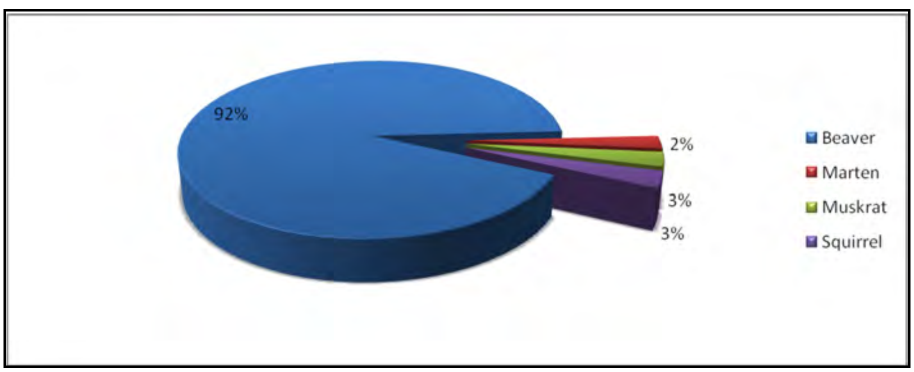


Figure 10.6-6: Frequency of Identified Species by Weight

There were only three pieces of bone identified as being from a mammal larger than a beaver. These were sections of broken rib shaft. On the other end of the scale, the two types of squirrel could quite possibly have become part of the site after it had been vacated, but these animals could have been easy additions to the stew pot if they were caught. Both the muskrat and the marten would have been only slightly better than the squirrels, in terms of available meat. They have the added benefit of some decent, if small, furs and this could have been the reason for their presence.

The large mammal elements identified would have provided a reasonable quantity of meat, but there is no way to tell if they were in fact from a recent kill or possibly relate to the spatula tools present in this level. Another possibility is that there is a large number of large mammal remains present in that portion of the occupation horizon which was not excavated.

One of the more interesting issues with Level 3 is determining major activity areas as they pertain to mammal and avian remain use. Despite the number of hearths excavated in Level 3 (Figure 10.6-3), only two of the seven hearths, one located at the intersection of Units A5, B5, A6, and B6 and the second in Unit E5, are in contact with a bone concentration. There is also a focus of avian material near the south central hearth but this concentration is the result of eggshell. It is entirely possible that despite the large number of fragments, there are only one or two eggs present. The distribution suggests a number of lightly used areas rather than a focused area for food preparation. However, this is hardly conclusive with such limited avian and mammal remains.

10.6.2 Bone Tools

There were not a lot of tools recovered from Level 3. One awl, DlLg-33:08A/15522, that was broken into two pieces, was made out of the long bone of a large mammal (Plate 10.6-1). As with many of the other bone tools, it is difficult to tell which element this tool was manufactured from, let alone the specific species. This awl measures 8.7 cm in length, 1.5 cm in width, 0.4 cm in thickness, and it has a weight of 3.4 grams.

One of the more interesting tools within this level was a double pointed "needle" (Plate 10.6-1). It is possible that this is also a fishhook similar to the artifact recovered in Level 2. DlLg-33:08A/16480 has a length of 3.9 cm, a width of 0.4 cm, and a thickness of 0.2 cm. It weighs 0.4 grams.

Plate 10.6-1: Bone Awl and Fishhook from Level 3 (1.5x actual size)

There were also two spatulas recovered, DlLg-33:08A/15372 and DlLg-33:08A/15450. Both of these were formed out of segments of ribs from large mammals and split and carved into the typical shape (Plate 10.6-2).

Plate 10.6-2: Bone Spatulas from Level 3 (actual size)

Both spatulas were heavily weathered and the larger of the two is broken at one end. Based upon the amount of weathering, these tools had been extensively used and were ready to be replaced. The large mammal rib pieces, found in this level, could represent raw material for the manufacture of this type of tool and may have been retained in anticipation of having to create new tools.

DlLg-33:08A/15372 measures 13.5 cm in length with a width of 2.0 cm and a thickness of 0.6 cm. It weighs 17.1 grams. DlLg-33:08A/15450 has a length of 16.2 cm, a width of 2.2 cm, a thickness of 0.5 cm, and weighs 18.4 grams.

10.6.3 Avian Butchering Remains

Only a small number of avian remains were recovered from Level 3 (Figure 10.6-7). The total number of bone specimens is 22. Some identified elements are the long bones of a larger bird, possibly a goose or turkey. However, the total amount of bird remains was only 16.5 grams. Interestingly, a high portion, 2.9 grams, of this amount was in fact eggshell. There were more eggshell fragments found in Level 3 than were found in all the other levels combined. This might be due to a bias of preservation and the 113 fragments of shell present do not likely account for more than a single egg or two.

10.6.4 Amphibian Remains

DlLg-33:08A/19964, from Unit C4, consists of 13 elements from a frog skeleton. Again, this frog probably died *in situ* and was not part of the subsistence base.

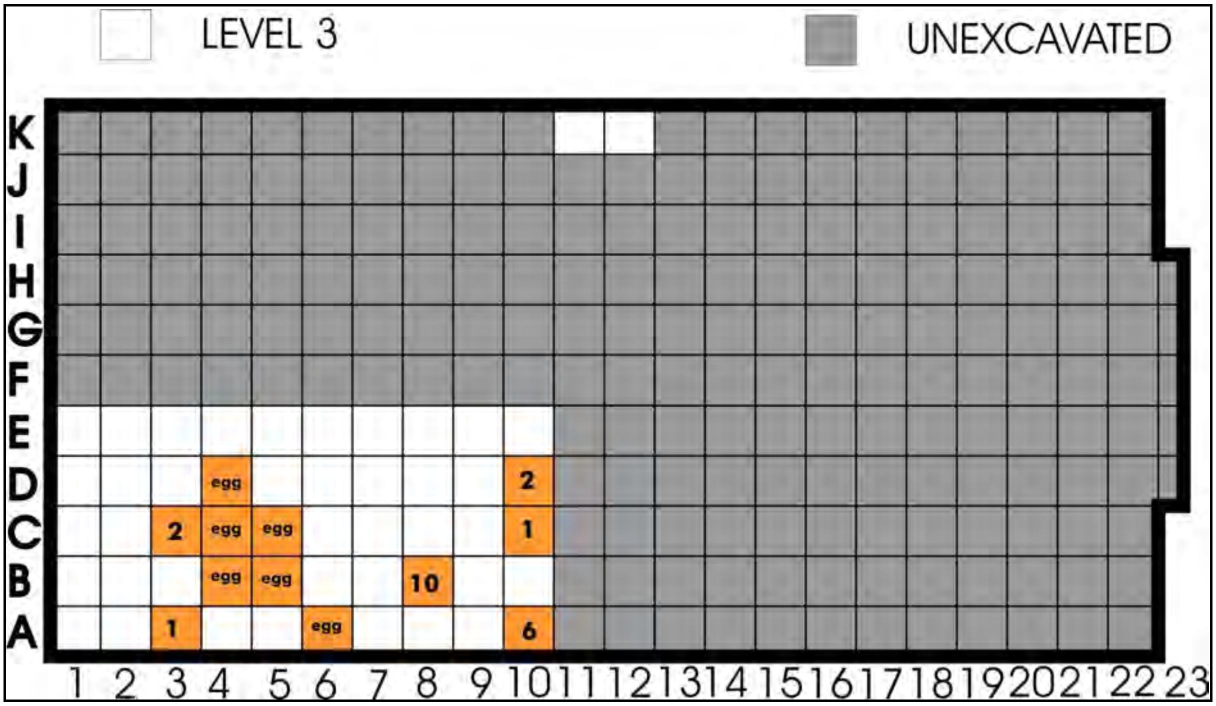


Figure 10.6-7: Distribution of Avian Remains

10.6.5 Summary

Based upon these materials, it seems likely that this occupation, much like those that eventually followed, was a summer and/or fall camp where the focus was much more on the fish resource available from the river. The other animals were hunted more for raw material for tool manufacture and their hides or fur as much as, if not more so, than for meat. The use of the "older" damaged tools and the presence of a possible fishhook seem to support this hypothesis.

10.7 Fish Remains

10.7.1 Artifact Recoveries

There are 12027 artifacts (2046 catalogued assemblages) in Level 3 which have been identified as fish remains. Each of those 2046 catalogued assemblage of artifacts represents a record in the database, from which to determine a quantitative analysis. Of the 12027 artifacts, 4389 were catalogued as "Unidentifiable Bone" (N=2780) or "Undetermined Bone" (N=1609), leaving 7638 artifacts (63.51%) being identified as to their element.

However, 3845 of those 7638 specimens (i.e., 31.97% of all artifacts, and 50.34% of the selected artifacts from this level) were either scales (N=3), rib/ray/spine (N=2243), or vertebra (N=1599) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

10.7.2 Species Determination

The remaining 3793 specimens (i.e., 31.54% of all artifacts from this level, and 49.66% of the selected artifacts from this level) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 10.7-1summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Angular	2							2	4
Angular; Retroarticular	17		2					73	92
Articular	1							33	34
Basioccipital	10							30	40
Basipterygium	1							1	2
Ceratohyal	6							76	82
Ceratohyal; Epihyal								1	1
Cleithrum	46	15	1					369	431
Coracoid	24							290	314
Dentary	18			1				171	190
Dentary; Articular								2	2
Dentary: Articular; Angular	1							8	9
Denatry, Tooth								3	3
Epibranchial	2							12	14
Epihyal	7							29	36
Exoccipital	2							2	4
Frontal	9							74	83
Hyomandibular	25	44						200	269
Hyomandibular; Preoperculum								3	3
Hypohyal	6							24	30
Interoperculum	12							47	59
Lateral Ethmoid	5							37	42
Maxilla	1	66				3		41	111
Metapterygoid	8							100	108
Operculum	12	1	1		1			173	188
Otolith						15		54	69
Palatine	7							51	58
Parasphenoid	7							59	66
Pharyngeal Bone	4							21	25
Pharyngeal Plate						2		2	4
Pharyngeal Plate, Lower						1		11	12
Pharyngeal Plate, Upper						2		10	12
Posttemporal								4	4
Premaxilla	17					6		51	74
Preoperculum	6							71	77
Preoperculum; Quadrate	6							40	46
Prootic	1							16	17
Pterotic	2							14	16
Quadrate	4							65	69
Ray, Branchiostegal	1							33	34
Retroarticular	1								1
Rib / Ray / Spine								2243	2243
Scale								3	3
Scapula								2	2
Scute							361		361
Sphenotic	6							33	39
Spine	1							7	8
Spine, Dorsal	2					6		135	143
Spine, Dorsal; Pterygiophore								1	1
Spine, Modified First	3							8	11

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Percidae	Sander	Hiodon	Aplod-inotus	Acip-enser	Fish	Total
Spine, Pectoral	22					11		186	219
Spine, Pterygiophore						2		41	43
Spine, Second Dorsal	6							39	45
Spine, Second Pterygiophore	1							1	2
Suboperculum								14	14
Supracleithrum	10							44	54
Supraethmoid	3							43	46
Supraoccipital	2							28	30
Tooth						3			3
Undetermined Bone			1					1608	1609
Unidentifiable Bone								2780	2780
Urohyal	6							29	35
Vertebra	15							1584	1599
Vomer								2	2
TOTAL	348	126	5	1	1	51	361	11134	12027

Table 10.7-1: Identified Elements by Taxon

10.7.3 Analysis

There are seven different taxa present in the sample, demonstrating a great diversity in the number of species being harvested. All have been determined to have been deposited as a result of butchering remains from processing fish harvested from the adjacent river systems. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 10.7-2. The results are further illustrated in Figure 10.7-1.

The MNI frequencies do suggest that some species may have a greater significance, specifically the *Aplodinotus grunniens* (freshwater drum) and Ictaluridae spp. (catfishes). Catostomidae spp. (suckers) are not well represented given the higher numbers of identified specimens. Percidae (perches), *Sander* sp. (sauger/walleye), *Hiodon* sp. (goldeye/mooneye), and *Acipenser fulvescens* (sturgeon) are each represented by a single individual.

The most significant species with respect to the NISP counts are catfishes and sturgeon. Together they account for nearly eighty percent of the identified elements. Sucker and freshwater drum have the next important showing. Interestingly, given the fewer numbers of identified elements for freshwater drum, the otoliths make it easy to determine an MNI count for them, while the suckers do not fare as well even though there are a greater number of specimens identified for that species. This is reflective, in part, on the inability to do a detailed re-examination of the artifacts to update the database during the final phase of the analysis. This is demonstrated in a review of the data summarizing the frequency of elements identified by taxon (Table 10.7-1). There is a large proportion of the elements that have been only recorded simply as “Fish” at the level of species, yet many could be properly identified to make more accurate information available.

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	348	38.97	6	28.57
Catostomidae (2)	126	14.11	2	9.52
Percidae (3)	5	0.56	1	4.76
Sander (4)	1	0.11	1	4.76
Hiodon (5)	1	0.11	1	4.76
Aplodinotus (6)	51	5.71	9	42.86
Acipenser (7)	361	40.43	1	4.76
TOTAL	893	100	21	99.99

Elements Used for MNI Determination

1. Angular; Retroarticular (Right)
2. Maxilla (Left)
3. Operculum (Incomplete)
4. Dentary (Left)
5. Operculum (Right)
6. Otolith (Left)
7. Scute

Table 10.7-2: Species Determination

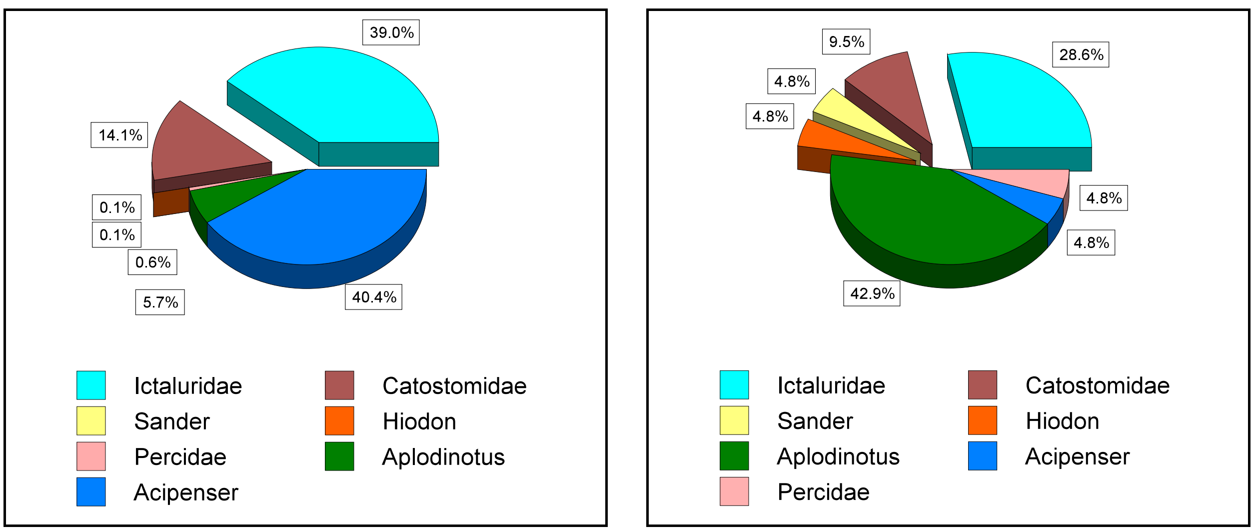


Figure 10.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

The distribution of the fish remains by species is shown in Figure 10.7-2. Fish remains were recovered in every unit excavated but one, Unit E9. Sturgeon is found widely scattered across much of the site. This is not surprising since they were a significant percentage of the number of identified specimens, but it suggests that they may be under-represented in the MNI count since our best estimate for this species is but a single individual. Suckers also seem to be present across the site and this supports the notion that they are not properly represented in the MNI count.

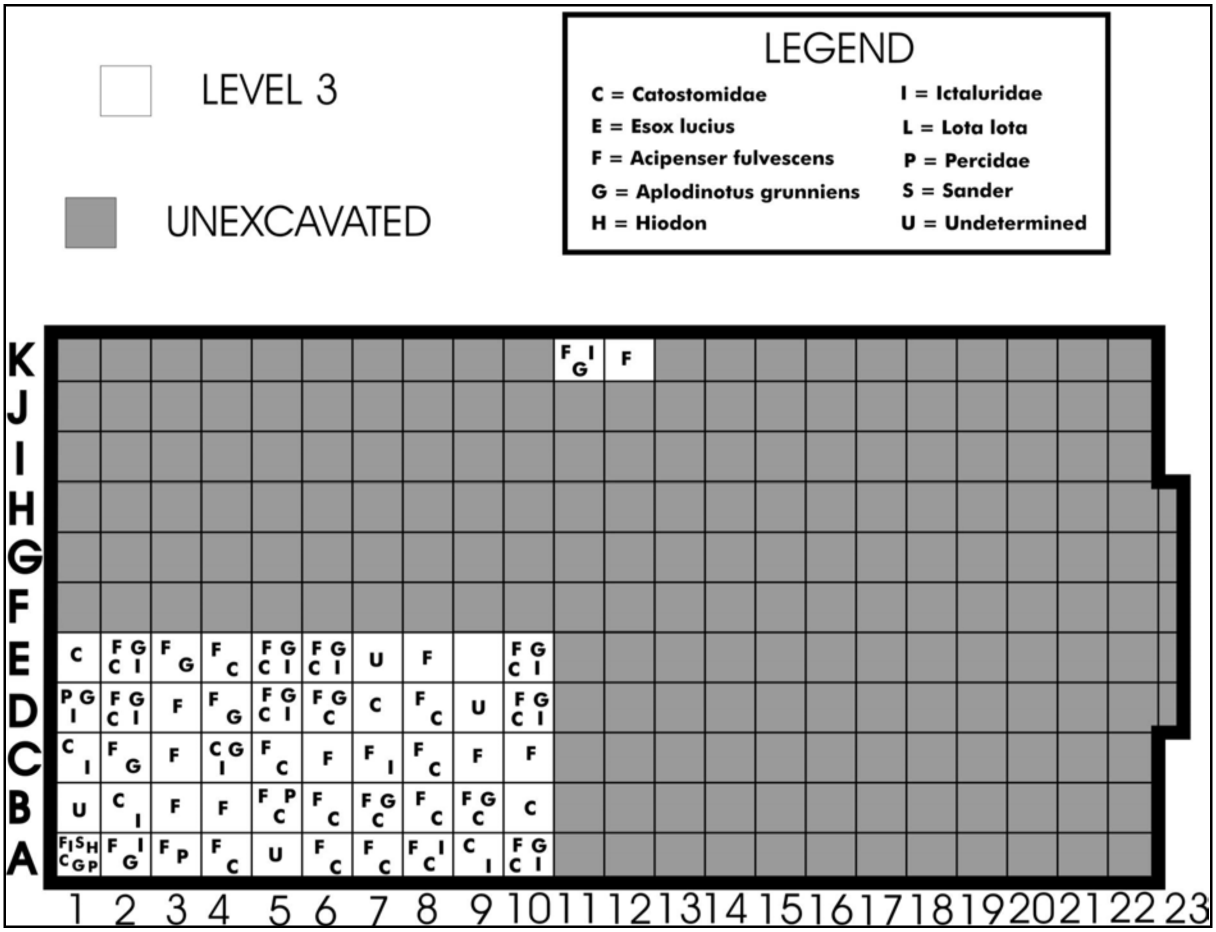


Figure 10.7-2: Distribution of Fish Remains by Species in Level 3

There are clusters where there is a greater diversity of species found in excavated units. Unit A1 has all seven species identified for this level. Units D2 and E2 have a strong diversity with similar diverse locales in the four units of D/E5 and D/E6, in addition to Units D10 and E10 in the northeast corner of the block excavation. The southeast corner of the block excavation area extending from about Unit B7 diagonally to Unit A10 shows some diversity in species, as does Unit K11 in the isolated excavation along the K gridline.

10.7.4 Interpretation

Figure 10.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 3. The only unit where scales were collected was in Unit A10, but they weighed a mere 0.1 grams and therefore have no effect on the reported weight for that unit. Unit A8 is the most dense with respect to weight, and although the majority of elements were unidentified as to their species, it appears that catfish likely comprise the majority of the weight, which is understandable given their live weight compared to other specimens. Three other units, namely Units E2, E7, and E10, each show a significant density in weight, yet they also have elements from catfish (as well as a large weight of "Undetermined Bone" and/or "Unidentifiable Bone") that comprise the better part of that weight.

These last three units do lie in three of the clusters which displayed a great diversity of species. Much of the rest of the excavation area has a fairly dense distribution of weight, although the northeast corner has scattered spots where little or nothing was recovered by way of fish remains.

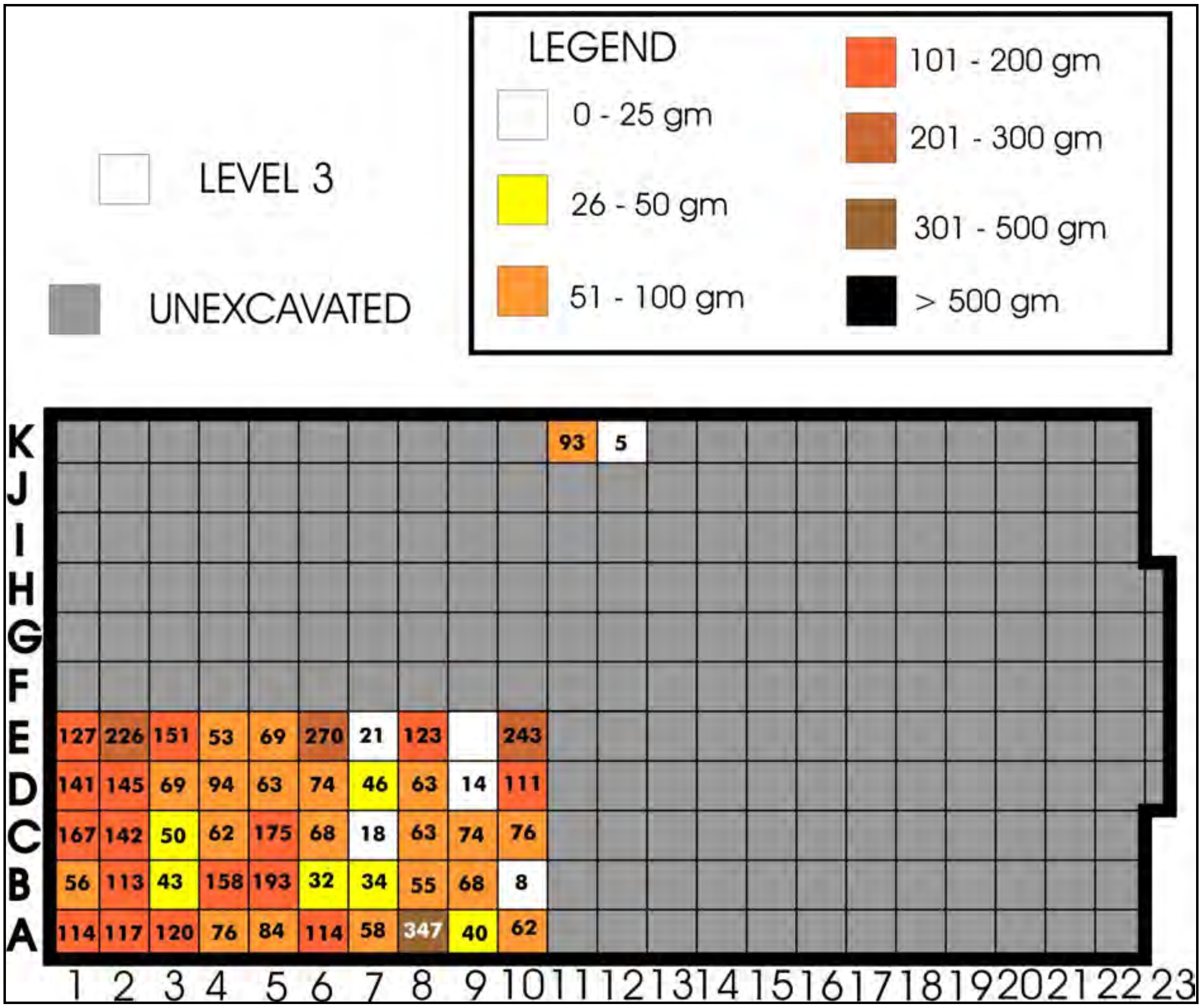


Figure 10.7-3: Distribution of Fish Remains by Weight

No cut marks were recorded on any specimens, which may have indicated any butchering techniques or other processing practices. No post-depositional marks such as carnivore chewing were recognized on any specimen. Two hundred and seventy-six (276) artifacts were found to be burnt, charred, or calcined by fire, representing only 2.29% of the total number of fish remains. Much of it can be found distributed in the several cluster areas that coincide with the distribution of the fish remains by species (Fig. 10.7-2). Two species, freshwater drum and sauger/walleye, were identified among the charred remains.

10.8 Shellfish

There were 639 shell artifacts recovered from Level 3, butchering remains and natural specimens.

10.8.1 Butchering Remains

One hundred and sixty-eight of the 442 butchering remains were identifiable to species (Table 10.8-1), with the remainder being Unionidae. Figure 10.8-1, indicates two areas of major concentration: Units D2/D3 to E2/E3 and Unit B6 through Unit E6 including units on the C line and D Line. These concentrations appear to be displaced from the peripheries of the hearths (Figure 10.2-1).

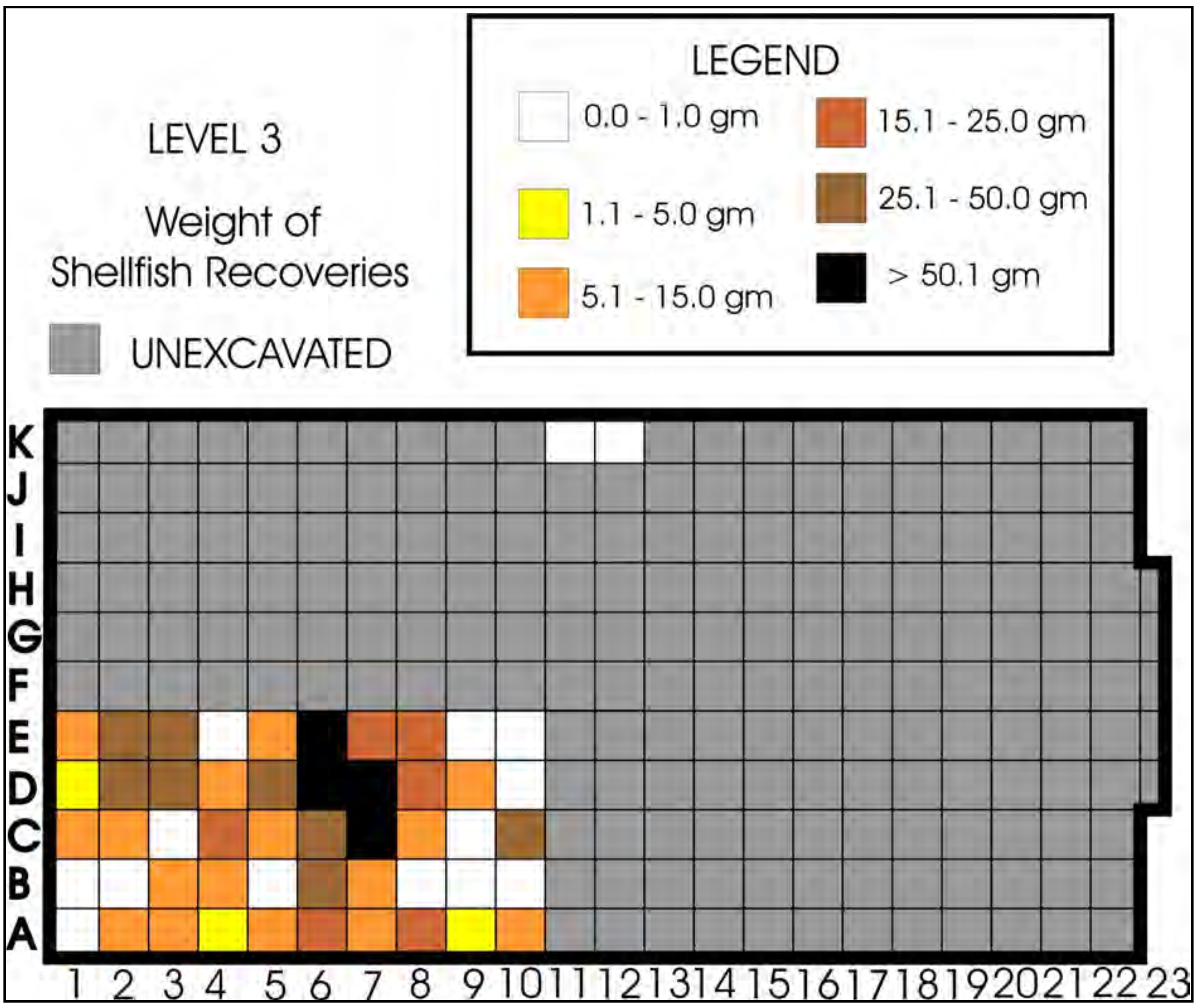


Figure 10.8-1: Density of Shellfish Recoveries

Five species were present in Level 3 (Table 10.8-1). These are Fat Mucket, Black Sand-Shell, Pink Heel-Splitter, Maple-Leaf, and Pig-Toe (Figure 10.8-2). Fat Mucket was dominant with Black Sand-Shell a distant second. This pattern is somewhat reminiscent of Levels 1, 2, and 2A.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	30	17.86	230.1	21.36
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	127	75.60	706.4	65.57
Pink Heel-Splitter (*Potamilus alatus*)	7	4.17	128.0	11.88
Maple-Leaf (*Quadrula quadrula*)	2	1.19	12.2	1.13
Pig-Toe (*Fusconaia flava*)	2	1.19	0.7	0.06
Three-Ridge (*Amblema plicata*)	-	-	-	-
	168	100.01	1077.4	100.00

Table 10.8-1: Frequency of Identified Butchering Remains by Taxon

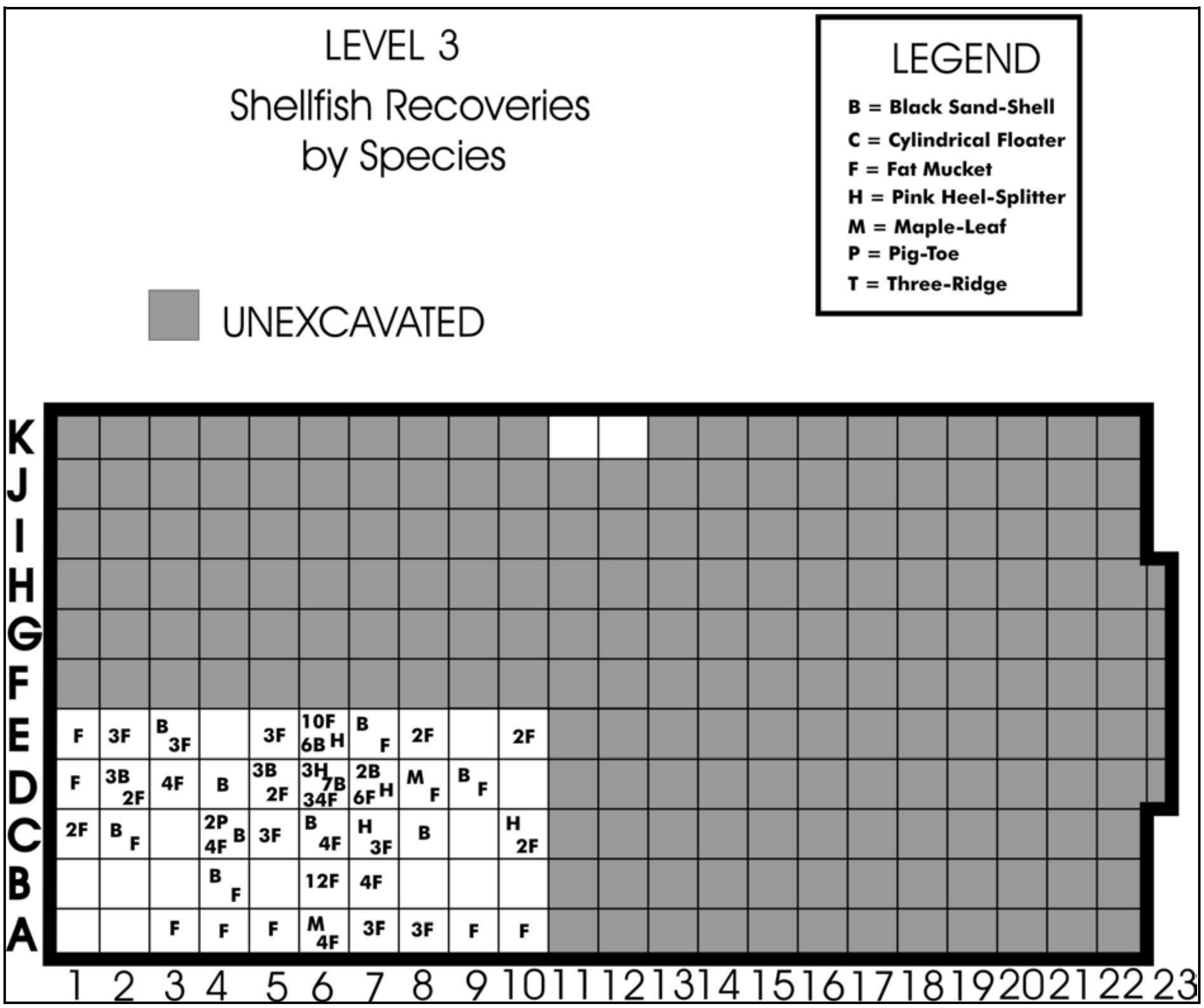


Figure 10.8-2: Frequency of Shellfish Recoveries by Species

Twenty-three valves had evidence of charring (Table 10.8-2). Four specimens could be identified to species, while two were identified to the Genus level only. The remainder could not be identified beyond Family level. The twenty-three specimens derived from six units: Units B6, B7, and E5 are immediately adjacent to hearths, Unit E6 is near a hearth, while Unit A10 and Unit D6 are a distance from the nearest hearth. Only one specimen, a Unionidae valve (DlLg-33:08A/16914) from Unit E6, displayed evidence of hematite staining.

CAT. NO.	UNIT	QTY	SPECIES
16689	E5	1	Fat Mucket
16805	E6	1	Black Sand-Shell
16985	E6	1	Unionidae
17040	E6	1	Fat Mucket
17468	B7	1	Unionidae
18297	B6	1	Fat Mucket
18612	D6	1	Lampsilis/Ligumia
23225	A10	2	Unionidae
23432	E6	1	Lampsilis/Ligumia
23472	E6	8	Unionidae
23507	B6	5	Unionidae
TOTAL		23	

Table 10.8-2: Charred Shellfish Specimens from Level 3

Figure 10.8-3 illustrates the frequency of the Minimum Number of Individuals (MNI) of each species. Fat Mucket overwhelms the assemblage being more than three-quarters of the identified specimens. Black Sand-Shell is a distant second with the remainder only minimally represented.

10.8.2 Natural Shellfish

There were 197 naturally deposited specimens recovered from Level 3 (Table 10.8-3). The majority of the recoveries consisted of a single deposit of 166 Sphaeriidae (pea clams) in Unit E3 (Figure 10.8-4). These may have been deposited in a slight depression or a clump of vegetation during a high water episode. The remainder of the specimens are scattered throughout the excavation area.

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	16	8.12
Ramshorn Snails (Planorbidae)	3	1.52
Pea Clams (Sphaeriidae)	178	90.36
TOTAL	197	100.00

Table 10.8-3: Frequency of Naturally Deposited Shellfish

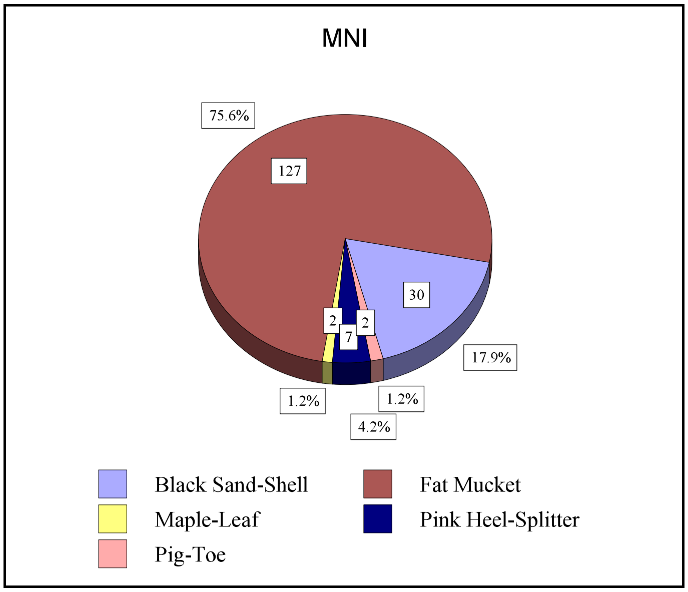


Figure 10.8-3: Frequency of Identified Taxa of Shellfish

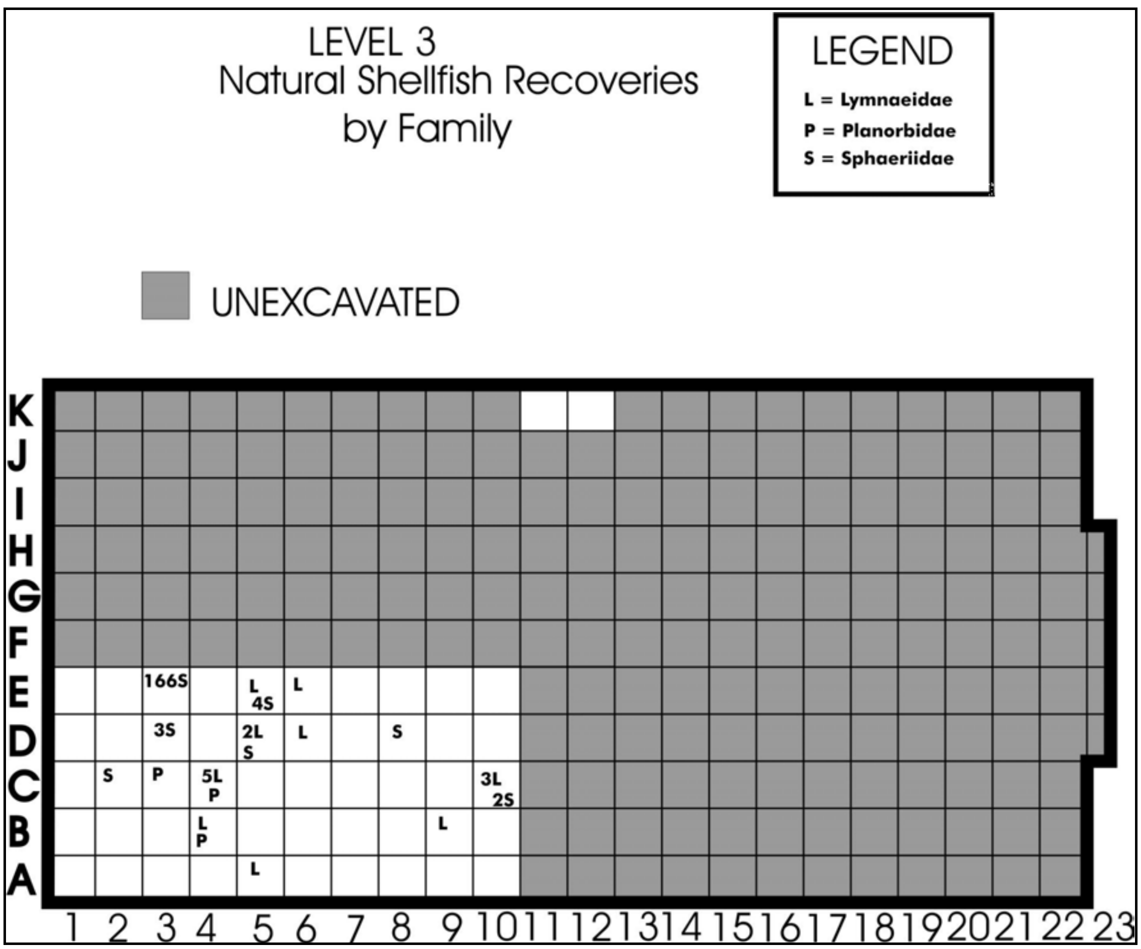


Figure 10.8-4: Location of Recoveries of Natural Shellfish in Level 3

10.8.3 Summary

There were 639 shell artifacts recovered from Level 3. This is more than Level 1 (478), but less than Level 2 (873). Due to the lesser area excavated in this level, the quantity represents a density of 12.29 artifacts/m^2, the highest density of all excavated levels. Four hundred and forty-two butchering remains were identified and 168 of those could be identified to species. Fat Mucket, Black Sand-shell, and Pink Heel-Splitter were present as well as two specimens of Maple-Leaf and two specimens of Pig-Toe. There were two areas of major concentration of these species, but these were not near any recovered hearths. This is an anomaly for this site as many of the shellfish densities on other levels were on the peripheries of hearths.

Level 3 was a location of more intense food-gathering of a larger group, but with only a portion of the level excavated, it is not clear whether this would have been on a par with the occupations of Levels 1 and 2.

A large deposit of pea clams (Sphaeriidae) was recovered from Unit E3—166 out of a total of 197 natural shellfish recovered from Level 3. These artifacts do occur in one of the areas of concentration of butchering remains, the D2/D3 to E2/E3 location, however, this may have just been a coincidence and not an intentional use of pea clams by the inhabitants.

10.9 Miscellaneous Recoveries

As noted earlier, certain types of recoveries do not readily fall into the previous classes of artifacts. These recoveries consist of various types of soil samples and esoteric artifacts.

10.9.1 Soil Samples

A total of 63 soil samples were collected from Level 3. In addition to the soil matrix samples, samples were taken when circumstances warranted. These include 13 hearth samples, two ash samples, two clay samples, one sand sample, and one caliche sample. As well, ten samples were taken of hearth clay and 12 samples of heat-modified clay were recovered.

10.9.2 Coprolites

There were two samples of coprolites curated. This could indicate the presence of domesticated dogs or scavenging feral canids.

10.9.3 Undetermined

DlLg-33:08A/15826 is a small lump of soil with an irregular dark blue-green stain. It was recovered from Unit D5. This sample was tested with Cuprotesmo strips and yielded negative result for copper (L. Croom 2009:pers.comm.). It is possible that this is the residue an organic dye which was spilled on the soil during the period of occupation.

10.9.4 Insect

DlLg-33:08A/18457 is a semi-circular impression in a clay matrix with what appears to be a segmented chitinous material at the base of the depression. The incomplete specimen is 11.5 mm long which would suggest a relatively large bodied insect such as a dragonfly or millipede.

10.10 Level 3 Summary

The excavation area consisted of a contiguous block of 50 square metres plus two outlying units which could be Level 3 but are not physically linked due to the intervening unexcavated area. Thus, artifacts from Units K11 and K12 may not be part of the Level 3 assemblage.

A large number of ceramic vessels (22) were recovered from this horizon, suggesting a considerable amount of food processing or other activities that would result in a large amount of breakage. The ceramic assemblage appears to be quite homogenous and, as discussed by Ernie Reichert (Chapter 13), could be ancestral to the defined complexes within the Rainy River Ceramic Tradition. No extra-local ceramic wares were present as had occurred in four of the higher levels.

In terms of the lithic assemblage, three-quarters of the tools are made of Knife River Flint and, in the detritus, 85% of the 507 flakes are Knife River Flint. The preponderance of this material, derived from quarries in North Dakota, suggests that the occupants of the site had probably travelled from that location where they had mined a large quantity of material for personal use and perhaps for trade. A few flakes represented areas in the Interlake region of Manitoba, the Lake of the Woods area on the Ontario border, and the Manitoba/Saskatchewan border area. However, these are only one or two flakes of each type of material. They may derive from residual material or from sharpening tools made from those materials. The parent tools were not lost or discarded in the excavation area.

The faunal remains do not indicate a strong reliance on mammal for a protein source. Only six individuals of small mammal were identified (beaver, red squirrel, squirrel, muskrat, and marten). In terms of available meat, this would probably be less than 10 kilograms. The fish remains only indicate the presence of a minimum number of 21 discrete individuals with freshwater drum being the highest followed by catfish. The dominant food resource, in terms of butchering remains, were shellfish which had 168 individuals. If the butchering remains across the excavation area are indicative of the campsite *in toto*, it was a short term occupation of a small group of people.

The pollen from the residue analysis of the ceramic sherd indicates a standard environmental profile but with elevated frequencies of the pigweed family, suggesting disturbed ground such as would occur at a repeatedly visited campsite. The food residue analysis was similar to those in later cultural levels—wild onion, saltbush fruit, rose hips, beeweed seedpods, sunflower seeds, pine nuts, beans, venison, and fish. Based on the environmental data, the lithic assemblage, and the quantity of ceramic vessels, it is possible that this was a small, closely linked group which had travelled to the Knife River Flint quarries and stopped at The Forks to replenish some food supplies while en route to a homeland location.

11.0 LEVEL 3A

11.1 Introduction

Level 3A was encountered in almost every unit that was opened (Figure 11.1-1). It occurred throughout the block area on the south, excepting two units on the west edge (A1 and C1). Also, no trace of Level 3A was observed in the K line.

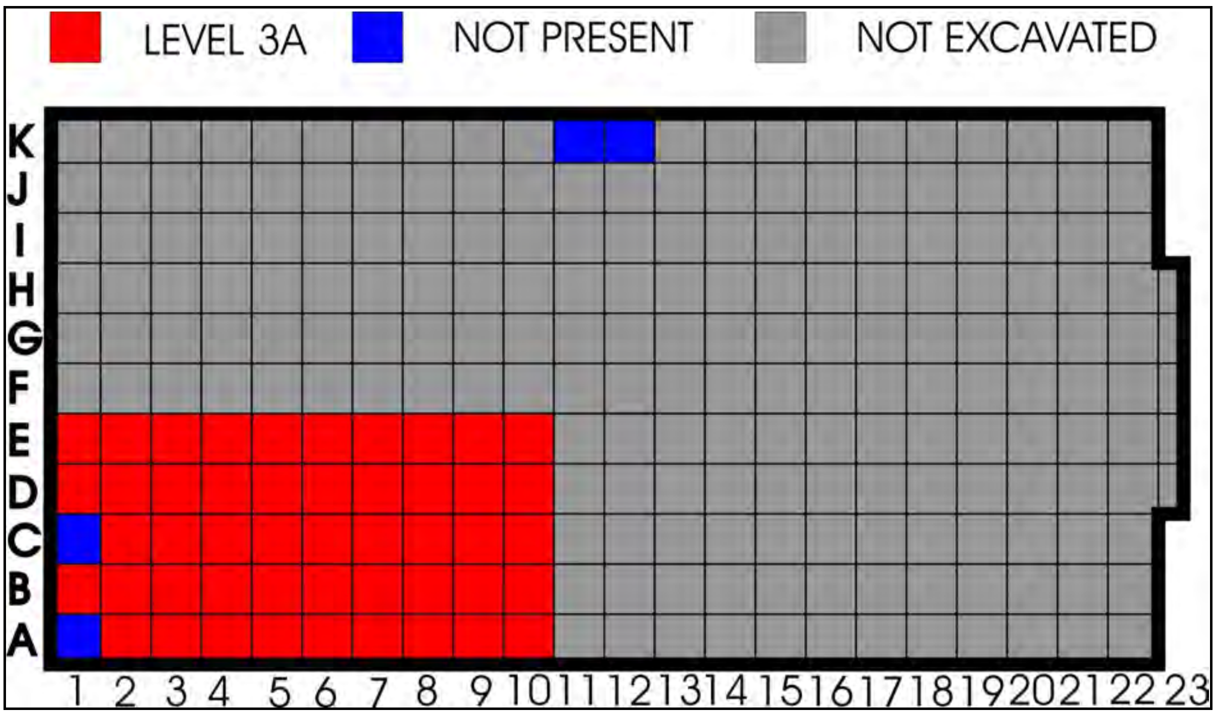


Figure 11.1-1: Map Showing Presence of Level 3A

11.2 Features

Four hearths were identified in this level (Figure 11.2-1). Three were very small and the fourth was located along the southern edge of the excavation, so its size cannot be determined.

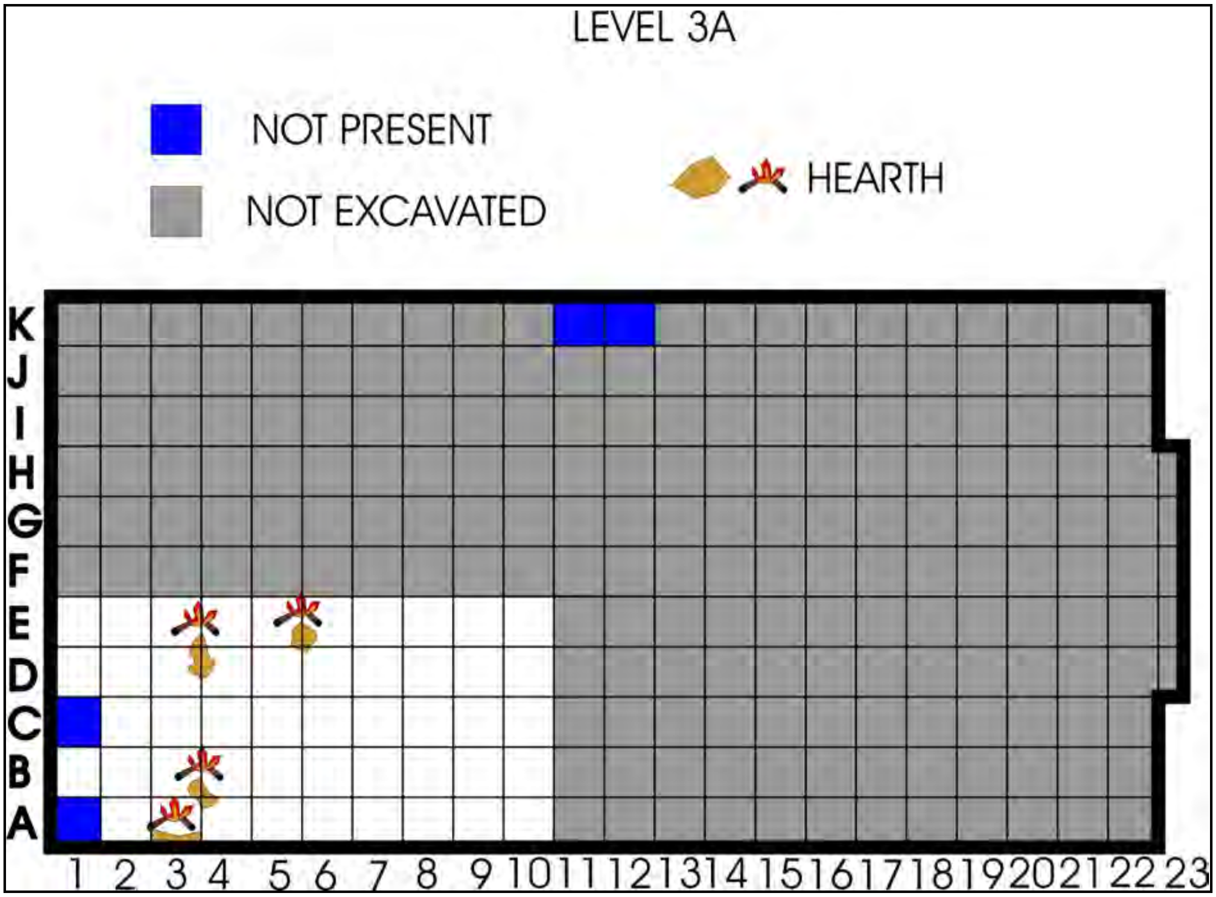


Figure 11.2-1: Distribution of Hearths in Level 3A

11.3 Ceramic Artifacts

11.3.1 Artifact Distribution

The average sherd weight (including rims and body sherds) for Level 3A was 2.2 grams, higher than that of Level 3 which was 1.5 grams. The total quantity of recoveries was 617 sherds with a total weight of 1406.2 grams.

Level 3A was not found in four of the 52 units excavated. Five of the remaining 48 units had no ceramic recoveries, all of these were in the southeast corner of the main excavation block. The highest densities for weight and quantity were found in Units A2 and B2, 359.6 grams for 217 sherds in Unit A2 and 238.3 grams for 65 sherds in Unit B2 (Figure 11.3-1).

Level 3A ceramic distribution is sparse compared to Level 3. Some units indicating generally higher weight totals than their neighbouring units mirror units identified with low weight totals in Level 3, specifically Units E4, E7, E9, and E10, as well as Units A2, B1, and B2. This may represent excavator error due to the intermittent and nuanced variation on the occupational horizons with the stratigraphy. The distribution of Vessel 98 echoes this situation as it was recovered from Units E3, E5, and E8 in Level 3 and in Units E4 and E6 in Level 3A. The density identified in Unit A2 and Unit B2 is likely directly related to the concentration recorded directly to the northeast in Level 3. Vessel 88 has been identified from both densities.

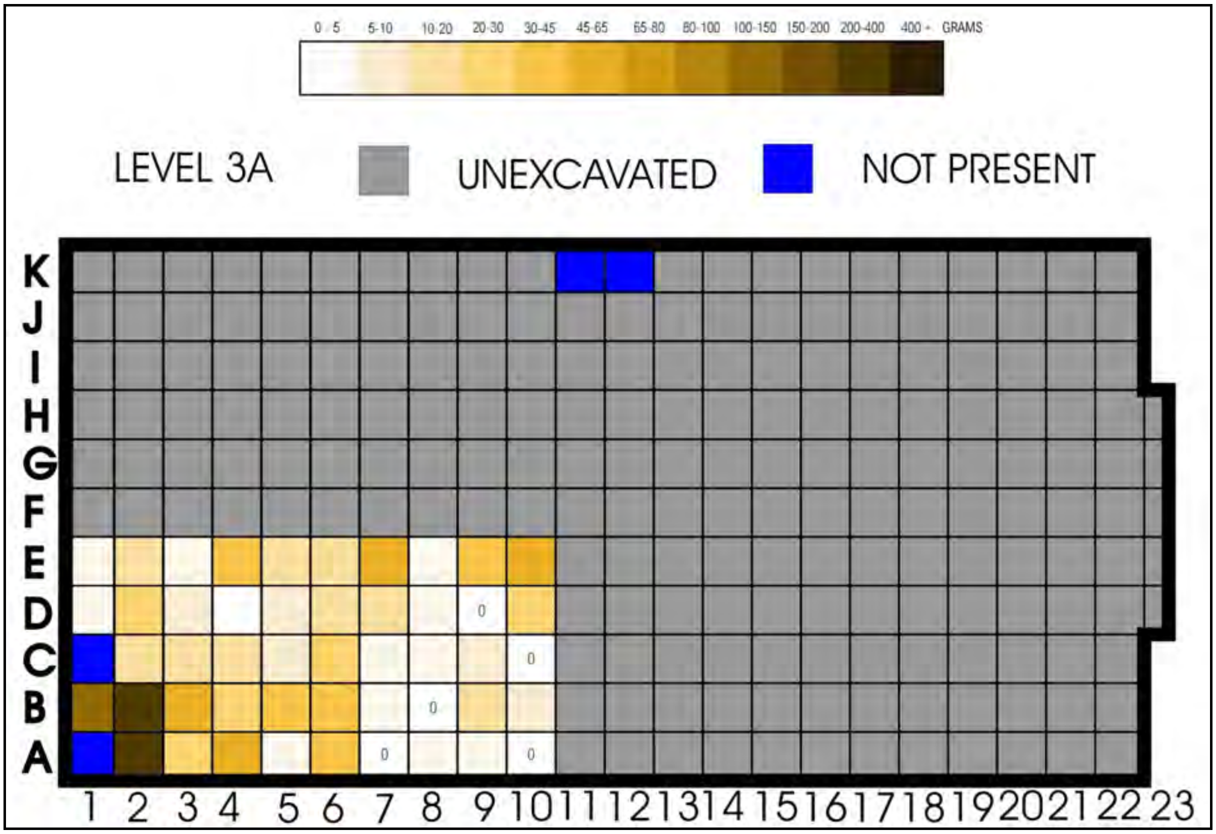


Figure 11.3-1: Distribution of Ceramic Recoveries in Level 3A

No particular patterning is apparent, but there is a general reduction in the density toward the southeastern corner. This is most likely related to the topography, as this region would be the crest of the slope where the greatest compaction may have occurred. The identified vessel fragments are clustered more toward the western end of the excavation block. Scatter, where it is observable, tends to be along a southwest to northeast axis.

11.3.2 Artifact Recoveries

Level 3A was identified in 48 of 52 units excavated and total ceramic recoveries (not including non-vessel ceramic artifacts) accounted for 24.7% of the total recoveries for Level 3 and Level 3A combined (by weight). From Level 3A alone, 617 sherds with a weight of 1406.2 grams were recovered, yielding an average weight per sherd of nearly 2.3 grams. Four non-vessel ceramic recoveries totalled 12.8 grams.

11.3.2.1 Identified Vessels

One hundred and twenty-three sherds and sherdlets accounted for 19.9% of the vessel related ceramics recovered for Level 3A and had an average rim sherd weight of 4.7 grams. Twelve vessels were identified as being present on Level 3A (Figure 11.3-2). Six of these were found primarily on Level 3 with only one or two sherds for each being recovered on Level 3A. Only three vessels were exclusively recovered from Level 3A. Two more vessels were found in a majority on Level 3A, but each of these had a single sherd recovered on Level 3. As mentioned in the Level 3 section, a single vessel (Vessel 104) was found split evenly between levels, with one sherd on each. This leaves a total of only five vessels found wholly or in majority on Level 3A.

There were no features or traits observed to indicate that a cultural entity different from that of Level 3 was present on this horizon. For that reason, it is suspected that the two levels actually represent a single cultural entity that may have occupied the site twice within a very brief period.

Vessel 86

This pot, a small example of what is likely an Otterhead type vessel, was identified from Unit A4. The rim and the upper neck were not recovered, so this designation is based on an incomplete profile. The decoration and the positioning of the decoration on the neck, the neck curvature and apparent stance, as well as the very fine wrapping on the cord-wrapped tool are all similar to those seen on other Otterhead pots in this assemblage.

Vessel 87

This vessel occurred in Units A4 and E7. The straight neck with a very slight outward lean and no hint of curvature toward the bottom of the neck perhaps should cause questioning as most if not all of the other Otterhead vessels exhibit this to some degree. Vessel 87, however, has nearly identical decorative structure to some of the other Otterhead pots. The jury is out on this pot, but for now it will be placed with the Otterhead group.

Vessel 88

Recovered from Units A3 and D3, this vessel was described in Level 3.

Vessel 90

When seen with the vessels of the Level 2 Complex, Vessel 90 does not seem out of place. But, with its contemporaries in Level 3A and Level 3 it stands out. The even thickness through the neck and rim, in conjunction with the straight, outward leaning profile and well defined shoulders, produce a unique form in Level 3A and Level 3. The decoration consists of typical elements with typical placements, but the design is by no means typical. The significance of this vessel in the context of the surrounding materials has not been fully evaluated at this point. It is an undefined type that may be external to the Rainy River ceramic realm, at least as it was originally envisioned. It was recovered from Units A4, B1, and B2.

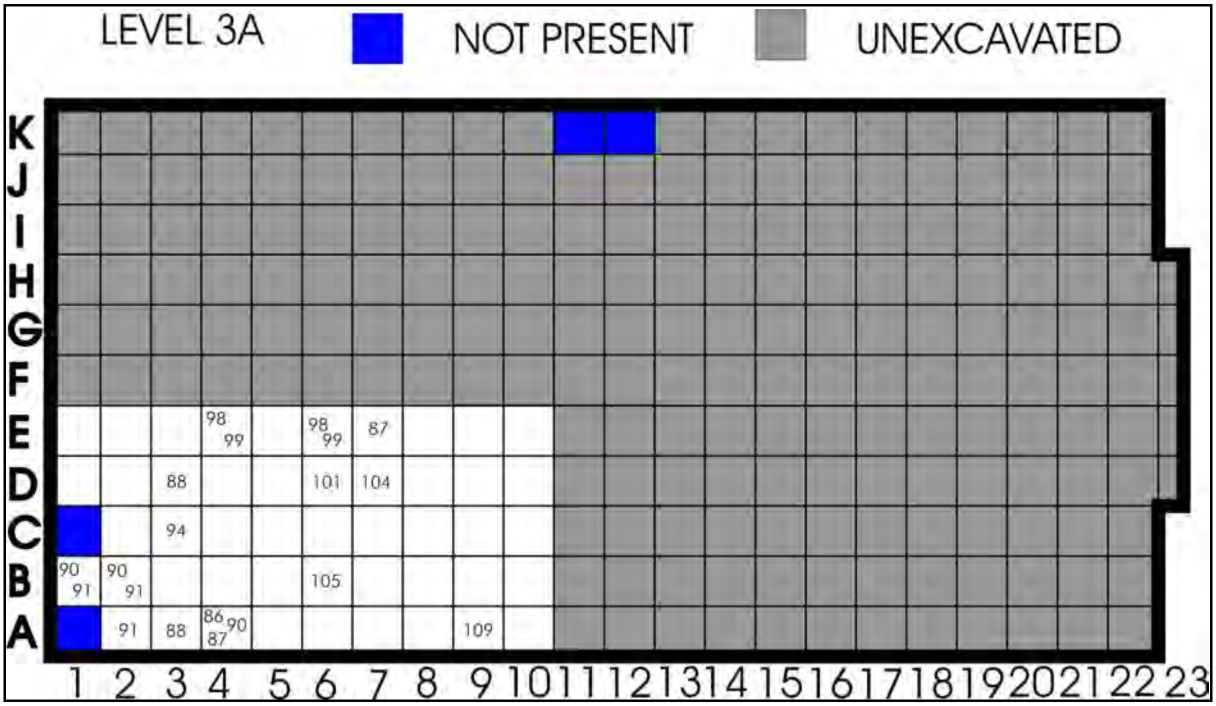


Figure 11.3-2: Distribution of Identified Vessels in Level 3A

Vessel 91

The horizontal CWOI on Vessel 91 are somewhat lower than others in this level, but the oblique CWOI above are still short, leaving a gap between the two motifs. The punctates are placed on the top row of the horizontal set. This vessel was difficult to classify. Poor definition of the bosses and the essentially squared rim and the context of the other surrounding vessels have bumped it into the Rainy River Coalescent, despite the lack of stamping. A sample of this vessel was submitted for residue analysis. It was recovered from Units A2, B1, and B2.

Vessel 94

Recovered from Unit C3, this vessel originated in Level 3.

Vessel 98

Recovered from Units E4 and E6, this vessel was described in Level 3.

Vessel 99

Also recovered from Units E4 and E6, this vessel was described in Level 3. A taphonomically displaced manifestation was recorded in Unit D4 of Level 2.

Vessel 101

Vessel 101 was located in Unit D6 and is discussed in Level 3.

Vessel 104

Recovered from Unit D7, this vessel cross-cuts both horizons and is described in Level 3.

Vessel 105

Vessel 105 was located in Unit B6. This vessel was described in Level 3.

Vessel 109

Very similar to Vessel 91, Vessel 109 was kept separate based on being thicker, more flaring, and having a wider more rounded rim. It has been given a general classification of Rainy River Coalescent. It was recovered from Unit A9.

11.3.2.2 Body Sherds

The 494 body sherds, recovered from Level 3A, accounted for 80.1% of the total vessel related recoveries. The average sherd weight was 1.7 grams.

11.3.3 Manufacturing Characteristics

Paste quality ranged from very good to poor, but most were well to very well consolidated. Thinner walled vessels tend to be denser and better fired. Most sherds tended to be buff or grey to dark grey/black. As the majority were identified as sprang impressed exteriors, it is assumed that forming within sprang woven bags was the preferred method.

11.3.3.1 Surface Treatment

Sprang weave was identified on 76% of recoveries (Table 11.3-1). Eleven percent were categorized as textile impressed. Obliterated textile was recorded for 4.3%. Two small sherds were identified with a smooth surface, accounting for 0.1%, and 9.5% remained with no recorded surface treatment.

LEVEL 3A	48 units	WT (grams)	QTY	%
SPRANG		1061.1	369	75.5
TEXTILE IMPRESSED		160.8	180	11.4
OBLITERATED		62.9	23	4.5
VERTICAL CORD		-	-	-
SMOOTH		0.3	1	0.1
No Recorded Surface		121.1	44	8.6
TOTAL		1406.2	617	100.1

Table 11.3-1: Types of Surface Treatment Recorded in Level 3A

11.3.4 Residue Analysis

A rim sherd of Vessel 91 (DlLg-33:08A/15166) was submitted to Paleo Research Institute in Golden, Colorado for residue analysis (Appendix B).

The pollen sample obtained from the sherd indicated *Pinus* (pine), *Quercus* (oak), *Ulmus* (elm), Compositae (daisy family), and Poaceae (grass family). This is a fairly standard pollen profile for this area indicating long distance transport of the pine pollen and representation of local trees, forbs, and grasses. The phytolith sample from the residue contained specimens of *Phragmites* (reed grass), other grasses, and sedges (both seeds and roots). It should be noted that diatoms were present indicating the presence of river water and some of the phytoliths may have been present in the water rather than indicating direct utilization of the plants.

Residue analysis indicated the presence of *Allium* (wild onion), leaves of *Helianthus* (sunflower), *Xanthium* (cocklebur) seeds, *Quercus* (oak) nutshells, and *Atriplex* (saltbush). Other indications were for pronghorn blood and cooked fish. The sherd also tested strongly positive for dried *Nicotiana* (tobacco) leaves. It is not likely that the pot represented by this rim sherd would have alternated in use between a cooking pot and a storage vessel for tobacco. Probably, it was retired from cooking activities and used as a storage vessel. The presence of tobacco suggests trade with southern groups.

11.3.5 Non-Vessel Ceramics

Several fired clay items were recovered from Level 3A. All unfortunately incomplete, they offer insight into utility of fired clay and a more intimate view of the lives of the people to whom they belonged. Four items were catalogued with a total weight of 12.8 grams.

11.3.5.1 Bead

A simple tubular form, DlLg-33:08A/24961, from Unit E4, exhibits fine execution and craftsmanship (Plate 11.3-1). The exterior surface finish is smooth. Very fine quartzitic sand was used as temper. The exterior diameter would have been approximate 10 mm and the internal diameter was approximately 3-4 mm. Unfortunately, not enough of the object remains to give us insight into the process of its manufacture.

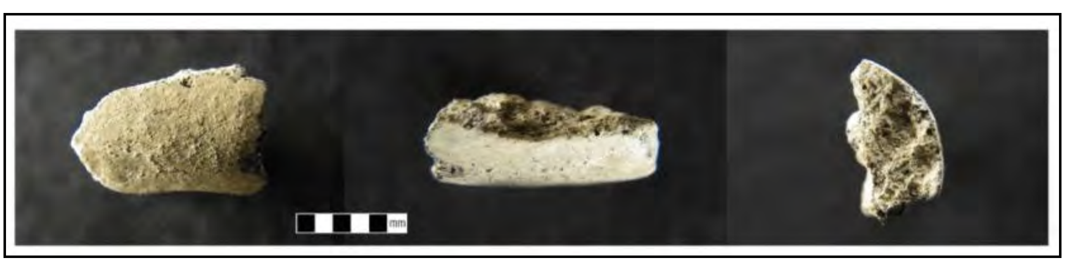


Plate 11.3-1: Ceramic Bead - Exterior (left), Longitudinal Contour (centre), and End (right)

11.3.5.2 Clay Ball

Two fragments of fired clay balls were recovered on Level 3A (Plate 11.3-2). The two objects were found in adjacent units situated between two hearths. Their colour, surface and interior composition suggest the same approach to manufacture. They seem to have been fired to the same degree and they exhibit a low to moderate level of sintering, no vitrification is visible. There is an absence of temper in both objects as well.

Estimations of diameter were accomplished using circle templates. Neither artifact exhibits perfect spherical curvature, so the diameter of each was estimated by measuring the exterior surface on at least two axis. DlLg-33:08A/15785, from Unit D2, would have had an approximate diameter of 45-50 mm. The measurements for DlLg-33:08A/17586, from Unit C2, came in at 45-60 mm. Based on these observations, they could be from a single object.

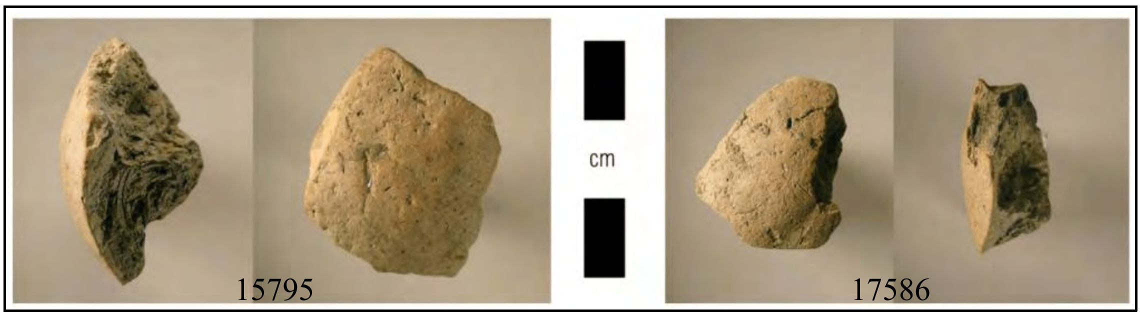


Plate 11.3-2: Side and Exterior Surface Views of Clay Balls

For both objects, the cause of the fragmentation is not clear. No points of impact were defined indicating that they may have fractured while being fired. The quality of the body is indicative of poorly mixed and worked clay. This, and the absence of temper, would not have helped the spheres survive the firing process. Also, shrinkage and the difficulty in thoroughly drying the spheres of this size prior to firing would also contribute to a higher likelihood of failure. Oxidization, reddening of the clay, is confined to the outer surface. None was observed on the exposed interior surfaces. This would indicate that they did not continue to be fired after breakage, so post firing breakage seems most likely.

11.3.5.3 Hand Molded Clay

Anyone who has played with clay or plasticine will identify with this object—DlLg-33:08A/20979. At 25.5 mm in length and 14-16 mm in diameter with a roughly conical form, it is a very familiar looking artifact. It was separated or broken off from a once larger source piece prior to being fired. Whether it was deliberately or inadvertently fired, this is what preserved it. Finger prints can be seen in several locations on the surface (Plate 11.3-3).

Plate 11.3-3: Three Views of Hand Molded Clay (DlLg-33:08A/20979)

11.4 Lithic Artifacts

Level 3A contains a total of 17 tools with a combined weight of 196.7 grams, 4606 flakes with a total weight of 328.2 grams, and 21 fragments of ochre weighing 2.4 grams. The single limestone cobble weighs 1635.7 grams, the two Swan River Chert pebbles weigh 59.7 grams, and the single granite spall weighs 9.0 grams for a total amount of 4648 objects and a total weight of 2231.7 grams. The tool assemblage in Level 3A is similar to the tool assemblages found in the other levels.

11.4.1 Lithic Tools

A total of 17 tools (Table 11.4-1), with a combined weight of 196.7 grams, were recovered. Like Level 3, the Level 3A lithic tool assemblage is composed of tools mostly made out of Knife River Flint. The materials of these tools are tabulated in Table 11.4-2 and their distribution is portrayed in Figure 11.4-1.

LITHIC TOOL TYPE	QUANTITY	%
Projectile Point	4	23.53
Scraper	1	5.88
Biface	2	11.76
Retouched Flake	4	23.53
Utilized Flake	2	11.76
Chopper	1	5.88
Drill	1	5.88
Pièce Esquilleé	2	11.76
TOTALS	17	99.98

Table 11.4-1: Lithic Tool Types in Level 3A

The tools will be described by type on an individual basis. The measurements (the metrics) of these artifacts will be illustrated in tables following each tool type or within the artifact description for smaller groupings.

LITHIC MATERIAL TYPE	QUANTITY	%
Knife River Flint	12	70.59
Swan River Chert	2	11.76
Denbeigh Point Chert	1	5.88
Quartzite	1	5.88
Porcellanite	1	5.88
TOTALS	17	99.99

Table 11.4-2: Lithic Material Types Represented in the Tool Assemblage from Level 3A

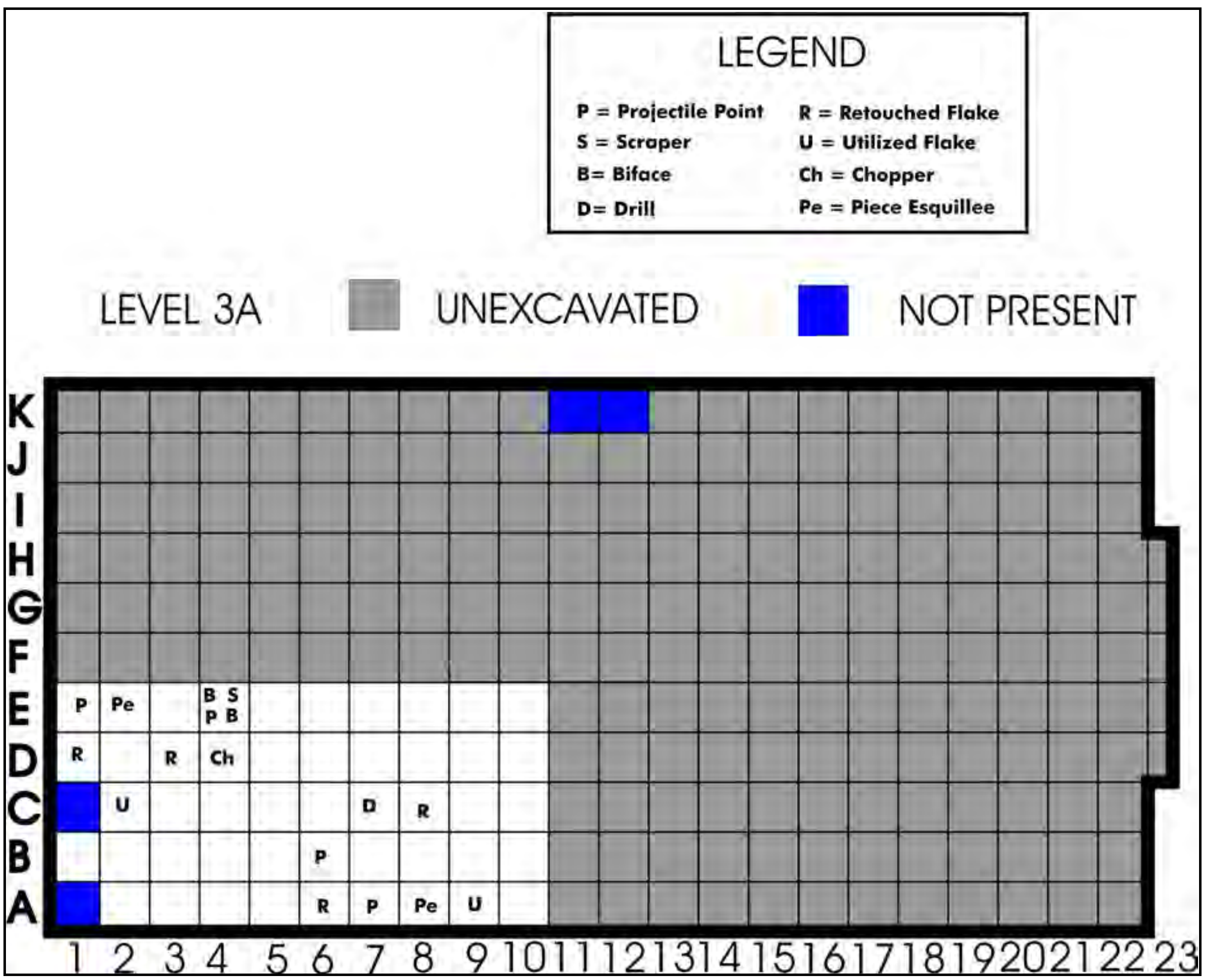


Figure 11.4-1: Distribution of Lithic Tools in Level 3A

11.4.1.1 Projectile Points

Four projectile points were recovered from Level 3A. Their metrics are listed in Table 11.4-3 and they are depicted at two times actual size.

Plate 11.4-1: Both Sides of DlLg-33:08A/15970

DlLg-33:08A/15970 is a Prairie Side-Notched Swan River Chert projectile point recovered in Unit E1. This complete point has serrated edges, the flake scars on both edges are high-shouldered and large amounts of material have been removed with each flake scar. There is basal thinning that is also roughly knapped, resulting in a very slightly excurvate arc with deep knapping scars. The base is 13.48 mm in length and flake scarring runs to 0.38 mm in depth. Several large flake scars on the dorsal face run 5.08 mm into the point, terminating at the half-way point of the tool's thickness. The dorsal face has been completely flaked 14.91 mm from the tip into the body of the point. The area below that in the center of the point is clear of knapping marks; the ones from the notches are barely visible on the surface.

Plate 11.4-2: Dorsal and Ventral Faces of DlLg-33:08A/18183

DlLg-33:08A/18183 is a KRF Plains Side-Notched projectile point which occurred in Unit A7. This projectile point appears to have been discarded in manufacture as only one notch has been flaked out. The opposite notch has a relatively heavy hinge fracture running vertically from the edge right in the area where the notch would be flaked out. This is the most likely reason for this point's abandonment, barring the possibility that the point was simply lost. Due to the extensive and invasive quality of the knapping on this point, dorsal/ventral are not identifiable. The base itself has been thinned with two deep flake scars that cause a slight concavity at the base. On the left edge, nine generally oblique flake scars move into the point up to 9.3 mm, this longest flake scar is right at the tip of the point. The right edge from the base has three small flake scars; 0.62 mm, 0.68 mm, and 1.2 mm. Immediately adjacent is the notch, which consists of two flake scars, 4.31 mm and 2.08 mm. Both of these flake scars in all likelihood hide prior notching flake scars. Eight more flake scars from the notch make up the rest of this edge, ranging from 0.85 mm to 2.2 mm. Seven flake scars make up the basal thinning ranging from 0.51 mm to 2.2 mm. The left edge consists of three flake scars prior to the notch, 2.85 mm, 1.47 mm, and 2.53 mm, although this last flake scar is a hinge-fracture that exists below both of the other flake scars. The notch consists of an undefinable amount of flake scars (considerable grinding on the inner surface of the notch prevents count). Following this are five flake scars that move from the notch to the tip of the point. These flake scars range from 0.76 mm to 4.20 mm.


Plate 11.4-3: Dorsal and Ventral Faces of DlLg-33:08A/18330

DlLg-33:08A/18330 is a KRF Plains Side-Notched projectile point recovered from Unit B6.This complete point is beautifully made. The notches are clear, deep, and fairly even. One shoulder slopes slightly more than the other, but this may well be because of breakage, and the base is slightly convex and has been ground. The tips of the base are slightly rounded on the left and squared on the right. There is some polish on the ventral face at the base, not just on the base itself but on the ventral face below the notches. The tips of the base appear to have been slightly ground as well, as they are rounded and polished. The notches are rounded as well in their innermost areas. The base of the ventral face has a thinning flake scar which terminates in a step fracture. Two other flake scars, one on each side of this larger, central flake scar, appear to have occurred prior to this central flake scar. The flaking on the left edge of the point above the notch is high-shouldered, resulting in a serrated edge. The flake scars point at a low oblique angle toward the base of the point, total nine in count, and range from 1.73 mm to 2.99 mm with a maximum depth of 8.04 mm. On the right edge from the tip to the notch, there are ten flake scars in 27.61 mm, ranging from 1.88 mm to 2.88 mm. There is a single flake scar in the notch area that thins the shoulder. It moves horizontally from the bottom of the shoulder into the body of the shoulder and is 1.46 mm wide and 2.88 mm deep. On the dorsal face, the base of the point has eight flake scars on it along the 19.12 mm length of the base. The entirety of the dorsal face has knapping on it, no original material is visible. Nine flake scars make up the edge above the notch on the left edge, totaling 27.58 mm. These flake scars range from 1.51 mm to 5.01 mm and are directed straight into the body of the point, i.e., there are no oblique flake scars along this edge. The deepest of these flake scars is 10.18 mm which reaches more than halfway across this face. One original shaping flake scar is visible and is steeply angled from the tip down toward a hinge fracture from the opposite face. It too terminates in a step fracture, leaving a slight high point 18.83 mm from the tip. On the right edge from the tip to the notch are eight flake scars totaling 25.64 mm. Three of these flake scars are comparatively large flake scars, 5.32 mm (plunging flake scar), 4.43 mm, and 7.76 mm, which terminates in a large step fracture. It is the opposite of the 10.18 mm deep flake scar that extends from the left edge. One of these flake scars was intended to remove the other's hinge fracture. Some of the high points on both faces have light to medium polish on them, which suggests either post-depositional wear or possibly wear created by points rubbing against each other as they were carried around, prior to use as a point. This is, of course, highly conjectural.

Plate 11.4-4: Dorsal and Ventral Faces of DlLg-33:08A/19358

DlLg-33:08A/19358 is a broken KRF projectile point. It was located in Unit E4. This point is broken at the notches. Without the base/notch areas, determining Prairie/Plains distinctions are not possible. On the ventral face, the left edge consists of fifteen flake scars, ranging from 1.06 mm to 1.82 mm, with a maximum depth of 4.09 mm. All flake scars are at a slightly oblique angle, tending to angle toward the base. On the right edge, only four flake scars have been removed from the tip down, totaling 7.61 mm. There is a 9.08 mm area without flake scars, then 5.57 mm of flaking. The point is broken below this area. On the dorsal face, from the base moving up the left edge, seven flake scars take up 13.76 mm. There is an area with no knapping that is 1.74 mm long, then eight flake scars totaling 8.25 mm. There is some polish on this edge which suggests this point may have been reused as a scraper after the point had broken. From the tip on the right edge, ten flake scars total 17.97 mm. The point is broken beyond this. Again, there is some polish on the edge suggesting that this point was reused as a scraper after the point was broken.

CAT. #	LE	WI	TH	BWI	HFTWI	BLE	NLE	NA	SHA	TIPA
15970	23.34	13.72	3.89	13.41	9.87	5.48	3.88	55	65	75
18183	17.56	12.82	3.79	12.86	n/a	4.78	4.44	52	65	65
18330	36.61	20.15	4.31	19.12	8.92	5.71	7.31	58	80	50
19358	25.20	15.41	2.21	n/a	n/a	n/a	n/a	n/a	n/a	49

Table 11.4-3: Measurements of Projectile Points from Level 3A

11.4.1.2 Scraper

Plate 11.4-5: DlLg-33:08A/19357 (2x actual size)

DlLg-33:08A/19357 is a Denbeigh Point Chert thumbnail scraper recovered in Unit E4. It has been heat treated/burnt and has patination all over the dorsal face as well as the working edge. There does not appear to be any on the ventral face, suggesting that this tool sat, ventral face down, on the ground for a good length of time prior to being enveloped by the land. It has also been either heat-treated or burnt, as it has a glossy, greasy sheen that often accompanies heat treatment. The proximal end has been broken off and it is possible that this tool was originally hafted, which would suggest that it is in fact an end scraper. There is a very mild work-polish on the ventral face, below the working edge. The ventral face is free of knapping scars; all knapping was therefore done on the dorsal face. This tool has an elongated pyramid form but no indications of the original striking platform/bulb of percussion. These markers could have been lost when the base of the tool broke. The break is opposite the working edge and is the elongated portion of the elongated pyramid. There is a central ridge on the ventral face that peaks at the mid-point of the working edge. Due to the patination, it is impossible to discern if this tool was flaked into this pyramidal form or if it occurred naturally. The working edge has use wear extensively enough to cause the edge to slope back into itself, suggesting this tool's working edge was near exhaustion prior to the tool breaking. As the patination on the dorsal face is extensive, no flake scar counts or metrics are possible. This tool measures 21.9 mm in length, 20.79 mm in width, and 9.28 mm in thickness. The working edge width is 18.97 mm, the length is 4.77 mm, and the angle is 70º.

11.4.1.3 Bifaces

DlLg-33:08A/19359 is a broken KRF tool fragment from Unit E4. Bifacially flaked, this could be the shoulder or tip of a projectile point, the tip of a side scraper, or the working edge of a larger tool, such as a knife. Some polish is discernable on both faces. This fragment is small enough that no definitive statement can be made about the tool's intended use. The measurements of the remnant of the working edge are listed in Table 11.4-4.

DlLg-33:08A/20417 is a broken Knife River Flint biface from Unit E4 (Table 11.4-4). This fragment of a tool, illustrated in Plate 11.4-6 at twice actual size, has bifacial flaking along the right edge. Five flake scars make up this edge, two of which terminate in a step fracture. These flake scars point toward each other so it is probable that the knapper attempted to remove the step fracture from one flake with a flake pointing obliquely into it. One of these flake scars is midway along the break so metrics for it are not possible. The other flake scars range from 1.1 mm to 5.52 mm. There are a total of seven flake scars, all of which point obliquely toward the base. These flake scars are invasive. They cover over half of the tool with a maximum depth of 9.6 mm. The right edge has patination and cortex on it and no flaking. Some medium use wear polish is visible on this edge.

Plate 11.4-6: #20417

11.4.1.4 Retouched Flakes

Four retouched flakes were recovered. Their metrics are outlined in Table 11.4-4. DlLg-33:08A/15703 is a retouched flake made of KRF. It was recovered from Unit D1. This tool consists of a very flat flake with a striking platform and a clear bulb of percussion. It is unifacially flaked on both edges with some edge polishing visible. The flaking on this tool is very small and regular. Flake scars range from 0.24 mm to 2.14 mm. The deepest flake scar, from working edge into the body of the flake, is 2.41 mm. This is very delicate flaking.

DlLg-33:08A/18981 is a retouched flake from Unit D3.This KRF flake has been knapped to create a concave working edge. The flake has the bulb of percussion/striking platform clearly visible. Both faces have slight work polish on them. The working edge is made up of twenty overlapping regular flake scars which range in size from 0.98 mm to 2.13 mm and are all approximately 0.2 mm deep. The flake is broken at the distal end and there are a few areas of work-polish on this end, suggesting that this flake was utilized after it broke.

CAT. #	TYPE	ARTIFACT MEASUREMENTS			WORKING EDGE MEASUREMENTS		
		LENGTH	WIDTH	THICK	WIDTH	LENGTH	ANGLE
19359	biface	13.16	7.02	2.33	13.94	0.20	24
20417	biface	17.98	14.07	3.71	18.13	2.34	23
15703	retouch fl.	32.83	19.15	2.54	30.05	5.89	30-50
18981	retouch fl.	38.65	18.62	5.01	25.57	2.15	49
19006	retouch fl.	21.66	20.15	2.31	21.36	0.00	55
23728	retouch fl.	20.90	18.60	2.25	17.60	-0.90	29
17587	utilized fl.	33.10	23.10	5.10	17.30	-0.10	30
23704	utilized fl.	23.50	11.10	3.80	18.30	-3.00	undeterm
20978	chopper	91.60	78.50	25.20	n/a	n/a	49
15556	drill	22.22	9.23	8.03	8.03	undeterm	undeterm
16543	pièce esq.	22.45	25.70	5.90			
18356	pièce esq.	25.49	22.63	7.78			

Table 11.4-4: Measurements of Flaked Lithic Tools (Excluding Scrapers) from Level 3A

DlLg-33:08A/19006 was recovered in Unit C8. This extremely flat and thin KRF retouched flake has its striking platform and bulb of percussion clearly visible. The working edge is on the left side. The tool is broken on the edge opposite the striking platform. No flake scars are discernable on the ventral face and there is no notable polish. On the dorsal face, medium polish on the ridges suggest that this tool saw consistent use. It is somewhat unusual for there to be polish on the dorsal, and not the ventral, face as the angle of the working edge would cut best with the ventral face against the object being worked on. The working edge of this tool consists of nineteen flake scars, all overlapping and very regular in size and shape. All flake scars are a maximum of 1.7 mm deep. This working edge is very straight and was probably longer prior to the flake breaking.

DlLg-33:08A/23728 is a KRF retouched flake from Unit A6. This tool is quite small to be utilized in and of itself and it appears that it may have been part of a larger retouched flake that broke and this piece was abandoned. The ventral face has one edge that has some knapping scars along its edge. These scars move a maximum of 3.2 mm into the body of the flake. The working edge is 17.6 mm and there are eleven flake scars visible along this edge. There is no evidence of polish anywhere on the tool.

11.4.1.5 Utilized Flakes

Two utilized flakes were recovered and their measurements are delineated in Table 11.4-4. DlLg-33:08A/17587, a Swan River Chert utilized flake, is from Unit C2. This broken tool is part of a larger tool but, as the working edge is broken on both ends, the size of the original tool is unknown. There is a slight polish on the ventral face directly on the working edge, but no other flaking or use wear can be discerned from this tool.

DlLg-33:08A/23704 is a utilized flake of KRF. It was located in Unit A9. This flake's dorsal face is all cortex so it is likely that this is a tool of opportunity. The working edge is very incurvate with a high point in the middle of the working edge resulting in a scalloped outline. The tool is broken parallel to the working edge. Use wear is visible on the working edge and some polish can be seen on the ripples on the ventral face. This tool was most likely abandoned after the break as it would have been too small for effective use in hand and too thin to survive much use as a hafted tool.

11.4.1.6 Chopper

Plate 11.4-7: DlLg-33:08A/20978 (actual size)

DlLg-33:08A/20978 is a quartzite chopper (Table 11.4-4). It was recovered from Unit D4. This large tool has three working edges; the fourth is the base of the tool and it was most likely held in this general area. It is roughly rectangular in form with an offset ridge running along its dorsal face. Four large invasive flake scars are visible on the right edge, which appears to be the main working edge. The other edges on this tool also have battering evidence, but the right edge is the most used. Numerous smaller use wear flake scars have been battered off of this edge. There are some faint scratches all along the right edge, indicative of use. These are heavily step-fractured but are not sufficient to prevent further use, so it is likely that this tool was lost or abandoned. The ventral face has numerous use wear scratches that criss-cross the face, which suggests that this tool was used at varying angles. As well, there are several places where polish has occurred on the ventral face. Finally, the ventral face has hematite on approximately one-third of it. This tool was not washed in the field laboratory and due to the possibility of future residue analysis the decision was made not to wash this tool during the analysis.

11.4.1.7 Drill

DlLg-33:08A/15556 is a broken porcellanite drill located in Unit C7 (Table 11.4-4). This drill tip appears to have undergone light to moderate use prior to breaking. This appears to be a tool of opportunity as the surviving portion of the drill is roughly pyramidal in form and one elongated tip of the pyramid has been knapped on two edges, one being the base of the pyramid, the other one edge of the rising angle that makes up the pyramid. However, the third edge that would have been subject to use wear, appears to be raw lithic material with no knapping or use wear. It is possible that the drill has broken along several axis. The knapping along the base of the pyramid is on the dorsal face only and is fairly heavy. A single flake scar makes up a shoulder that, were this a projectile point, would be called a notch. It moves into the material 1.27 mm. Two more flake scars exist on this edge as well, once again all on the dorsal face. They are both steep but short flake scars, perhaps removed to strengthen the edge beside the shoulder. The opposite edge on the base has neither flaking nor use wear, which suggests that this tool broke bilaterally. There is more flaking on the 'tip to pyramid peak' edge. This is unifacial flaking but very precise flaking. Maximum depth of these flake scars is 2.03 mm. This measurement is uniform across these flake scars. This edge is also the only area on this tool that has use wear and polish; the use wear sufficiently obscures the flaking so that a flake count is not possible. However, this knapped area is 9.58 mm long and slightly incurvate, so it is possible that this tool was multifunctional. Oddly, the flaking here does not run the full length of the edge itself, so that there is no flaking on this edge at the tip of the drill. There is use wear on the proximal face directly at the tip of the drill, a very slight polish, and several overlapping use wear flake scars.

11.4.1.8 Pièce Esquillée

Two artifacts of this class were recovered. Their measurements are listed in Table 11.4-4 and both are depicted at twice actual size.

DlLg-33:08A/16543 is a KRF pièce esquillée. It was recovered from Unit E2. This artifact has seen light use as a pièce esquillée; some battering exists on two edges, both of which have been knapped. Some cortex remains on the dorsal face near the edge. The original bulb of percussion lies at the opposite impact zone.

Plate 11.4-8: DlLg-33:08A/16543

DlLg-33:08A/18356 is also a Knife River Flint pièce esquillée. It was located in Unit A8. This pièce esquillée has been extensively utilized as all edges have heavy battering and crushing marks on them. The edges are all

Plate 11.4-9: DlLg-33:08A/18356

rounded from repeated use; there are no areas on this tool that could be used without extensive knapping to resharpen them. This is the probable reason for the tool's abandonment, once again assuming this tool was not simply lost.

11.4.2 Detritus

Detritus is a term used by archaeologists to define the waste material that results from the creation of a stone tool. Cores and flakes are the two main waste material types that result from this process. Cores are the usually exhausted pieces of stone that flakes are struck from; in other words they are used until they are abandoned. Cores can vary greatly in size. A flake can be extremely small or quite large and its size will, as a general rule, depend on the stage of manufacturing and the size and shape of the original core. If a knapper sits down to create a chopper/chopping tool out of a cobble of chert, that cobble becomes a core as soon as the knapper removes a few flakes from it. Often a knapper will remove the patination, or cortex, from most if not all of the core prior to removing useable flakes off the core. The corticated flakes are defined as primary decortication flakes. If that knapper removed two flakes of equal size and shape and used one, ignoring the other, the flake left behind would be considered detritus. As well, were the flake the knapper further refined into a tool to dull over time, it would require subsequent resharpening. The smaller flakes removed along that dulled edge would be considered detritus as well. One of those flakes is defined here as a thinning/sharpening flake. Basically, flakes can be refined into tool forms, retouched to sharpen an edge or stabilize an edge (or both), be used briefly, or simply ignored. The ones that are simply ignored are detritus.

11.4.2.1 Cores

DlLg-33:08A/19113 is a KRF core from Unit A9. This core is roughly rectangular with a substantial portion of one side covered in cortex. It weighs 11.47 grams and measures 305 mm by 280 mm, measuring from the longest point at each end. It has a mostly random flaking pattern with steep conchoidal ribbing on one face and heavy step-fracturing on most surfaces. One face has steeply-sided percussion flaking patterns. The presence of cortex on one surface, combined with step-fracturing, may have been the reason for this core's abandonment as there are not many clear areas for more useful flakes. One edge of the core has a short section of micro-flaking, 56.0 mm, so it may have seen a brief usage as a tool of convenience.

DlLg-33:08A/20418 is a chert Core recovered in Unit E4. This core is slightly unusual in that it is a roughly rectangular, flat slab with several flake scars visible on the two long faces. One face has one large flake (over 50%) removed and the other has five flake scars, three from one edge and two from the opposite edge. One hinge fracture on each edge of this face may have spelt the end of this core's usefulness. On the edge that has three flake scars, two are pressure-flaked very deeply such that the pressure flaker's tip mark can be seen.

11.4.2.2 Flakes

The assemblage from Level 3A has representations of all five of the types of manufacturing stages (Table 11.4-5, Figure 11.4-2).

STAGE OF MANUFACTURE	QUANTITY	WEIGHT
Primary decortication	83	81.5
Secondary decortication	205	25.7
Secondary shaping	64	35.0
Tertiary	1	0.1
Thinning/sharpening	4253	185.9
TOTAL	4606	328.2

Table 11.4-5: Frequency of Types of Recovered Flakes in Level 3A

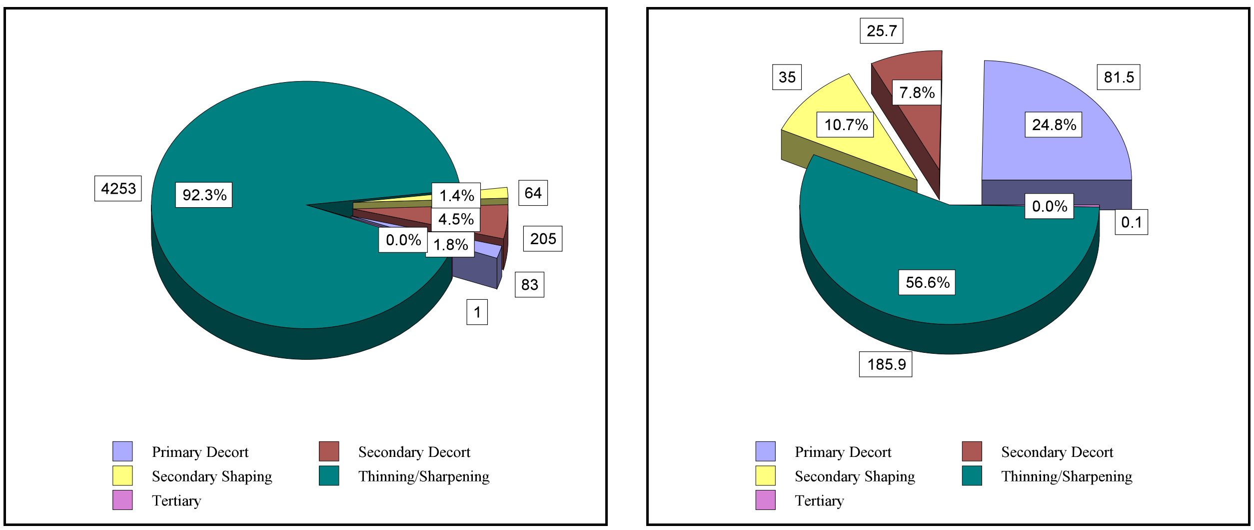


Figure 11.4-2: Frequency of Types of Flakes by Quantity (left) and Weight (right)

The vast majority of flakes in Level 3A are thinning/sharpening flakes by quantity of 4253 out of a total of 4606 as well as by weight at 185.9 grams out of 328.2 grams. By weight, primary decortication flakes are the second largest phase of tool manufacture at 25% of the assemblage but by amount they are 1.8% of the total.

Level 3A contains a fairly well defined knapping station. Figure 11.4-3 shows Units A7 and A8 to have the vast majority of flakes within their boundaries. The very steep drop-off in the amounts of flakes recovered in the units on all sides of them is notable. Unit A8 for example has 2035 flakes and Unit A9 has only two flakes. It is also interesting to note that no hearth is directly associated with the concentration in Units A7 and A8, which has not been the case in the other levels. The closest hearth is nearly four metres away, being at the northwestern corner of Unit A3. This could suggest a cultural difference between the inhabitants during the period this level was utilized and the previous levels. Alternatively, and more likely, it is possible that there is a hearth beyond the excavated area south of Units A7 and A8.

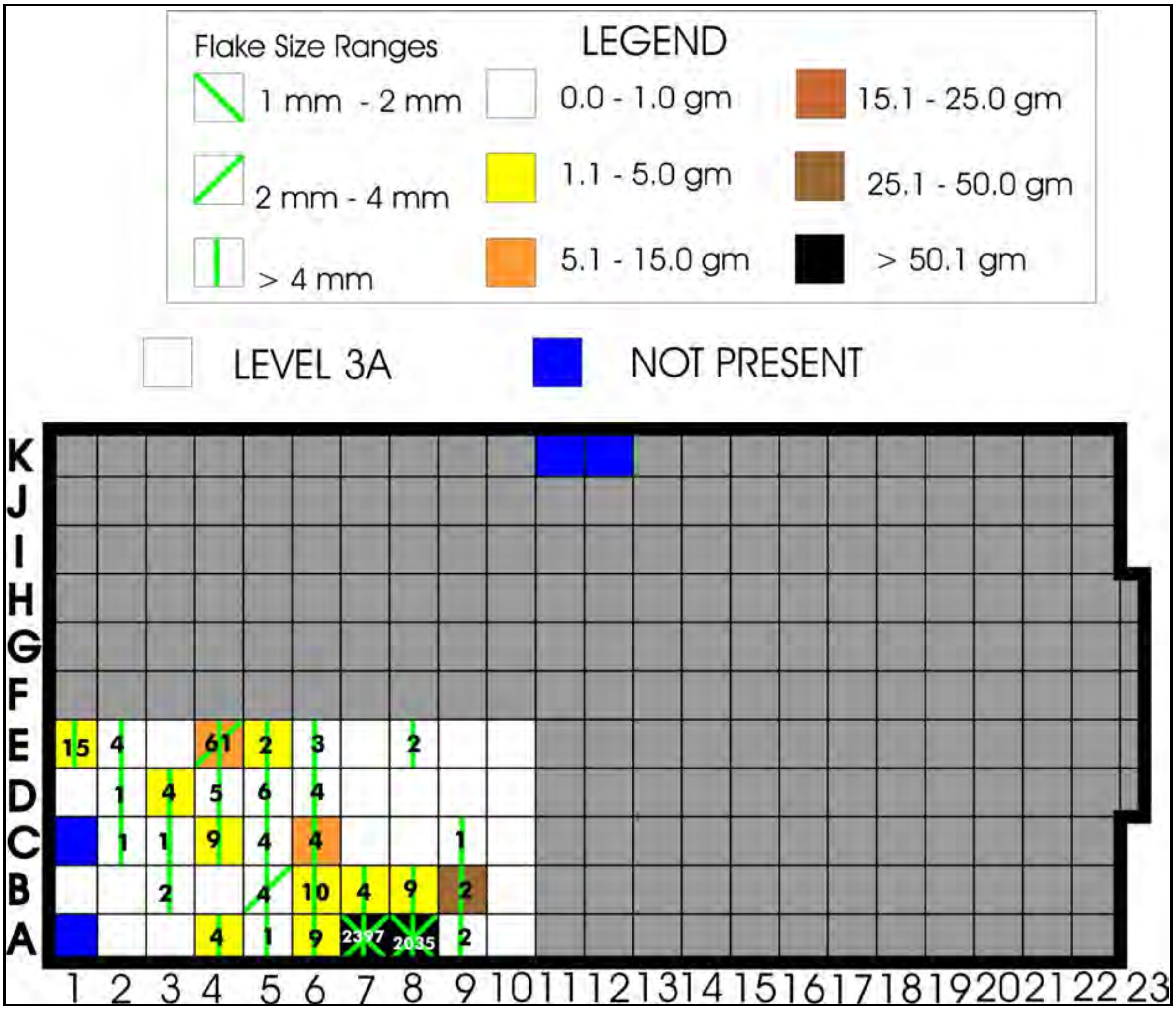


Figure 11.4-3: Distribution of Flakes in Level 3A

There is a second concentration in Unit E4. The unit total for recovered flakes is 61, which is nowhere near the totals in Units A7 and A8, but it is a concentration. As well, this concentration is immediately adjacent to a hearth in Units A3 and A4 and another hearth in Unit E5 and Unit E6. This lends strength to the supposition that a hearth may be uncovered at some later date south of Units A7 and A8. A third and much smaller concentration occurs in Unit E1 with 15 flakes. Two material types, Knife River Flint and undifferentiated chert, are present.

There are ten different types of stone among the flake assemblage for this level (Table 11.4-6, Figure 11.4-4). They are listed by material name, quantity of flakes of that material type, and the total weight of those flakes.

MATERIAL	QTY	%	WT	%
Diorite	1	0.02	0.1	0.03
Limestone	1	0.02	1.5	0.46
Porcellanite	1	0.02	0.1	0.03
Siltstone	2	0.04	2.3	0.70
Winnipeg River Quartzite	2	0.04	0.1	0.03
Selkirk Chert	4	0.09	0.3	0.09
Chalcedony	11	0.24	0.8	0.24
Chert (Undifferentiated)	16	0.35	53.8	16.39
Agate	46	1.00	5.9	1.80
Knife River Flint	4523	98.20	263.4	80.26
	4606	100.02	328.2	100.03

Table 11.4-6: Frequency of Level 3A Flakes by Material Type

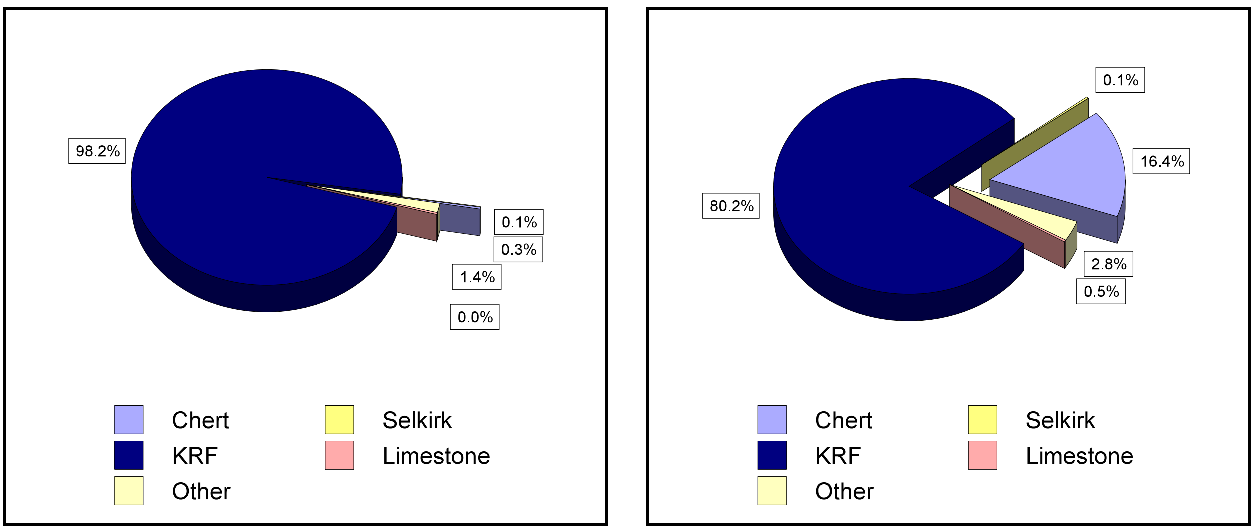


Figure 11.4-4: Frequency of Flakes by Material Type - Quantity (left) and Weight (right)

Knife River Flint is by far the predominant material in Level 3A at 98.2% of the total by quantity and 80.1% of the total by weight. Agate is the next most numerous at a quantity of 46, but makes up a mere 1.8% of the weight total. Agate appears in Units A7 and A8, as well as Unit E4. These units have been identified as the two lithic concentrations in this level.

The distribution of material types across the excavation area (Figure 11.4-5) generally replicates the frequency distribution pattern.

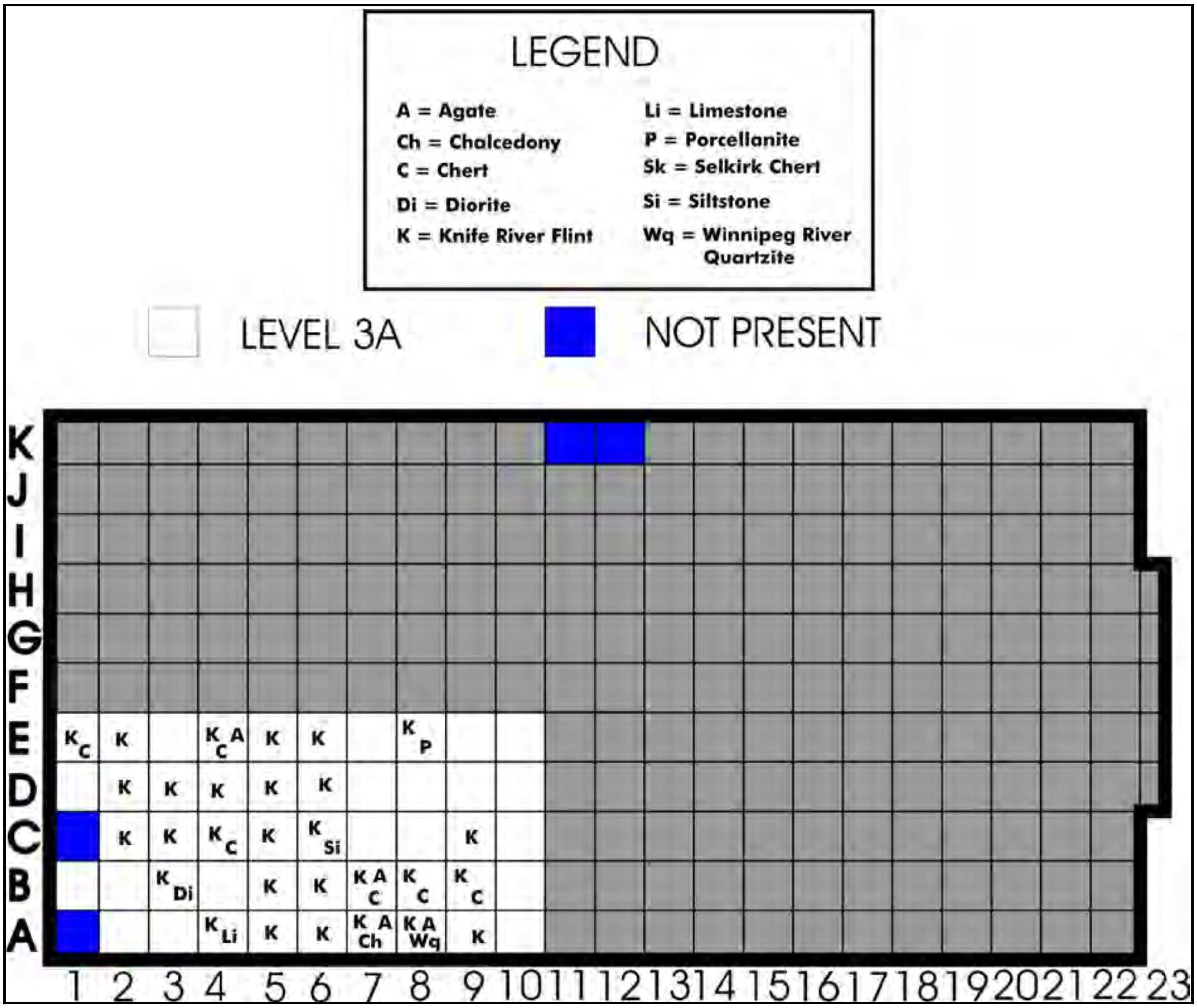


Figure 11.4-5: Distribution of Flakes by Material Type

11.4.3 Natural Object Modified

Two types of modified natural objects were recovered from Level 3A: fire-cracked rock (FCR) and ochre. Two granite fragments of fire-cracked rock (DlLg-33:08A/20037 and 20052), weighing 38.9 grams, were recovered from Unit A7. Another fragment (DlLg-33:08A/15493) occurred in Unit C6. It weighs 101.9 grams.

The second modified natural object is ochre (Table 11.4-7). The ochre from Level 3A occurs in association with the two lithic debitage concentrations; ochre is found in Unit A7 and A8, as well as Unit E4. Units B6 and B7, which are adjacent to Units A7 and A8, also contain ochre. Unit E1 contains the highest amount of ochre by weight at 1.0 grams and is associated with the smallest of the lithic debitage concentrations in Unit E1. The highest amount of ochre by quantity is in Unit D5 with 11 separate pieces. These weigh the same amount as the single piece of ochre found in Unit B7, 0.2 grams. The distribution of the relatively small quantities is shown in Figure 11.4-6.

CAT. #	UNIT	QTY	WT
15878	D5	11	0.2
15975	E1	3	1.0
17495	B7	1	0.2
17768	D7	1	0.1
18334	B6	1	0.1
17882	A8	1	0.1
19362	E4	1	0.5
20030	A7	1	0.1
20049	A7	1	0.1
TOTAL		21	2.4

Table 11.4-7: Ochre Recovered from Level 3A

11.4.4 Natural Objects Unmodified

Four unmodified natural objects were curated. These are two Swan River Chert pebbles (DlLg-33:08A/19115), weighing 59.7 grams, from Unit A9, one limestone cobble (DlLg-33:08A/18998) weighing 1635.7 grams from Unit D3, and a granite spall (DlLg-33:08A/14819) from Unit A5. This spall weighs 9.0 grams.

11.4.5 Summary

Level 3A, like Level 3, is mainly made up of Knife River Flint tools. As was noted in Level 3, this is the primary difference between these levels and Level 1 through Level 2D. In the upper levels, undifferentiated chert made up the majority of the materials used in the creation of the tools and detritus.

Three out of four projectile points are Knife River Flint, the other being a Prairie Side-Notched Swan River Chert point. Two of the three KRF points are Plains Side-Notched types and the third of these points is broken in such a way as to be undefinable. In general form, it could be either a Prairie or a Plains Side-Notched point, but it lacks sufficient identifiers for further definition. Knife River Flint by amount takes up the vast majority with 12 out of 17 tools. By weight, quartzite is in the majority, but there is only one quartzite tool in this level and it is a single object, a chopper/chopping tool, which is a comparatively large and heavy object.

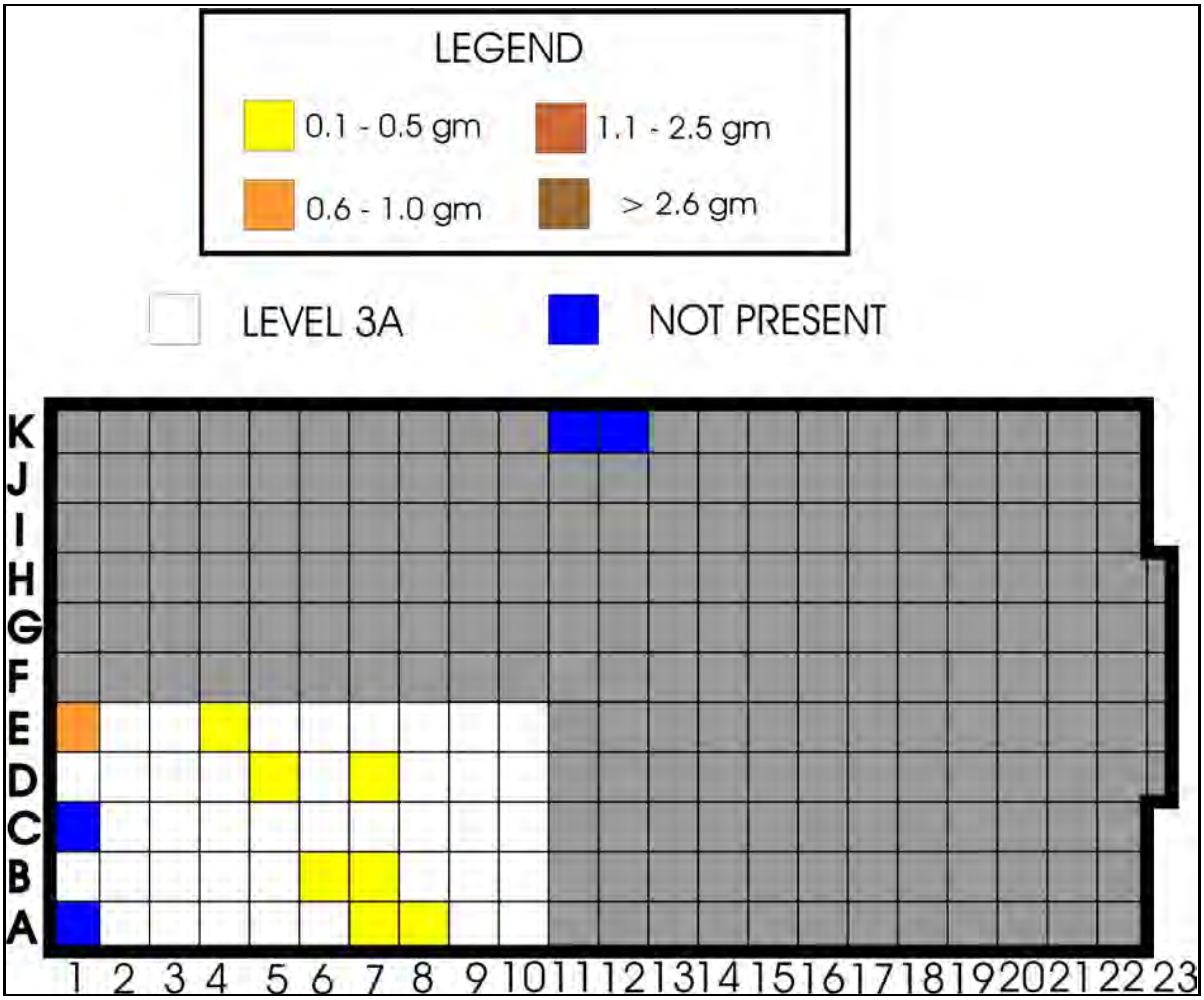


Figure 11.4-6: Distribution of Ochre in Level 3A

11.5 Botanical Remains

Level 3A produced 62 charcoal samples which contained 191 specimens (Table 11.5-1). Elm was abundant, ash was frequent while poplar/willow and oak were occasional.

Graphically, the frequency of the identified taxa is depicted in Figure 11.5-1. As in Level 3, elm overwhelms the other taxa with maple a distant second. Ash is third and poplar/willow is fourth. No oak was identified.

TAXON	CAT #'S	QUANTITY	PERCENTAGE OF IDENTIFIED
Ash (*Fraxinus*)	8	13	15.48
Elm (*Ulmus*)	11	40	47.62
Maple (*Acer*)	10	18	21.43
Oak (*Quercus*)	-	-	-
Poplar (*Populus*)	-	-	-
Poplar/Willow	7	11	13.10
Willow (*Salix*)	2	2	2.38
Diffuse Ring Pattern	6	15	
Semi-ring Porous	-	-	
Hardwood	-	-	
Unidentified	18	92	
	62	191	

Table 11.5-1: Frequency of Charcoal Recoveries

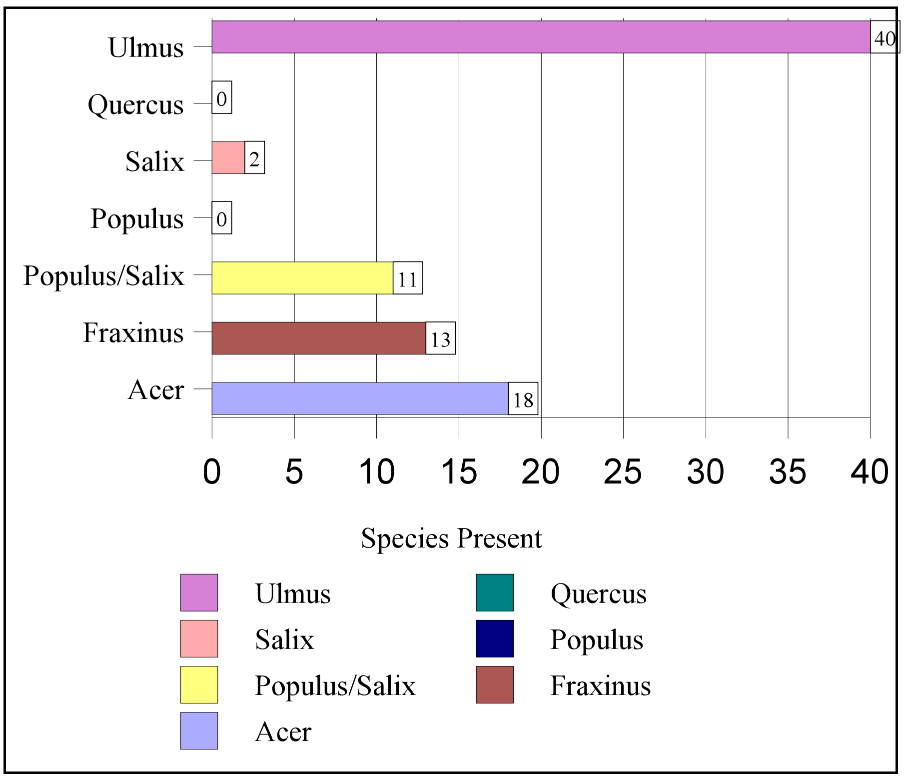


Figure 11.5-1: Frequency of Identified Taxa

Three of the four hearths (Figure 11.2-1) had charcoal samples (Table 11.5-2). Maple occurred in all three hearths; maple, ash and elm in one (Units B3-A4) and maple, elm and poplar/willow in another (Units E4-E5).

HEARTH	B3-A4	D3-E4	E4-E5
NUMBER OF SAMPLES	2	1	4
Elm (*Ulmus*)	1	-	2
Maple (*Acer*)	1	1	1
Ash (*Fraxinus*)	2	-	-
Poplar/Willow	-	-	3
Diffuse Ring Porous	1	-	2
TOTAL	5	1	8

Table 11.5-2: Frequency of Identified Charcoal Recoveries at Hearth Locations

A complete uncharred puccoon (*Lithospermum*)seed was collected from adjacent to the hearth in Unit B4. This seed was likely intrusive or had been present prior to the occupation.

11.6 Mammal, Avian, and Reptilian Remains

11.6.1 Mammal Butchering Remains

There are a total of 284 mammal bones weighing 162.9 grams from Level 3A. These numbers are in contrast to many of the earlier levels where the weight is far greater than the quantity. Most of the bones were too small to identify (Figure 11.6-1). Only 11% of the material by weight could be identified to species (Figure 11.6-2). In addition, there were elements from larger mammals present, but due to the small number of remains and the fragmented nature of the materials, it was not possible to determine the species.

Level 3A was present in 48 units. Sixteen of these had no mammal specimens (Figure 11.6-3). Of the remaining units, only seven had greater than 5 grams of material and none had more than 50 grams.

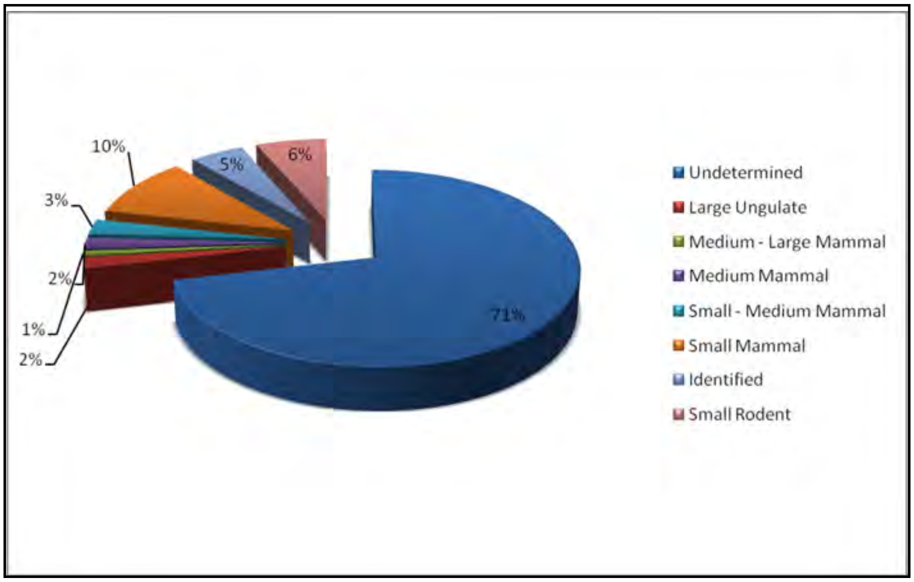


Figure 11.6-1: Frequency of Mammal Butchering Remains by Quantity

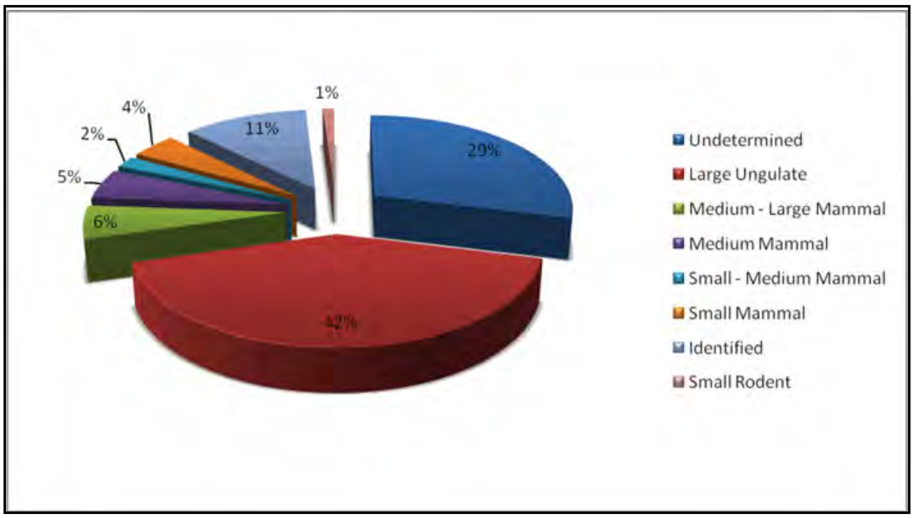


Figure 11.6-2: Frequency of Mammal Butchering Remains by Weight

There are four hearths in Level 3A , but two of these, located in Units A3 and B3, have only a few traces of mammal bone. There are also hearths in Units D4 and E5-E6 which are associated with larger concentrations of bone. However, only Unit E5 has a sizable concentration of bone, compared to the rest of Level 3A, at 34.8 grams.

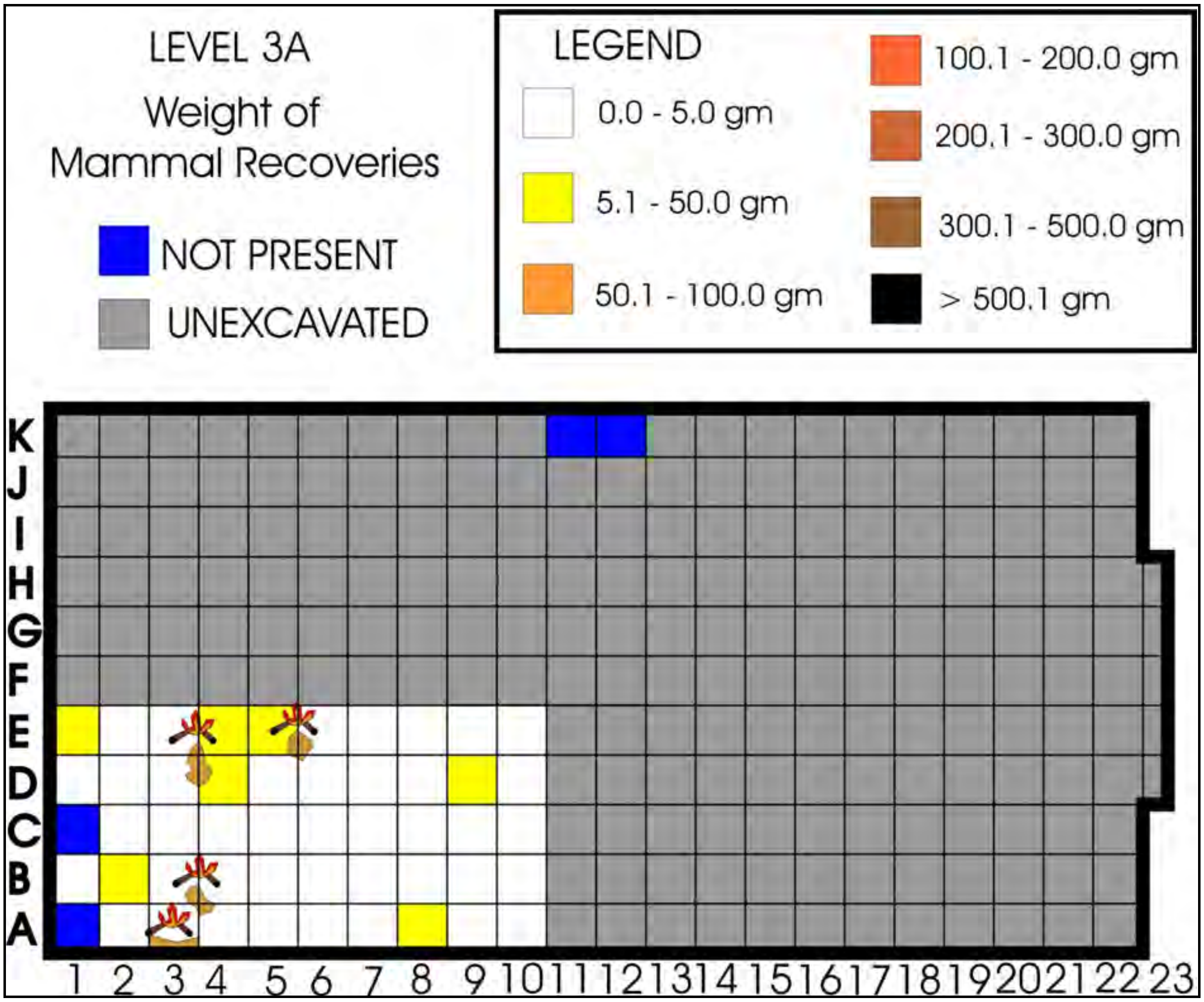


Figure 11.6-3: Distribution of Mammal Butchering Remains in Relation to Hearths

Most of the identified species occur on the periphery of the excavation area (Figure 11.6-4), especially around the northern hearths. Only beaver is present in more than one unit—Units A8, E2, and E4.

It was possible to identify several species but, as can be seen in Table 11.6-1, there appears to be only a single individual for each species. The vole is likely a taphonomic addition to the assemblage as the small size makes it unlikely that it is related to subsistence.

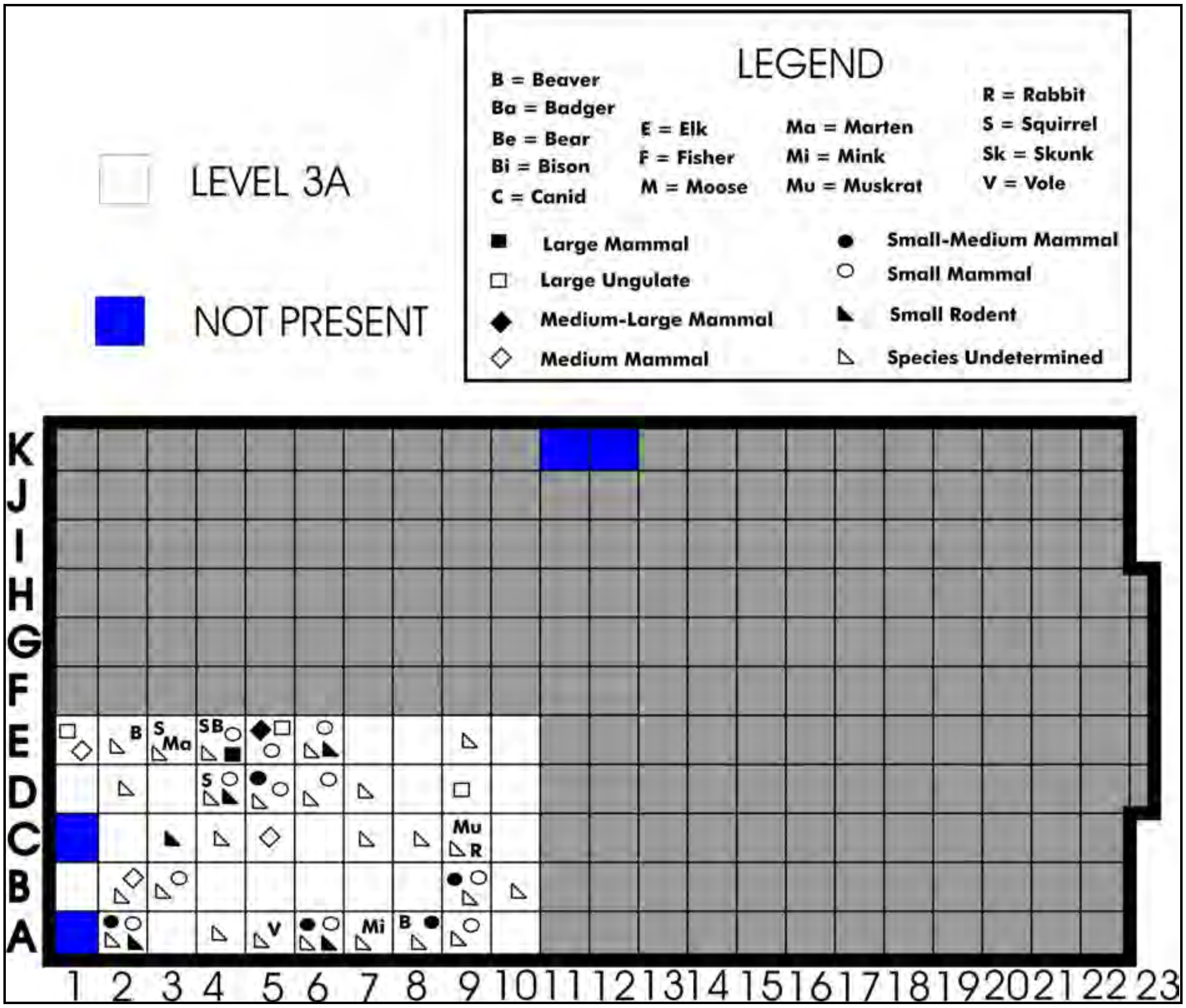


Figure 11.6-4: Distribution of Identified Taxa in Level 3A

SPECIES	MNI
Beaver (*Castor canadensis*)	1
Hare/Rabbit (Lagomorpha)	1
Marten (*Martes americana*)	1
Mink (*Mustela vison*)	1
Muskrat (*Ondatra zibethica*)	1
Red Squirrel (*Tamiasciurus hudsonicus*)	1
Vole (*Microtus* sp.)	1
Total	7

Table 11.6-1: Minimum Numbers of Identified Species

The frequency of the identified species is almost identical, whether it is categorized by quantity (Figure 11.6-5) or by weight (Figure 11.6-6).

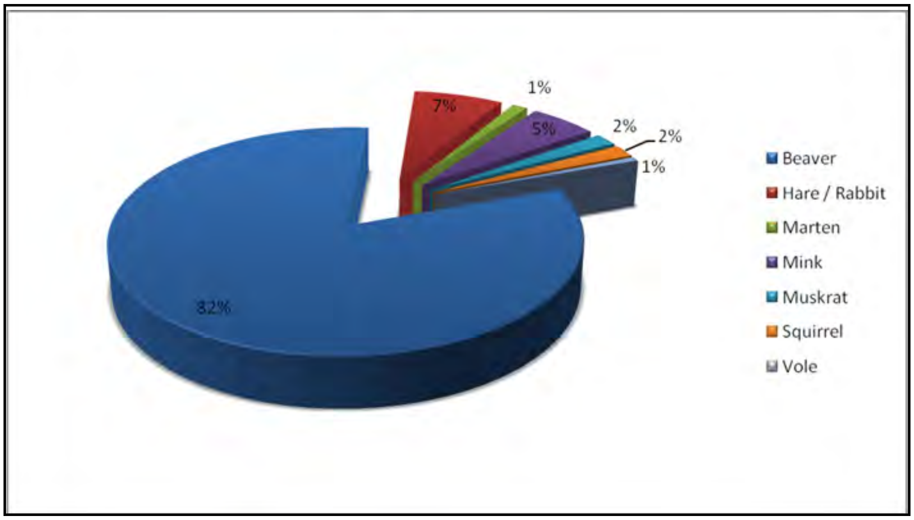


Figure 11.6-5: Frequency of Species by Quantity of Elements

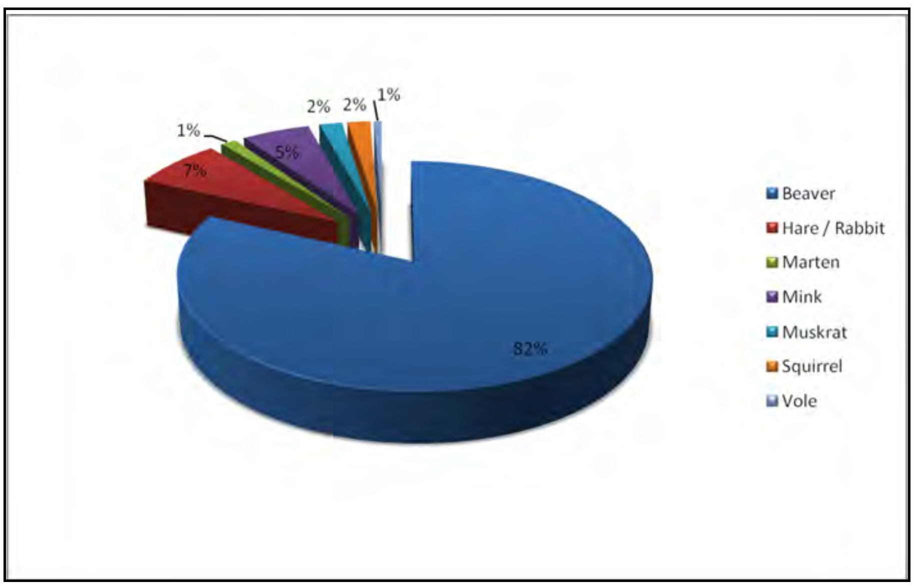


Figure 11.6-6: Frequency of Species by Weight of Elements

11.6.2 Bone Tools

Perhaps reflecting the large amount of bird remains, both tools in Level 3A are made from bird bone. These tools are both awls, DlLg-33:08A/18184 in Unit A7 and DlLg-33:08A/24920 in Unit E2. Both tools are typical awl designs (Plate 11.6-1) and both are damaged.

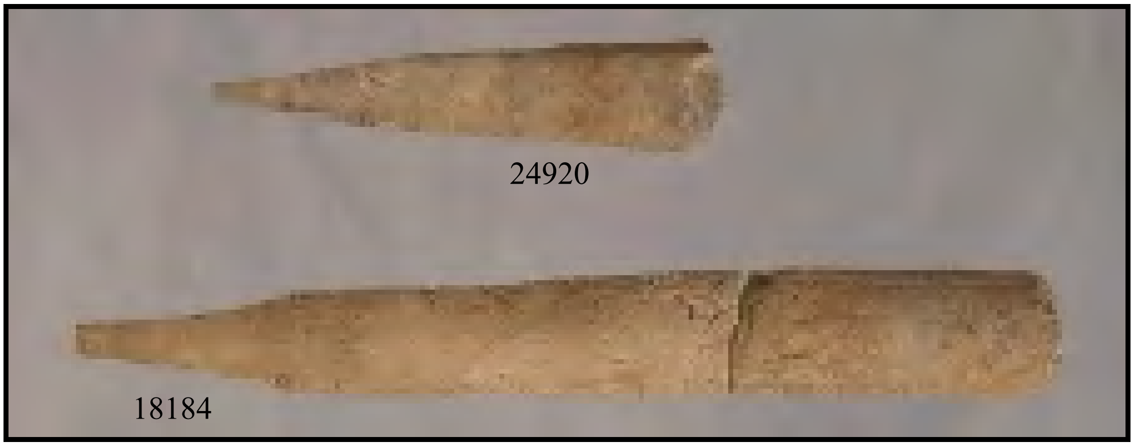


Plate 11.6-1: Bird Bone Awls (2x actual size)

Only the working end of DlLg-33:08A/24920 is present. It measures 3.5 cm in length, 0.7 cm in width, and 0.2 cm in thickness. It weighs 0.4 grams. DlLg-33:08A/18184 is broken in half with the very tip removed. The measurements are: length - 6.7 cm, width - 0.9 cm, thickness - 0.2 cm, and weight - 1.2 grams. It seems likely that these tools were discarded rather than having been lost.

11.6.3 Avian Butchering Remains

There are quite high numbers of bird bone within Level 3A with 69 artifacts (Figure 11.6-7) weighing a total of 49.95 grams of material. This is a fairly substantial amount especially when seen in comparison to the small amount of mammal bones. It was possible to identify one element as the humerus of a swan. The remainder could only be identified as medium or large bird. There were also concentrations of egg shell recovered, like Level 3, but the quantity was much less.

11.6.4 Amphibian Remains

DlLg-33:08A/15182 and DlLg-33:08A/15183, from Unit A2, are 47 undetermined elements from a frog. These specimens probably represent a single individual who died during hibernation.

11.6.5 Summary

This faunal assemblage suggests a much greater reliance on bird resources. While the excavated area is more limited than for Levels 1 to Level 2D, a large block of this level was exposed. However, it is not clear from the limited amount of faunal remains what type of site Level 3A represents. There is a slight concentration at the northern hearths, but to gain a better understanding of the site the distribution of other artifact types will be needed. The limited amount of mammal butchering remains suggests two main scenarios. Firstly, mammals were less prevalent at the time of the occupation and any hunting was not particularly successful or, secondly, this occupation was very short lived. The higher concentration of avian butchering remains in Level 3A compared to the other levels indicates that birds were being actively hunted. In addition, the fact that the only two tools present are both made out of bird bone is another indication of the major usage of these species. It is difficult to say if this was a particular preference of the people in this camp or if it was a matter of necessity or opportunity, especially if this was a fall campsite during the annual waterfowl migration period. The limited nature of the materials does suggest a smaller population inhabiting the location at this time.

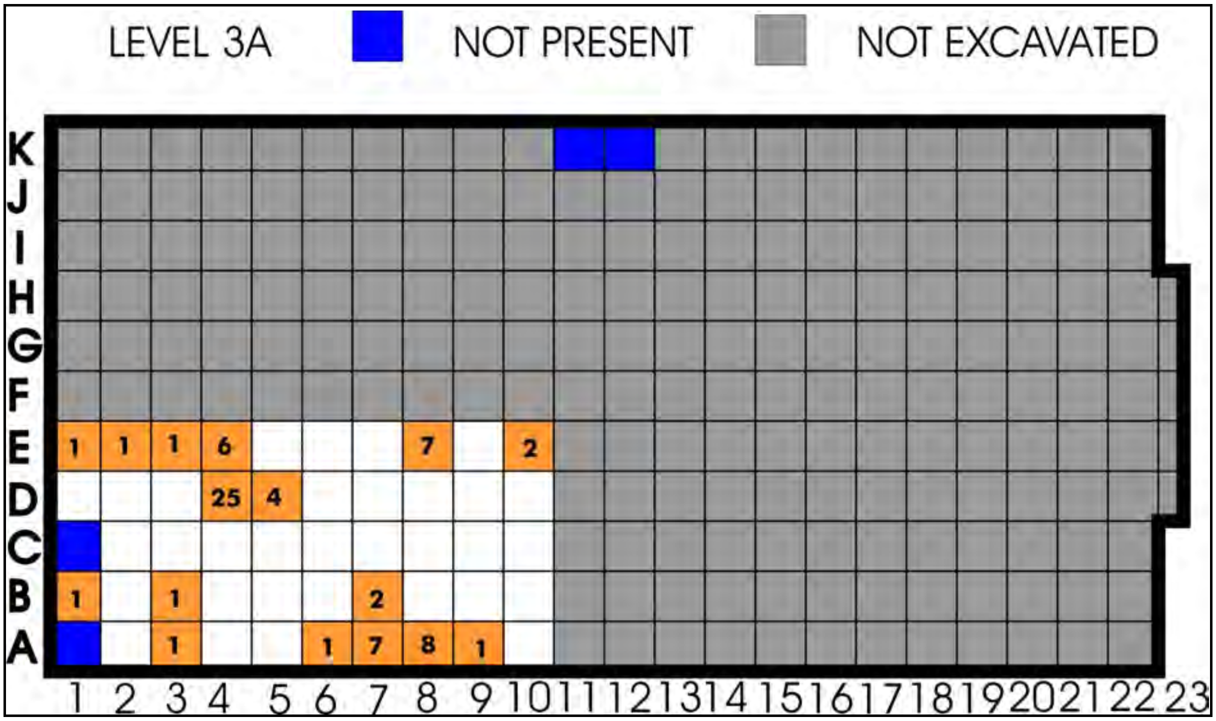


Figure 11.6-7: Distribution of Avian Remains

11.7 Fish Remains

11.7.1 Artifact Recoveries

There are 11579 artifacts (1625 catalogued assemblages) in Level 3A which have been identified as fish remains. Each of those 1625 catalogued assemblage of artifacts represents a record in the database, from which to determine a quantitative analysis. Of the 11579 artifacts, 5243 were catalogued as "Unidentifiable Bone" (N=2415) or "Undetermined Bone" (N=2828), leaving 6336 artifacts (54.72%) being identified as to their element.

However, 3821 of those 6336 specimens (i.e., 60.31% of the selected artifacts from this level) were either scales (N=63), rib/ray/spine (N=1816), or vertebra (N=1942) and therefore not diagnostic enough under the parameters of this analysis to provide much more information beyond that.

11.7.2 Species Determination

The remaining 2515 specimens (i.e., 21.72% of all artifacts from this level, and 39.69% of the selected artifacts from this level) can be considered as diagnostic elements and, as such, form the basis for the interpretation of this level. Table 11.7-1 summarizes the elements identified by taxon, indicating the frequency by the lowest level of species identification wherever possible.

Following the database design, most objects are identified according to the skeletal element, but there is one object identified as a "gorge/leister". DlLg-33:08A/18402 is very similar, if not identical, to the specimen recovered in Level 2B (DlLg-33:08A/11584). It, too, could be included in the general count of catfish pectoral spines for those objects, but its function is clearly much different than a product of butchering remains. It is clearly a bone tool and is positively identified as being a culturally-modified left shaft catfish pectoral spine, and thus is catalogued under the functional category as a food procurement implement.

11.7.3 Analysis

There are ten different taxa present in the sample, the most diverse number of species of any of the levels. The computations for both the Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) are shown in Table 11.7-2. The results are further illustrated in Figure 11.7-1.

The most significant species with respect to MNI frequencies is Ictaluridae spp.(catfishes) followed by Catostomidae spp. (suckers). *Aplodinotus grunniens* (freshwater drum) and *Hiodon* sp. (goldeye/mooneye), with similar counts each, make up a good proportion of the catch, while Perciformes, which can also include the remaining Percidae (perches) and *Sander* sp. (sauger/walleye), are in very low numbers. There is also the presence of pike and burbot in small individual numbers in Level 3A. Of particular difficulty is determining the accurate numbers of *Acipenser fulvescens* (sturgeon) which has been calculated as only one. This may be far too low a count, and given the amount of scutes recovered at this level across much of the excavated area, there could be possibly as many as ten (10) given the quantity of scutes present (albeit, many in an incomplete state).

The NISP counts do suggest that some species may have a greater significance, as appears to be the case with the catfishes. This can also be said about sturgeon. Sturgeon scutes are present in almost every unit in this level, suggesting that they were processed in larger numbers than the MNI can really account for. At this occupation level, too, more suckers were identified than the remaining species, while freshwater drum is very small in individuals compared to other occupation levels excavated. Indeed, freshwater drum is only marginally more represented in this level than the other species, including the perches, sauger/walleye, and goldeye/mooneye. There is the presence of both pike and burbot in very low numbers and they show up only in a couple of other occupation levels.

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Perci-formes	Perc-idae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Lota lota	Fish	Total
Angular	1											1
Angular; Articular; Dentary; Retroarticular	1											1
Angular; Articular; Retroarticular	2											2
Angular; Dentary; Retroarticular	3											3
Angular; Retroarticular	47				4		2			4	4	61
Articular	13										5	18
Basioccipital	17										1	18
Ceratohyal	33	7					21				5	66
Ceratohyal; Epihyal	1											1
Cleithrum	147	36									5	188
Coracoid	108										1	109
Dentary	55	6			14	14			4		9	102
Epibranchial	7											7
Epihyal	24		1								1	26
Exoccipital	1											1
Frontal	35										1	36
Gorge/Leister	1											1
Hyomandibular	97	46										143
Hyomandibular; Preoperculum	1											1
Hyomandibular; Preoperculum; Quadrate	2											2
Hypohyal	29											29
Interoperculum	27											27
Lacrimal	11										1	12
Lateral Ethmoid	30											30
Maxilla	31	52		2			1				2	88
Metapterygoid	41											41
Operculum	55	33		2	1	17					14	122
Otolith							19					19
Palatine	43				2							45
Parasphenoid	27	1		2							6	36
Pharyngeal Arch	4	5									10	19
Pharyngeal Plate					1							1
Pharyngeal Plate, Upper	2						1					3
Posttemporal							2				3	5
Premaxilla	33	2			9	1	8				4	57
Preoperculum	29			1								30
Preoperculum; Quadrate	15											15
Prootic	13											13
Pterotic	13											13
Quadrate	22	6	1	1	6						2	38
Ray											2	2
Ray, Branchiostegal	6										16	22
Rib / Ray / Spine												1816
Scale											63	63
Scapula				1			1				1	3
Scute								723				723
Sphenotic	13											13
Spine											4	4
Spine, Dorsal	5						23				12	40
Spine, Modified First	4											4
Spine, Pectoral	90						8					98
Spine, Pterygiophore	4						5				2	11
Spine, Second Dorsal	20										1	21
Spine, Second Pterygiophore	2											2

ELEMENT/TAXON	Ictal-uridae	Catosto-midae	Perci-formes	Perc-idae	Sander	Hiodon	Aplod-inotus	Acip-enser	Esox	Lota lota	Fish	Total
Suboperculum											7	7
Supracleithrum	32											32
Supraethmoid	25											25
Supraoccipital	19											19
Undetermined Bone											2828	2828
Unidentifiable Bone											2415	2415
Urohyal	13											13
Vertebra	46										1942	1988
TOTAL	1300	194	2	9	37	32	91	723	4	4	9183	11579

Table 11.7-1: Identified Elements by Taxon

TAXON	NISP	PERCENT	MNI	PERCENT
Ictaluridae (1)	1300	54.26	28	39.44
Catostomidae (2)	194	8.10	16	22.54
Perciformes (3)	2	0.08	1	1.41
Percidae (4)	9	0.38	2	2.82
Sander (5)	37	1.54	3	4.23
Hiodon (6)	32	1.34	9	12.68
Aplodinotus (7)	91	3.80	8	11.27
Acipenser (8)	723	30.18	1	1.41
Esox lucius (9)	4	0.17	1	1.41
Lota lota (10)	4	0.17	2	2.82
TOTAL	2396	100.02	71	100.03

Elements Used for MNI Determination

1. Pectoral Spine (Left)	6. Operculum (Left)
2. Maxilla (Left)	7. Otolith (Left)
3. Quadrate (Left)	8. Scutes
4. Operculum (Left)	9. Dentary (Left or Right)
5. Dentary (Left)	10. Angular; Retroarticular (Left or Right)

Table 11.7-2: Species Determination

The distribution of the fish remains by species is shown in Figure 11.7-2. Unit A10 does not have any fish remains recovered from it. The remaining excavated area has at least two separate species found in each unit. Significant clusters of different species appear in certain areas. Units A2 and B2 have several diverse taxa and both may be associated with activities around the two hearths in Units A3 and A4/B3. With hearths next to one another, it is understandable that adjacent units would show a greater frequency. Two other hearths, one in the D3/E4 area of units and one in the E5/E6 area, also have a wide variety of different fish species.

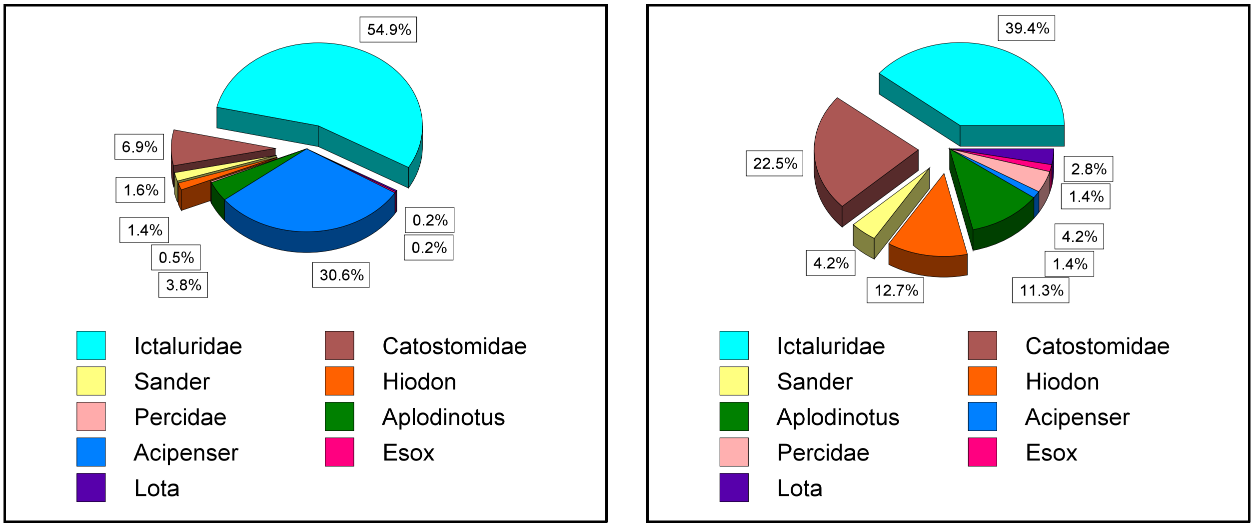


Figure 11.7-1: Frequency of Identified Taxa by NISP (left) and MNI (right)

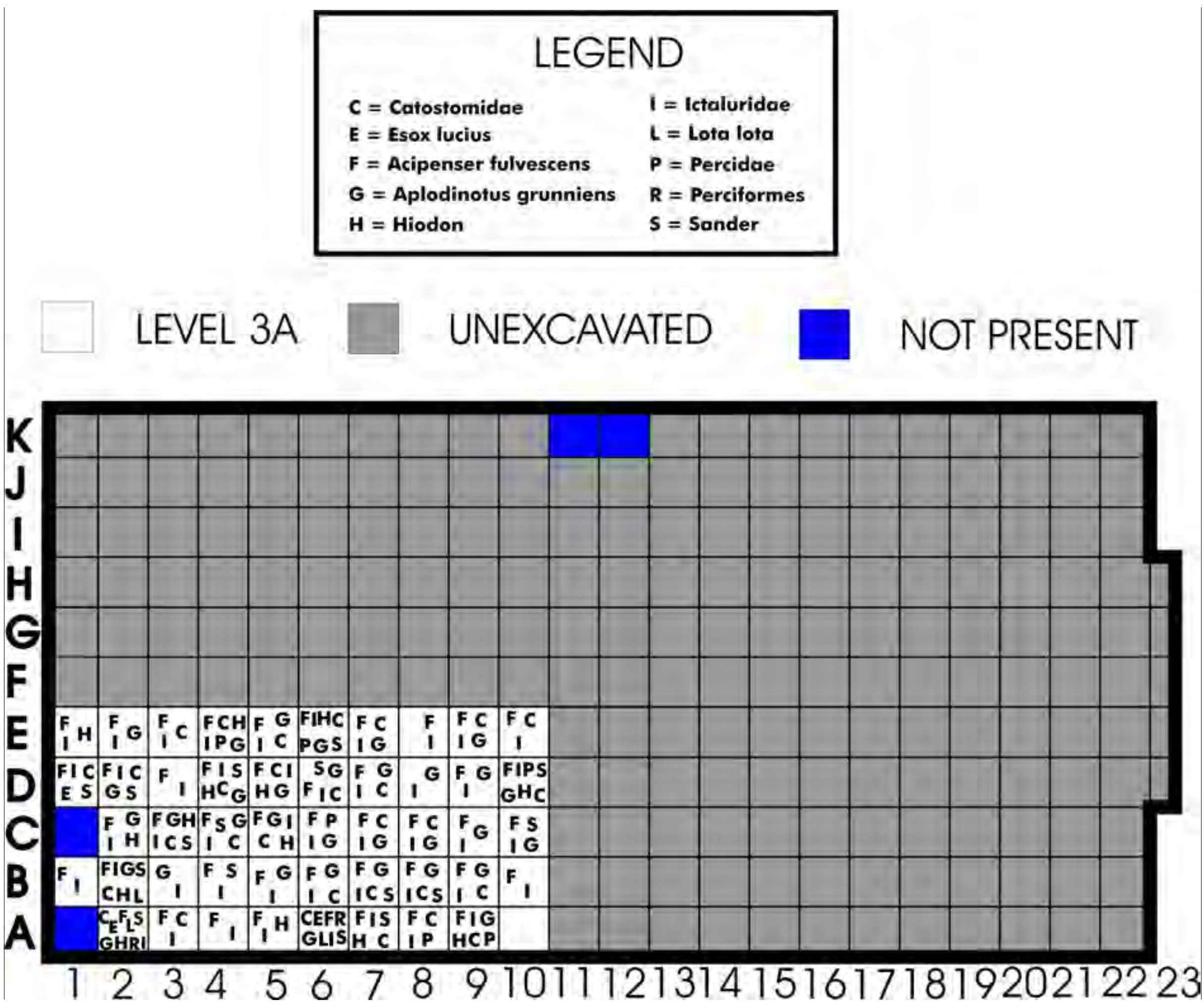


Figure 11.7-2: Distribution of Fish Remains by Species in Level 3A

There are three clusters, however, that do not appear to be related to any cultural features—Units A6, A9, and D10—and a deeper examination may help shed some light on this pattern. In somewhat of a contradiction to the MNI counts, certain species are found across the site and not just localized spots. For instance, both pike and burbot are identified in a couple of units but they are separated by two to four metres and sauger/walleye are found in many units widely scattered over much of the site. All three species have minimal counts for numbers of individuals. Of particular interest is the presence of sturgeon in almost every unit, suggesting a greater representation than the MNI figure accounts.

11.7.4 Interpretation

Figure 11.7-3 illustrates the density per unit (by weight in grams) of the fish remains in Level 3A.

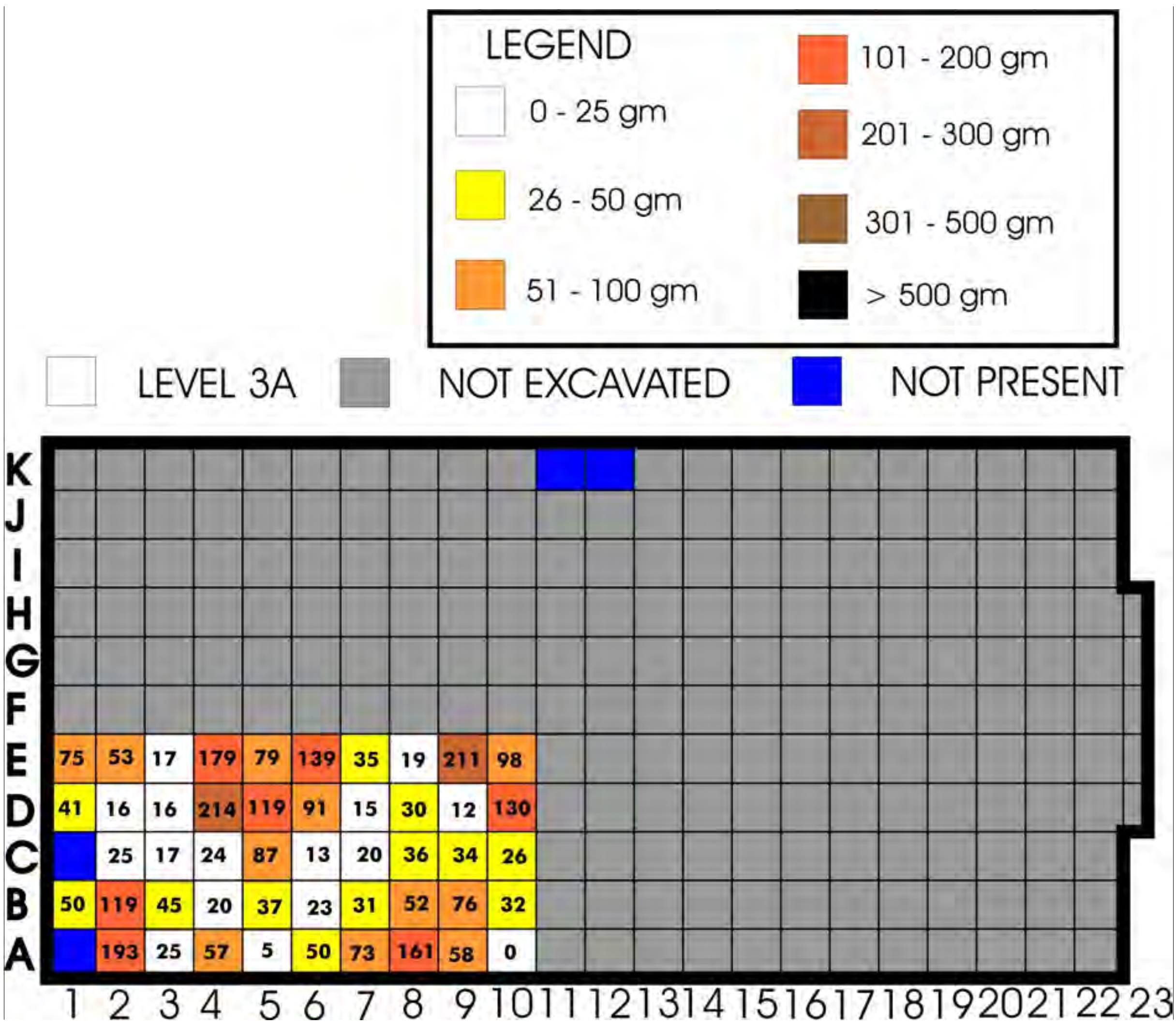


Figure 11.7-3: Distribution of Fish Remains by Weight

Unit A8 was the only unit where scales were collected. There does appear to be clusters similar to the distribution of the fish remains by species (Fig. 11.7-2). Units A2 and B2 have a dense concentration coinciding with the two hearths there, as do the areas around Units D4-D6 and Units E4-E6 in and around the two hearths in that area. The two other clusters, one in the E9/D10 corner and the other at Units A6 to A9, do compare with the greater variety of species deposited in those same loci.

No cut marks, which may have indicated any butchering techniques or other processing practices, were recorded on any specimens. No post-depositional marks such as carnivore chewing were recognized on any specimen. Twenty-nine (29) artifacts were found to be burnt, charred, or calcined by fire, representing only 0.25% of the total number of fish remains. Much of the thermally-altered bone can be found distributed on the western side of the excavation area following a pattern around the four hearths that run from Units A to E in a roughly north/south direction. Other occurrences match the clusters noted in both species and weight distributions away from hearth areas in Units A6, A7, and B9 as well as in Unit E9, in that northeast corner concentration. Again, freshwater drum were the only species positively identified from the charred remains, as evident from the otoliths collected in Unit A6.

Of great importance in this level is the recovery of another bone tool tentatively identified as a "gorge/leister". DlLg-33:08A/18402 was recovered from Unit A8 (Plate 11.7-1). It, too, like the identical specimen found in Level 2B, DlLg-33:08A/11584, is a modified left shaft of a large pectoral spine from a catfish. There is a certain degree of polish over much of the artifact from use wear. It is considered to be a complete specimen. It weighs 1.3 grams and measures 6.3 cm in maximum length, with a maximum width of 0.6 cm. Its significance is discussed in the chapter summarizing the analysis of the fish remains.

Plate 11.7-1: Left and Right Sides of Gorge/Leister (DlLg-33:08A/18402) Manufactured from a Catfish Pectoral Spine (2x actual size)

11.8 Shellfish

There were 160 shell artifacts recovered from Level 3A. These comprised butchering remains, naturally deposited specimens, and a single modified artifact which is tentatively identified as jewellery.

11.8.1 Butchering Remains

There were 101 butchering remains, of which 32 were identifiable to species (Table 11.8-1). The remainder were identified as Unionidae. The distribution map, Figure 11.8-1, indicates one area of concentration in Units D4 to E7. This concentration tends to include the two northern hearths in Units D3/D4 and Units E5/E6. There are also smaller clusters of shellfish adjacent to the two southern hearths in Units A3 and B3.

TAXON	QTY	%	WT	%
Black Sand-Shell (*Ligumia recta*)	5	15.63	3.6	1.33
Cylindrical Floater (*Anodontoides ferussacianus*)	-	-	-	-
Fat Mucket (*Lampsilis siliquoidea*)	21	65.63	141.7	52.42
Pink Heel-Splitter (*Potamilus alatus*)	4	12.50	124.0	45.87
Maple-Leaf (*Quadrula quadrula*)	-	-	-	-
Pig-Toe (*Fusconaia flava*)	2	6.25	1.0	0.37
Three-Ridge (*Amblema plicata*)	-	-	-	-
	32	100.01	270.3	99.99

Table 11.8-1: Frequency of Identified Butchering Remains by Taxon

Four taxa were present in Level 3A (Table 11.8-1). These are Fat Mucket, Black Sand-Shell, Pink Heel-Splitter, and Pig-Toe (Figure 11.8-2). Again, Fat Mucket was dominant with Black Sand-Shell a distant second and Pink Heel-Splitter a close third.

Six valves were charred (Table 11.8-2). Only one could be identified to a species, Black Sand-Shell. Two of the recovery units, Unit D5 and Unit D6, were adjacent to hearths, while Unit E2 was in the general proximity of a hearth, and the remaining two units were a considerable distance from a hearth.

CAT. NO.	UNIT	QTY	SPECIES
15879	D5	1	Unionidae
16546	E2	1	Unionidae
18660	D6	1	Black Sand-Shell
19010	C8	1	Unionidae
20032	A7	2	Unionidae
TOTAL		6	

Table 11.8-2: Charred Shellfish Specimens from Level 3A

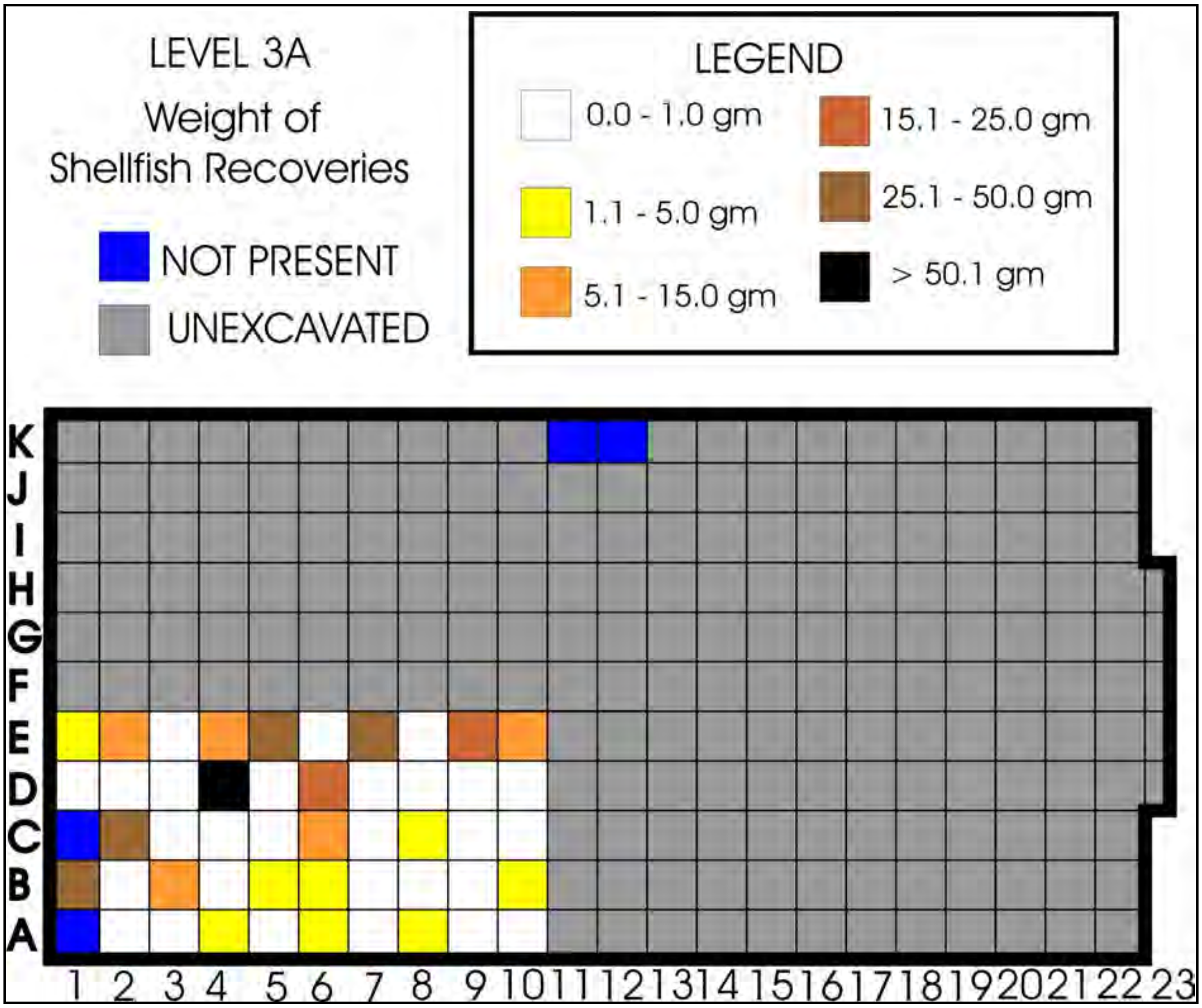


Figure 11.8-1: Density of Shellfish Recoveries

Figure 11.8-3 illustrates the frequency of the Minimum Number of Individuals (MNI) of each species. As with several other levels, Fat Mucket overwhelms the assemblage in Level 3A with nearly two-thirds of the identified specimens.

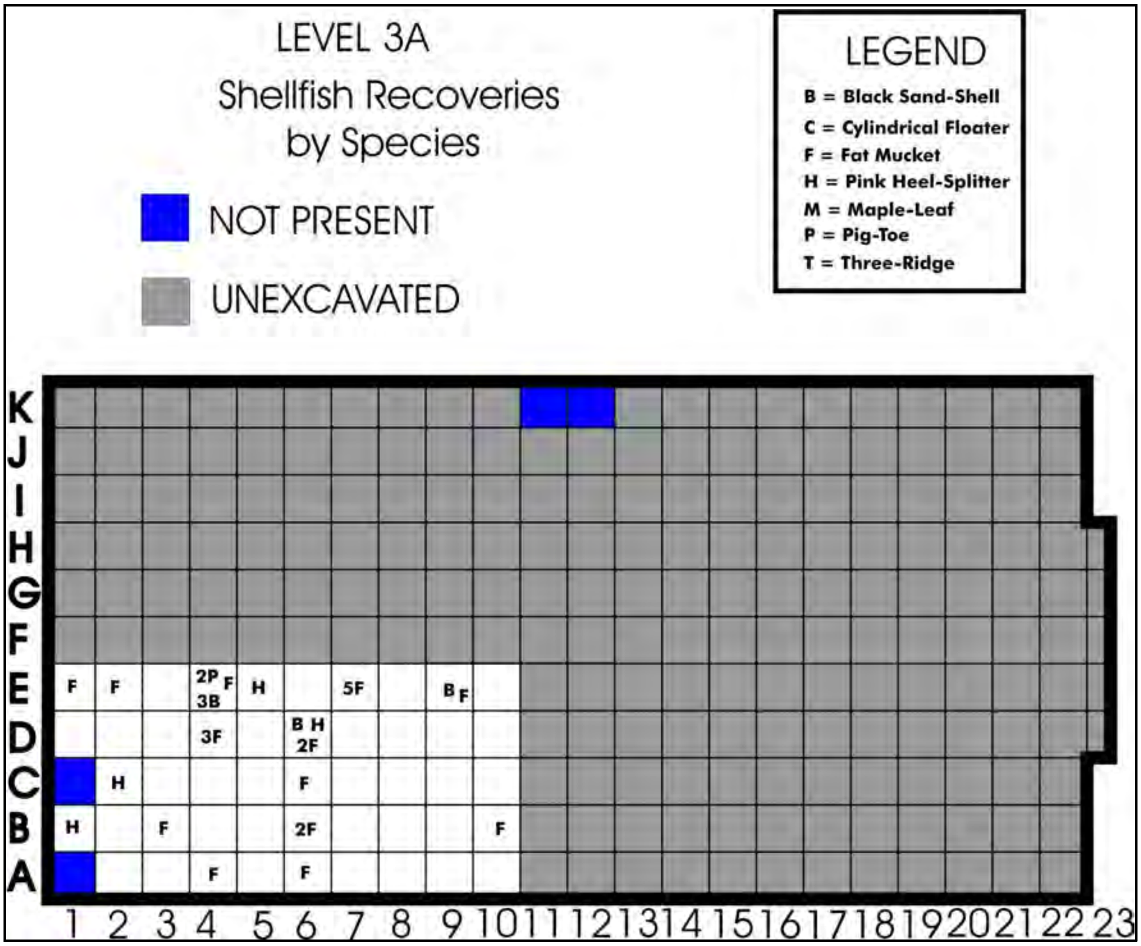


Figure 11.8-2: Frequency of Shellfish Recoveries by Species

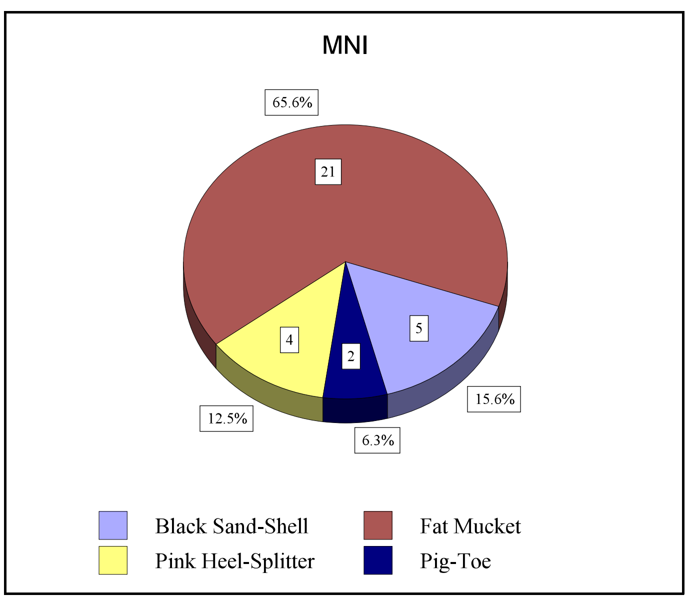


Figure 11.8-3: Frequency of Identified Taxa of Shellfish

11.8.2 Natural Shellfish

There were 58 naturally deposited specimens curated from Level 3A (Table 11.8-3, Figure 11.8-4). The majority of the recoveries consisted of a single deposit of 35 Planorbidae (ramshorn snails) in Unit A7.

TAXON	QUANTITY	PERCENT
Pond Snails (Lymnaeidae)	7	12.07
Ramshorn Snails (Planorbidae)	40	68.97
Pea Clams (Sphaeriidae)	11	18.97
TOTAL	58	100.01

Table 11.8-3: Frequency of Naturally Deposited Shellfish

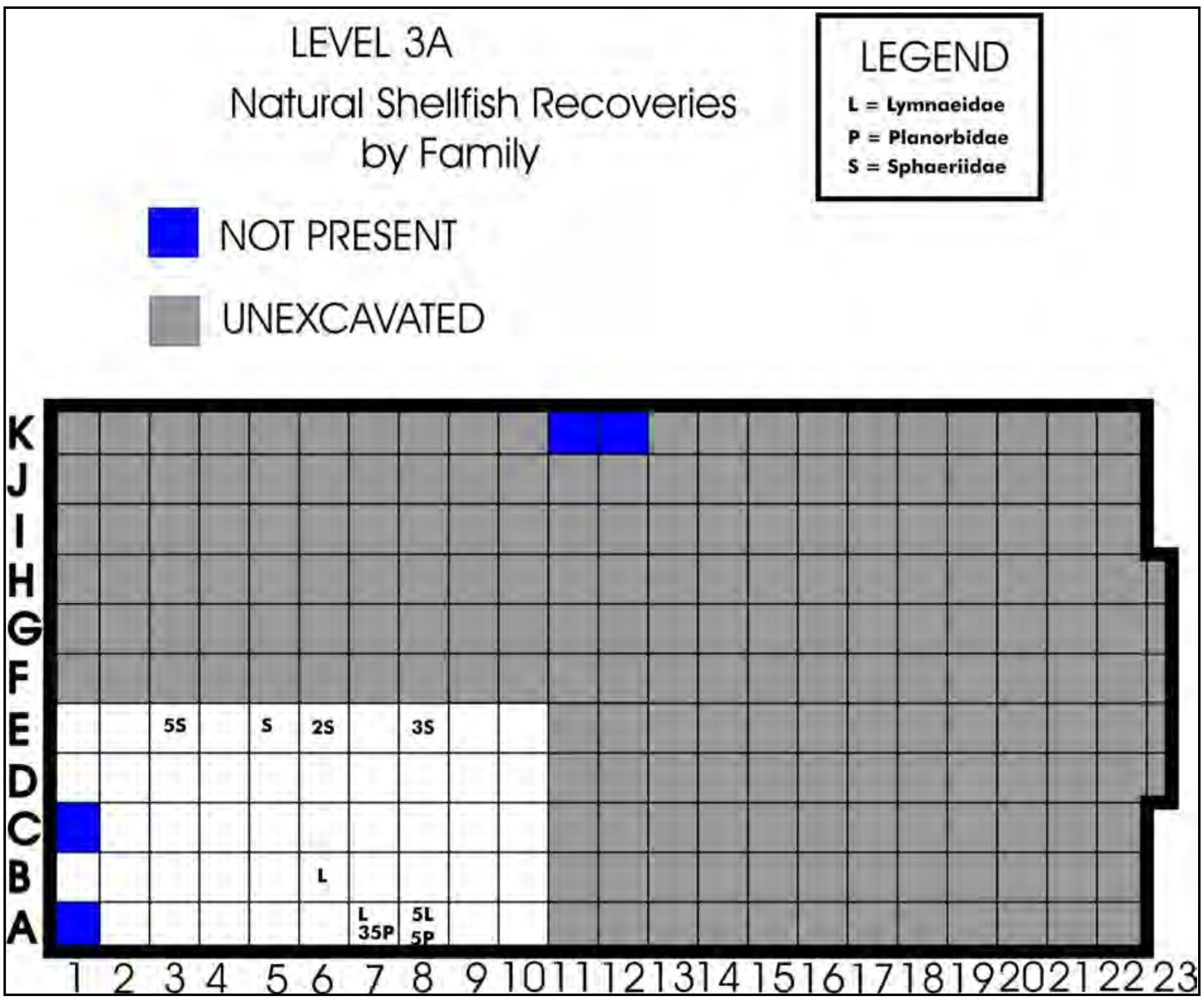


Figure 11.8-4: Location of Recoveries of Natural Shellfish in Level 3A

11.8.3 Worked Shell

One specimen, DlLg-33:08A/15177, was found to have been culturally modified (Plate 11.8-1). A large Lymnaeidae snail shell (from Unit A2) appears to have had a perforation hole drilled through the last spiral (or whorl) of the body. The circular perforation is drilled from the exterior and has a diameter of 3.4 mm. The upper portion of the spire of this shell is missing. It is not readily evident as to whether this broke off or was cut off during modification. The remnant of this snail shell measures 19.6 mm in length and 18.8 mm in diameter. It weighs 1.7 grams and is the largest Lymnaeidae shell recovered from this excavation. In addition, it is one of the more robust recovered.

Clarke (1981) illustrates several species in the genus *Stagnicola*. DlLg-33:08A/15177 most closely resembles the illustration of *Stagnicola catascopium preblei* (Clarke 1981:140-141). The distribution of this sub-species is in the Hays, Nelson, and Churchill River systems in northern Manitoba and Saskatchewan. As these rivers all flow north, this specimen could only have arrived at this site through trade or as a personal item of someone who had been in the northern portion of the province.

Plate 11.8-1: Ornament Made from Lymnaeidae Snail Shell (3x actual size)

11.8.4 Summary

One hundred and sixty shell artifacts were recovered from Level 3A. The density of artifacts is 3.33 per square metre. One hundred and one specimens were catalogued as butchering remains, with 32 of these being identifiable to a specific species. Again, only four species were present—Fat Mucket, Black Sand-Shell, Pink Heel-Splitter, and Pig-Toe. A concentration of these species occurs around two hearths in the northern area of the level with some smaller clusters near hearths in the southern section.

The natural shellfish numbers 58 with Planorbidae (ramshorn snails) being the largest component of the three types found throughout this level. Of the 40 Planoribdae, 35 were found in one deposit in Unit A7. The recoveries were along the northern and southern edges of Level 3A. Again, the sparsity and locations of these shellfish may be a result of the field collection technique.

The final worked shell, a large, complete Lymnaeidae snail with a drilled circular hole in it, was recovered from Level 3A. There have been no other recoveries like this on The Forks site. Whether this specimen was intended to be used as a pendant, a bead, or some other form of decoration is unknown. The distribution of the species of this shell is the northern Manitoba area and it had to have been brought onto the site as either a personal item or as part of a trade network.

Level 3A represents a larger group camped at the site, utilizing the resources, and meeting or trading with peoples from other areas.

11.9 Miscellaneous Recoveries

As in the previous levels, some types of recoveries did not fit into the previous classes of artifacts. These are various types of soil samples.

11.9.1 Soil Samples

There were 49 soil matrix samples collected. In addition to the soil samples, seven hearth samples and two sand samples. Ten hearth clay samples and four heat-modified clay samples were curated.

11.10 Level 3A Summary

The occupation resulting in Level 3A would have occurred one sediment deposition episode prior to that of Level 3. The radiocarbon dates are closely inverted meaning that they both fall within the same standard deviation span (Figure 2.4-4). The time between the two occupations could be as little as one year and as much as twenty years. Probably, due to the wetter climate at that period, the time would be less than five years.

The ceramic assemblage of the two levels is very similar and could represent successive occupations by the same group of people who returned to a familiar campsite. The ceramics tend to be concentrated in the southwest corner and the central north portion of the excavation area. The pattern of the lithic tools is different with occurrences in the northwest and southeast parts of the excavation block. A massive quantity of lithic flakes (4432) were present in Units A7 and A8, indicating a concentrated lithic manufacturing area. As was the case in Level 3, Knife River Flint overwhelms all other lithic types, both in the tools (71%) and the detritus (98%). This likely indicates a recent visit to the quarries in North Dakota. Agate is surprisingly strongly represented and may point to a source area to the south.

The mammal recoveries indicate harvesting of a small quantity of small mammals, while the fish remains indicate relatively intensive fishing with catfish being the dominant species. The style of fishing can be extrapolated from the presence of a leister/gorge (Plate 11.7-1). A moderate quantity of shellfish had been harvested to add to the protein component of the diet. The residue analysis of a sherd indicated wild onion, sunflower, cocklebur, acorns, saltbush, pronghorn, and fish. The sherd also tested positive for dried tobacco indicating trade with southern groups.

12.0 SITE SUMMARY

In an archaeological excavation, the process uncovers data from the most recent activities and, delving deeper, progresses back through time. In an historical chronology, analysis begins at the earliest and proceeds to the latest. That practice will be followed in this summary of the data recovered from the 2008 archaeological mitigation project at the Canadian Museum for Human Rights site.

12.1 Environmental Setting

Today, the native trees growing along the Red River consist of willow, poplar, elm, maple, oak ,and ash. Willow grows directly along the river with Manitoba maple or white elm dominating the flood plain. Other trees on the flood plain include green ash, cottonwood, peach-leaved willow, and rarely American basswood. Shrubs include chokecherry, alder, sandbar willow, and red-osier dogwood (Hilderman *et al.* 1980).The upper terrace is dominated by bur oak with white elm, Manitoba maple, and aspen poplar. Shrubs include saskatoon, American hazel, chokecherry, wild plum, gooseberry, wild rose, raspberry, downy arrowwood, and high bush cranberry (Deck 1989, Deck and Ward 2007). While not a definitive palaeo-environmental reconstruction, environmental data will be summarized to delineate the environment at the times of the occupations.

Data on past environments derives from two primary sources: the pollen analyses of the residue on the ceramic sherds and the botanical, primarily charcoal, analyses. Other environmental information can be inferred from the species identified in the faunal assemblages but the aspect of long-distance transport of elements must also be taken into consideration.

12.1.1 Pollen Data

Pollen data is recorded during the process of residue analysis. Ceramic sherds were submitted to Paleo Research Institute by Quaternary Consultants Ltd. during the initial analysis (2009) of the archaeological recoveries. A second set of ceramic sherds were also submitted to the same laboratory in 2010 by Parks Canada in conjunction with a project undertaken by them.

The pollen profile obtained from the samples submitted in 2009 (Appendix B:Figure 1) shows a heavy presence of *Pinus* pollen in all five levels represented by the sherds. This does not mean that pine is part of the local vegetation. In the prairie portions of Manitoba, which do not have pine as part of the vegetation, as much as 25% to 30% of the current pollen rain is composed of pine pollen grains transported by wind (McAndrews, Kroker and Slater 1979). Other arboreal pollen consists of *Alnus* (alder) and *Salix* (willow) in Level 1 and *Quercus* (oak) and *Ulmus* (elm) in Level 3A.

The other dominant taxa in the pollen profile are Poaceae (grasses) and Asteraceae (daisy family). Both would be present locally and would represent clearings within the gallery forest which lined the banks of the two rivers. The extent of the gallery forest and the size of the clearings would have depended upon the general climate with outward expansion during pluvial periods and contraction during xeric periods due to lessening water supply and increased fires. Colonizer species of disturbed ground, particularly the Chenopodiaceae (goosefoot) and Amaranthaceae (pigweed), collectively known as Cheno-Am due to the similarity of the ecological niche, plant morphology, and the pollen, are present in Level 1, Level 2, and Level 3. The pollen of two other colonizing taxa, representing the Brassicaceae (mustard) family and *Pologonum persicaria* (lady's-thumb), are present in Level 2B. *Allium* (wild onion) was recorded in Level 3 and Rhamnaceae (buckthorn family) in Level 2B.

Two indicators of cultigens were recorded during the microscopy of the samples by Paleo Research Institute. Pollen of *Zea mays* (corn) and starch granules of Fabaceae (bean family) were observed from the Level 1 sherd.

The second set of samples, submitted in 2010, consisted of ceramic sherds from Level 1 and Level 2 (Appendix C). The pollen recovered from the residues on the sherds from Level 1 (Appendix C:Figure 1) added *Juniperus* (juniper), Corylaceae (hazel family), and Saxifragaceae (saxifrage family) to the taxon list, while the sherd from Level 2 had Asteraceae, Poaceae, *Pinus*, *Ulmus*, *Artemisia* (sage), and Cheno-Am pollen.

Except for the arboreal pollen, which tends to be dispersed in the spring but can be re-deposited throughout the summer, most of the species represented by pollen flower from mid-summer to fall. This suggests that the occupations at the site occurred during the summer or fall.

12.1.2 Macrobotanical Data

Charcoal from the eight occupations were examined for species identification. There were eight species present, six of which were trees and two were types of shrubs. The predominant species was ash followed by maple and then elm. All three of these tree species rated as "Frequent". This was followed by poplar, willow, and oak which all rated as "Occasional". The two shrub species, Oleaster Family and plum, were rated as "Rare" as they occurred in one sample each. Ash and maple were the most abundant species and present in more of the samples than any other types in Levels 2B, 2A, 2, and 1. This was followed by elm. There was a shift in the wood composition during Levels 3A and 3 with a dominance of elm. Ash and maple were still present but not to the same degree. Oak was absent in Levels 3A and 2A. There was no poplar or willow in Level 2C.

Overall, it appears that during the two centuries represented by the occupations, wood was harvested from the immediate area of the Red River and Assiniboine River gallery forests. In general, there was a predominance of maple, ash, and elm in the samples followed by poplar, willow, and oak. The variety of wood in some of the hearths may indicate that wood was randomly collected. This would likely reflect wood availability in the immediate vicinity. There was a higher use of elm in the lower levels. Ash, maple, and elm were the predominant wood types recovered from the upper occupation levels. This shift in wood use may indicate cultural choice or vegetation change.

12.1.3 Species/Habitat Data

The species that were identified in the faunal record remained relatively constant from the earliest to the latest occupation. The absence of a particular taxon does not mean that that species was not available. Either it was not successfully hunted or the skeletal elements pertaining to that species were not recovered in the excavation area. Species of both the open prairie, such as bison and antelope, and those of the riverine gallery forest, such as rabbit and beaver, are present suggesting a similar ecological framework as existed until the advent of agriculture in the Red River basin.

12.1.4 Palaeo-Environment

Based on the pollen data, the charcoal data, and the faunal data, it would appear that the ecology of the area surrounding the archaeological site would have been very similar to that which existed at the beginning of the Fur Trade. The successional pattern caused by fire would be interrupted and occasionally delayed by the thickness of sediments deposited by flood episodes. If the flood episode was minor and only deposited a thin layer of silt, the existing vegetation would have grown through it. If the sediment layer was thick as is the case between Level 3 and the Level 2 Complex, it would have largely eliminated much of the understory in the gallery forest and the vegetation in the clearings. The data is too broad to be able to produce fine-tuned palaeo-environmental reconstructions of exactly what the ecological setting was at the time of each occupation. However, in general, the setting at the site would have been similar enough that each occupation would have been revisiting a familiar situation.

12.2 Ceramic Artifacts

Based upon the analyses of the ceramic artifacts by level and in the ceramic summary (Chapter 13), there appears to be a cultural continuity from the earliest occupation in Level 3A to the latest occupation in Level 1. Except for a few extra-local types (Levels 2B, 2A, 2, 1), the majority of the ceramics were identified within the generalized Rainy River sequence which post-dates Blackduck. As elucidated by Reichert (Chapter 13), there appears to be a nearly linear, with some caveats, progression to types from Level 3A to Level 1.

One of the difficulties in archaeological interpretation is the determination of the population at a specific campsite. Calculation of the available food, as inexact as that analysis is, can provide a set of limiting figures. Another possible method of deriving the relative numbers of people is by determining the number of cooking vessels that have shattered during the occupation. The larger the population, the more cooking pots will be broken. This can be quantified in absolute numbers (Figure 12.2-1) or by number of vessels per square metre of the excavation area (Figure 12.2-2).

In terms of absolute numbers, Levels 1 and 2 contain the greatest quantity of identified vessels. However, both of these levels were present in 149 excavation units. Level 3, present in 52 excavation units, due to the cut back in the size of the excavation area after the basement was cancelled, has a much higher ratio of vessels per square metre. If these data are accepted as reflecting reality, this would mean that a higher population density was present during the Level 3 occupation than at any other time with the lowest density occurring during Level 2B.

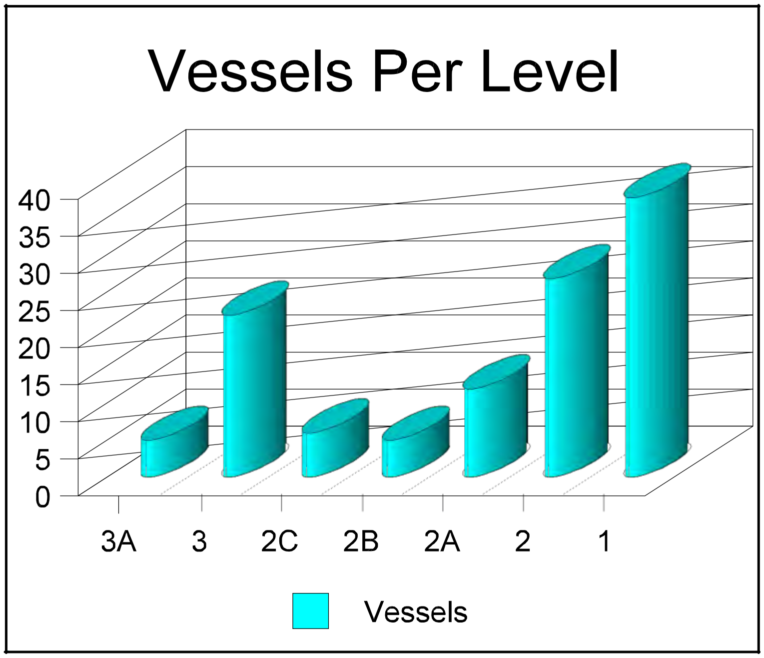


Figure 12.2-1: Number of Identified Ceramic Vessels per Level

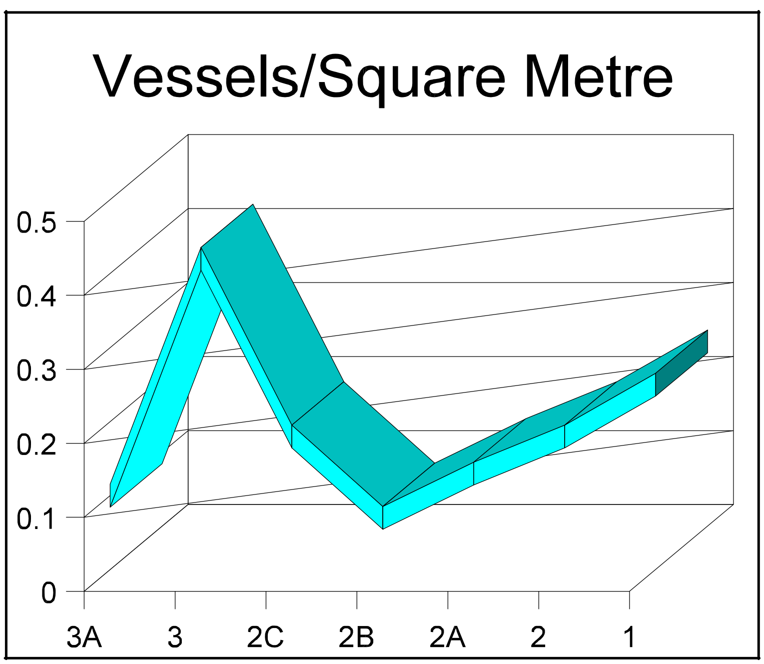


Figure 12.2-2: Density of Ceramic Vessels per Square Metre

An alternate explanation could be that the excavated area of Level 3 was the communal cooking area and the number of vessels per square metre would diminish precipitously beyond the excavation area. This is partially borne out by the plotting of ceramic densities (Figure 10.3-1) and vessel locations (Figure 10.3-2). Another explanation could be that a large number of vessels were damaged during travel and new vessels were manufactured with the damaged specimens being discarded at the occupation site.

12.3 Lithic Artifacts

The frequencies of various lithic materials in both the tool kit and the detritus provides some information on trade patterns and group movements. The composition of the tool kit tends to indicate long-term cultural preferences of specific materials which are retained as long as the tool lasts. The detritus indicates short-term availability of raw materials. Raw materials for tool manufacture are obtained from quarry sites while the group is travelling through the vicinity of the source area or obtained by trading with others who have accessed the material.

There is a difference in the frequencies between detritus and tool kits in that some materials, particularly the more cohesive microcrystalline stone, are favoured for tool manufacture. The higher the quality of the raw material, the longer the tool will last and hence will be carried longer as part of the tool kit. In the tool kit (Figure 12.3-1), Knife River Flint is present at discernible amounts in most levels with a stronger reliance in the earlier occupations. Swan River Chert, in the tool kits, is minimal in Levels 3A, 3, and 2C becoming prominent in Levels 2B, 2A, and 2 and diminishing in Level 1. Generic undifferentiated chert, usually derived from glacial deposits such as gravel bars and moraines, has a steadily increasing frequency beginning in Level 2C and culminating in Level 1. Also of note is the increasing percentage of tools made from various different materials, lumped under the “Other” category, in the upper levels. These include materials, such as Denbeigh Point Chert, Lake of the Woods Black Chert, and jasper, which are extra-local in that the source area may be part of the seasonal round but not encountered frequently enough to be a major component within the tool kit.

When the detritus frequencies are examined (Figure 12.3-2), a somewhat similar scenario appears. Knife River Flint is overwhelming in Levels 3A and 3, dropping to a minimal amount in all subsequent occupations. Swan River Chert is minimal up to Levels 2C and 2B where it dominates. Undifferentiated chert is the material of choice in Levels 2A, 2, and 1 while being minimal in the earlier occupation levels.

The detritus frequencies often tend to be an indicator of most recent source areas visited. Alternatively, a high frequency of lithic material may indicate that a trader, bringing in a supply of raw material, had recently met with the group. The frequencies in detritus represent the immediate aftermath of collection of raw material when it is processed into tools, preforms, or trade blocks to lessen the weight that must be carried by a nomadic group.

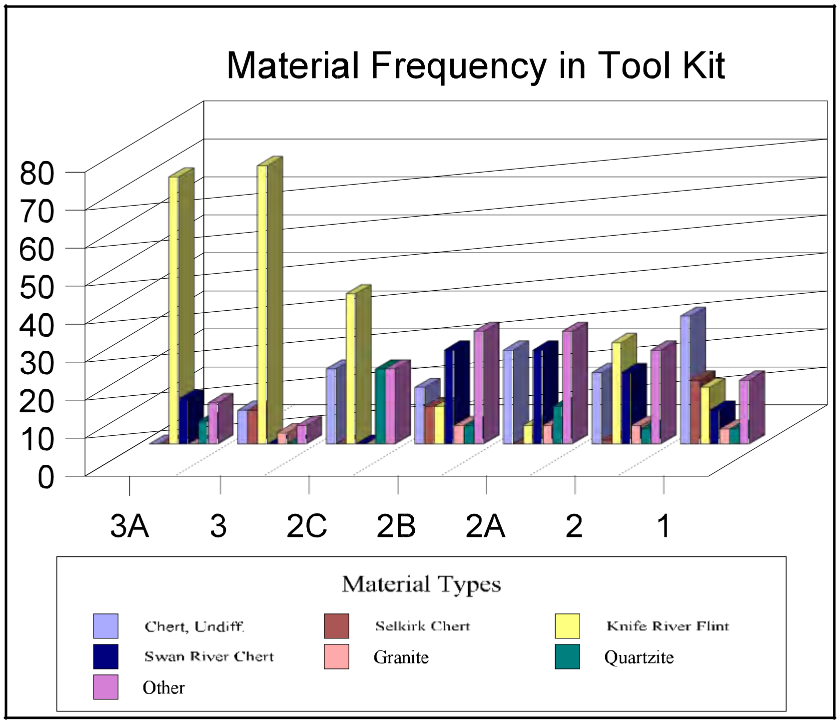


Figure 12.3-1: Frequency of Lithic Material Types in the Tool Kits by Level

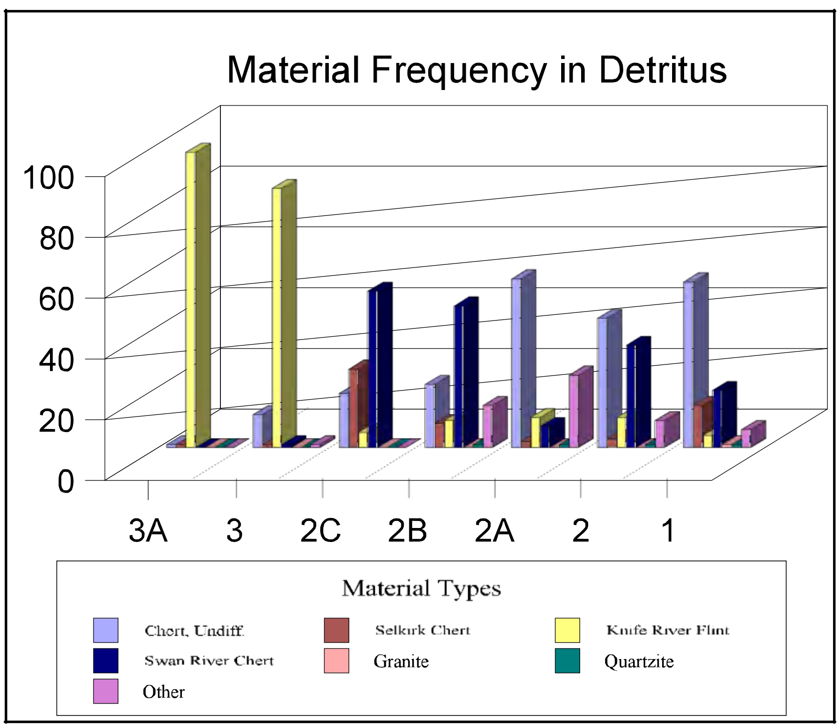


Figure 12.3-2: Frequency of Lithic Material Types in Detritus by Level

In Levels 3A and 3, the occupants of the site likely had recently arrived from the Knife River Flint quarries of North Dakota. While in Levels 2C and 2B, and perhaps Level 2, the occupants probably arrived from the west where they had obtained Swan River Chert. Level 2A and Level 1 have a strong reliance on undifferentiated chert which could be obtained locally or at gravel deposits along the seasonal round. Only in Level 2C and Level 1 is there a significant signature of local lithic quarrying with a presence of Selkirk Chert. This would suggest that for these two levels, the tool kit needed replenishing and a task group travelled downstream to the Selkirk Chert source area.

12.4 Faunal Resources

The food sources were quite varied and numerous different species, both terrestrial and aquatic, were harvested. The preserved elements of the fauna can provide identification of utilized species as well as quantities of each species that were used by the occupants. Residue analysis on lithic tools can also provide some extra information. As an example, a biface from Level 2 (DlLg-33:08A/16135) had bighorn sheep blood on it (Table 12.5-1). Other lithic tools such as a grinding stone (DlLg-33:08A/7851) had sturgeon residue while DlLg-33:08A/8762, a retouched flake, and DlLg-33:08A/12742, an ochre bowl, both had antelope blood. Of these three species, only sturgeon had been identified from the faunal remains.

Through the analyses of the different classes of faunal resources, a composite graph can be compiled to determine the available meat in kilograms (Figure 12.4-1). This uses the potential meat per individual animal times the minimum number of individuals identified in the faunal record.

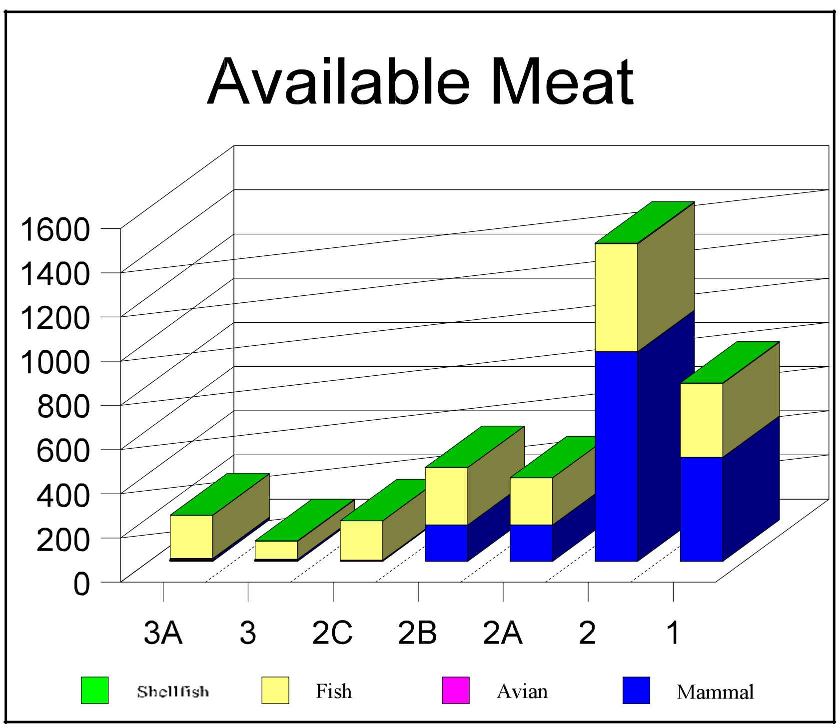


Figure 12.4-1: Combined Totals of Available Meat from All Faunal Classes

For purposes of this compilation, a generalized value of 40% of live weight has been used to determine available meat. For some species, it is higher, for others, it is less and it has an underlying assumption that all available meat from a kill was used at the site. In all likelihood, portions of the food were dried, smoked, or otherwise preserved for future use in times of unsuccessful hunting or fishing. This preserved food would also be used while the group was travelling from one campsite location to another.

It is obvious from the graph that there is a considerable difference between the available food in Level 3 and Level 2. Also, it is evident that the proportions of the meat by class differs greatly in each of the different levels. The earlier three levels (Levels 3A, 3, and 2C) relied predominantly on fish resources. In Level 2, mammal resources were dominant and the remaining occupation levels were intermediate in their reliance on different classes.

Not all levels are equal. Some levels like Level 2 and Level 1 extended across the excavation area and were encountered in every unit that was opened. The sub-levels of the Level 2 Complex were present in diminishing numbers of excavation units. Others, like Levels 3A and 3, were constrained due to a small excavation area. If the area of excavation is taken into consideration, the discrepancy between the various levels in terms of meat consumption lessens. In Figure 12.4-2, the size of the excavated area (square metres) is divided into the total available meat for that level and the resultant value is the amount of meat per square metre of occupation area. This can be used as an indicator of the size of the group or the duration of the stay at the campsite, or both.

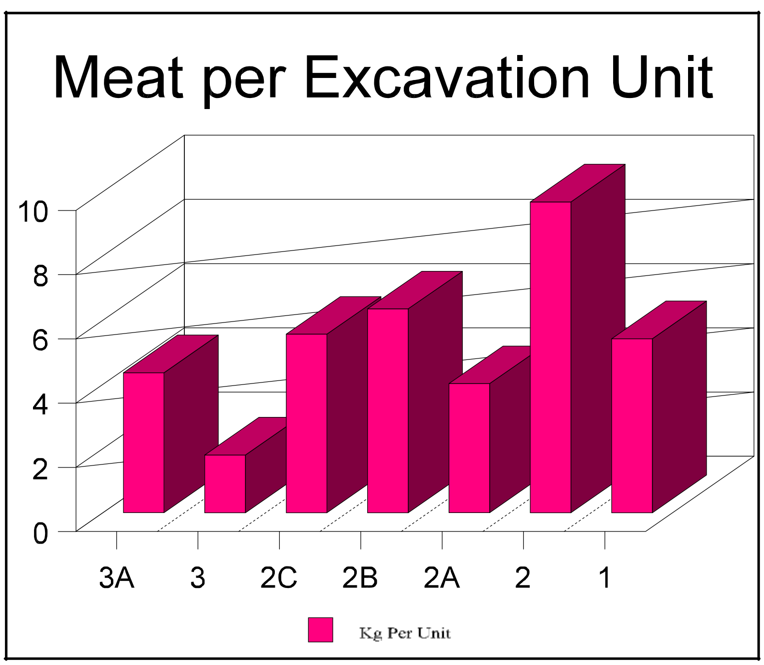


Figure 12.4-2: Available Meat per Excavation Unit (Square Metre)

Based on an assumption of the consumption of 0.5 kilograms of meat per person per day, the available food can provide a rough estimate of the number of person/days that the resources would support. It must also be acknowledged that there was an inestimable vegetable component to the diet and the meat consumption may have been less than the amount assumed. However, based on the above assumption and another major assumption, i.e., that the excavated portion of the level is a microcosm of the entire occupation zone within and without the excavation area, values can be determined that show comparative densities and/or durations (Figure 12.4-3). The calculated figures show that Level 3 was a short term occupation of a small group. The data calculates to 187 person/days from the available meat. In reality, all of the occupation levels would have extended beyond the limits of the excavation and it is unknown how accurately the faunal assemblage in the excavated area replicates that which would have been found externally, if the opportunity still existed.

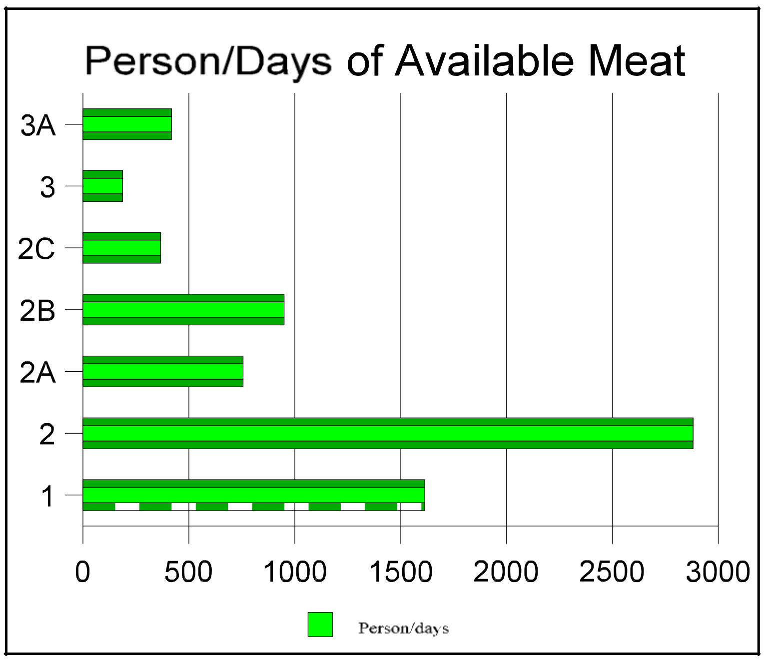


Figure 12.4-3: Person/Days of Available Meat per Occupation Level

Level 2 shows the longest duration and/or the largest population with a calculated value of 2881 person/days. Level 1 has the second highest calculated value (1614 person/days) followed by Level 2B (850 person/days) and Level 2A (756 person days). Level 3 has the lowest quantity with a calculated value of 187 person/days. This appears to be different from the values determined in the ceramic section where Level 3 had the appearance of the largest population density. Based on the ceramic vessel density, it would appear that the population of Level 3 would be 2.5 times that of Level 2. The available meat for Level 3 is less than one-tenth that of Level 2. This discrepancy cannot be reconciled and alternative explanations must be sought. It may be that the excavated portion of Level 2 was the midden deposit for a large campsite area and, thus, reflects a subsistence pattern of a much wider area. Alternatively, the excavated portion of Level 3 may have been the location of communal cooking resulting in damage to pots representing a population spread well beyond the limits of the excavation. Also, the faunal resources recovered from the Level 3 excavation area may not be representative of the subsistence base of the occupants as there may have been a larger midden deposit beyond the limits of the excavated area.

12.5 Plant Resources

The most difficult portion of the subsistence strategy to quantify is the botanical component. Very little tends to preserve. Charcoal from the campfires can be identified and may provide some cultural data. Charred seeds often preserve to add to the botanical inventory. Different species that were cooked within the ceramic vessels can be identified through various tests. The composite picture, albeit very incomplete, does provide some indications as to the complexity of the botanical part of the diet.

12.5.1 Charcoal Data

Wood was likely one of the most heavily exploited plant resources. It served a wide variety of purposes, such as tools for hunting, food processing, and procurement as well as subsistence, shelter, transportation, and fuel. Wood touched all areas of cultural activity in one form or another, from everyday utilitarian to ceremonial purposes. The most common use of wood was, no doubt, as fuel. Wood resources at the site can be viewed as

> "…the product of cultural selection which takes into account the activities at the site; the physical characteristics of the wood, the availability, form, and size of local wood types; and culture-specific factors" (Smart and Hoffman 1988:170).

Archaeological literature presents two hypotheses on the cultural selection of wood for fuel. Wood may have been selected based on cultural preference and classification which determined the choice of wood with certain properties (Ford 1979). With this hypothesis, wood resources locally available, or even abundant in the environment, could be absent from the site record if they were not a preferred wood to exploit. On the other hand, the firewood indifference hypothesis states that firewood was randomly selected reflecting the composition of the local forest. Choice was based on what was the easiest to gather, without considering heating or other qualities (Asch and Asch 1985).

There are a variety of reasons why people built fires, the most common being for warmth and cooking. Fires were also built for specific purposes, such as smoking meat, curing hides, firing pottery, or warding off insects. Wood selection for cooking depended on the purpose. For instance, among the Cree in Manitoba, a long burning fire was used for cooking bannock, while a quick burning fuel was used for making tea (G. Granzberg 1993:pers. comm.). This example illustrates that the choice of wood type for fuel is affected by the "physical characteristics, such as heat content and quantity of smoke produced during burning" (Smart and Hoffman 1988:168). As well, modern ethnographic research indicates that weather conditions influenced the type of taxa used (G. Granzberg 1993:pers. comm.).

Heat value data was available for some of the identified wood taxa from the site. The heat value for oak is the highest followed by ash, elm, maple, and cottonwood. The degree that this had an effect on cultural selection for the archaeological data is unknown, although it could be logically assumed that high heat, slow-burning wood would have been chosen for firing ceramics. The pattern of wood types within hearths varies but correlates to wood that commonly grew along the terraces and flood plains of the river.

12.5.2 Seeds and Nuts

The plant resources that were part of the diet cannot be quantified. A small number of seeds and nutshells were collected during the excavation. There was a charred *Prunus americanus* (plum) pit fragment from Level 3. Samples of charred *Corylus* (hazelnut) fragments were recovered from Levels 3, 2C, 2, and 1. As well, two *Lithospermum* (puccoon) seeds and grass seeds were recovered. These are uncharred and may be intrusive. The charred hazelnuts and plum pit were all associated with hearths. These indicate that locally available fruits and nuts were part of the diet. Wild plum fruit and hazelnuts are both available in late summer to early fall (Shay 1980).

12.5.3 Plants Identified Through Residue Analysis

All other utilized species can only be determined by presence/absence information obtained from residue analysis of the sherds of the cooking vessels. Due to budgetary constraints, not every vessel from an archaeological site can be tested and, accordingly, several species that may have been utilized are not identified. Based on the residue analysis, some species appear to have been used throughout the time period represented by the occupations (Table 12.5-1).

In the table, species which would have been harvested from areas to the north of The Forks are highlighted in blue while those from the south are highlighted in pink. Their acquisition could have been either by trade or as a result of travelling to areas where the plants could have been harvested. The remaining species would have been available in the gallery forest along the rivers or in the adjacent prairie.

Wild onion, sunflower, pine nuts, and acorns are the most prevalent species occurring throughout the occupations. Cultivated beans are also present on most sherds, in all the tested levels except Level 3A. It is interesting to note that corn only appears in the latest two occupations as does wild rice. This could suggest expanded trade networks, although the presence of tobacco in Level 3A is indicative of southern trade links at an early date.

The identified species are illustrated below. Each species (or genus, in cases where two or more species have similar properties) has brief annotations concerning their known uses. This information was obtained through investigations of various ethnobotanical studies in references and on the Internet and the compiled data in the Paleo Research Institute reports (Appendix B, Appendix C). It must be emphasized that this is but a small component of the botanical world which would have been utilized by people who knew their environment intimately and relied on the distilled knowledge of centuries of predecessors.

Sturgeon					T									
Fish	T												T	T
Duck		T	T		T		T					T		
Bighorn Sheep								T						
Antelope	T					T			T		T	T		T
Deer						T							T	
Bison	T	T	T											
Rabbit												T		
Tobacco														T
Corn	T	T	T			T	T							
Beans	T	T			T	T	T					T	T	
Arrowhead										T				
Grass seeds										T				
Lotus tubers		T												
Sumac fruit		T												
Snowberry		T												
Rose hips													T	
Wild Currant		T	T				T							
Beeweed		T	T		T	T				T	T		T	
Wild Rice		T	T				T							
Saltbush	T		T				T						T	T
Cocklebur		T										T		T
Chokecherry	T													
Acorns	T	T	T		T	T	T				T			T
Pine Nuts	T	T	T		T	T	T						T	
Sunflower Seeds	T	T	T		T	T	T						T	
Sunflower Leaves	T					T				T	T	T		T
Wild Onion	T	T	T		T		T					T	T	T
Level	1					2						2B	3	3A
SAMPLE	Vessel 50	Vessel 41	Sh 24685	Biface 7836	Grinder 7851	Vessel 116	Sh. 10633	Biface 16135	Ret. 8762	Chitho 6816	Ochre Bowl	Vessel 46	Vessel 73	Vessel 91

Table 12.5-1: List of Species Identified by Residue Analysis

Plate 12.5-1: Wild Onion (*Allium* sp.) (www.nickisgarden.com)

The leaves and bulbs of most species of wild onion were used for food and medicine. Early people used wild onion for seasoning in stews and when cooking meat. The plant could also be eaten either uncooked or cooked as a vegetable. The bulbs were used as a remedy for colds.

Plate 12.5-2: Wild Sunflower (*Helianthus maximilianii*) (www.missouriplants.com)

The seeds and the leaves of wild sunflower (*Helianthus maximilianii*) and Jerusalem Artichoke (*Helianthus tuberosus*) were used for food, for medicine, and for dyes. The root of Jerusalem Artichoke was eaten raw (like a radish) or boiled or roasted. Sunflower seeds could be eaten raw, cooked, or roasted or ground into meal to make breads or porridge, or used as stew thickeners. The Iroquois and some western tribes obtained oil by boiling the seeds then skimming the oil off the top of the water. For medicinal purposes, sunflower tea could be used for lung ailments, malaria, and high fevers, while the leaves could be made into poultices. The Hopi used these for spider bites. The Ojibwa crushed the roots of the sunflower and used the paste to draw blisters. In addition, a lotion could be made from the root and used as a warm wash for rheumatism. Yellow dye was made from the flowers and purple and black dye from the seeds.

Plate 12.5-3: Jerusalem Artichoke (*Helianthus tuberosus*) (www.aphotoflora.com)

Plate 12.5-4: Pine Nuts (*Pinus* sp.)
(www.mdidea.com)

Nuts from pine cones were used for food and medicine. The seeds are edible and the inner bark of the tree could be mashed and formed into cakes which were dried for later use. As well, the inner bark could also be dried to make flour for cooking. Pine nuts were used to treat a variety of illnesses. Poultices were made for wounds. The inner bark was made into a tea to be used as an expectorant for colds, bronchitis, or pneumonia. The pitch (or sap) of the pine was warmed up and used to treat rheumatism, sore muscles, and insect bites. Buds from pine were chewed for sore throats or made into a tea to use as a laxative.

The shelled nuts (acorns) from oak trees were boiled and eaten as a vegetable or roasted and eaten as a snack. They could also be boiled, mashed, and mixed with grease and eaten like mashed potatoes. The inner bark was dried and made into a medicine for heart and lung problems, while the root could be used for stomach cramps or diarrhea. A red or black dye could be made from the inner bark of the oak.

Plate 12.5-5: Acorn (*Quercus* sp.)
(www.wildflower.org)

Plate 12.5-6: Chokecherry
(*Prunus virginiana*)
(www.listsoplenty.com)

The fruit of the chokecherry (*Prunus virginiana*) was pounded, made into cakes, and dried for later cooking. In addition, the pounded berries were added to pemmican which consisted of dried meat, fat, and dried berries. Sticks from the chokecherry tree were stripped and used as flavouring by being inserted into meat when it was cooking. The inner bark of the chokecherry was made into a tea and used for lung problems, while a boiled solution of the outer bark was used as a hair rinse.

Plate 12.5-7: Cocklebur (*Xanthium* sp.) (www.igb.agri.gov.il)

The seeds of cocklebur (*Xanthium* sp.) were parched and ground into a flour. Cocklebur had several different medicinal uses. The seed pods could be crushed and used for rheumatism and arthritis as well as an antiseptic and a diuretic tea could be made from the leaves. In addition, cocklebur was used to treat herpes, skin infections, and bladder infections.

Plate 12.5-8: Saltbush (*Atriplex* sp.) (www.calflora.net)

Due to the salty taste, the leaves and young shoots from the saltbush (*Atriplex* sp.) were used for seasoning. The seeds could be ground into meal and used as flour or added to water to make a beverage. The plant could be chewed and made into a poultice. The Navajo and the Zuñis used this poultice for ant, bee, or wasp stings. The dried leaves could be used as snuff for nose troubles. A decoction could be used for stomach pain or as an emetic and the root could be pulverized to make a poultice for toothaches.

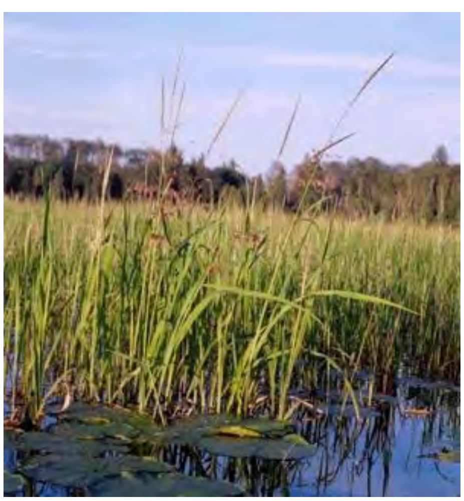


Plate 12.5-9: Wild Rice Stand (www.sos.state.mn.us)

Wild rice (*Zizania aquatica*) grows in shallow, slow-moving waters of lakes, streams, and rivers. Ethnographic and archaeological data indicates that Aboriginal peoples have used wild rice as a cereal for an extremely long time. In fact, the Menominee took their name from the plant. After harvesting the rice, people would thresh the grain and winnow it for storage until they were ready to use it. Wild rice can be boiled or it can be used in soups or broths with other foods. The grains could be pounded into a meal to add to pemmican.

The entire plant of beeweed (*Cleome* sp.) could be used as a potherb for seasoning. Older plants were boiled to a thick black residue which was then dried and made into cakes which were fried. The seeds of beeweed were eaten raw or cooked, dried, and ground into meal which made a porridge. A decoction of beeweed was used for stomach illnesses and fevers, while poultices of the leaves could be used on the eyes. In addition, beeweed could be boiled down and the liquid used as a body and shoe deodorant.

Plate 12.5-10: Beeweed (*Cleome* sp.)(www.danielclark.net)

Plate 12.5-11: Red Currant (*Ribes rubrum*) (farm1.static.flickr.com)

All the various species of *Ribes* (currants and gooseberries) have edible berries which could be eaten raw, cooked, or dried for later use. Dried berries were boiled or pounded with fat to make pemmican. The flowers were also eaten and the dried leaves were used to make a tea.

Plate 12.5-12: Rosehips (*Rosa* sp.) (www.rominapride.com)

The rose plant has several uses. The fruit, rosehips, could be stewed, candied, or made into preserves. In the spring, young shoots and stalks of the plant could be used as herbs or to make a tea and the flower petals could be eaten raw. As well, the inner bark could be boiled for tea. The flowers or buds were steeped in water and the infusion was used as an eye wash or an astringent as well as a treatment for diarrhea. Dried rosehips could be used as beads to make necklaces. The inner bark was smoked like tobacco.

Plate 12.5-13: Snowberry (www.nativeplants.org)

The waxy white berries of the snowberry (*Symphoricarpos* sp.) are edible but they have no flavour. The leaves were steeped to make a decoction for bathing wet or inflamed eyes. The root could be mixed with the roots of bluestem grass to make a medicine for stomach pains.

All species of sumac (*Rhus* sp.) have sweet acidic berries that were eaten both green and when ripe, either raw or cooked. Berries could be pounded into cakes that were sun dried for future use or dried whole and ground into a powder. The berries were also used to make a drink similar to lemonade. Buds from sumac were used to make an infusion for stomach pain. The buds could also be used to make a deodorant or perfume for personal grooming. A light orange-brown dye was made from the berries. The leaves of sumac could be dried and smoked, either with tobacco or alone.

Plate 12.5-14: Sumac (*Rhus* sp.) (mrsmaine.wikispaces.com)

Plate 12.5-15: Lotus (*Nelumbo lutea*) (wolf.mind.net)

American lotus or duck acorn (*Nelumbo lutea*) grows in ponds and slow streams from Massachusetts to Texas to Minnesota. Both the tubers and seeds are edible and the tubers were used with acorns, cooked with meat, or boiled and eaten as vegetables. They could also be dried and kept for winter food. Shoots were collected and cooked with meat or other vegetables, while seeds were gathered and roasted like chestnuts or cooked with meat to make a soup.

Arrowhead (*Sagittaria* sp.) is a perennial plant that grows in water or marshy habitats throughout most of eastern North America. It has white, edible, starchy tubers which can be eaten raw or cooked. They can be prepared in any of the ways that potatoes are cooked. The tubers can also be dried and ground to produce a flour. The Navajo used the plant as a headache remedy while the Ojibwa and Chippewa used it to treat indigestion.

Plate 12.5-16: Arrowhead (*Sagittaria latifolia*) (www.co.pierce.wa.us)

Beans consist of several species of *Phaseolus:* common bean, lima bean, and runner bean. It is believed that beans began to be cultivated about 8000 years ago in Central and South America. Beans are eaten when green and immature but often were harvested when ripe and the seeds dried and stored for future use. Dried beans are usually boiled until soft. Beans have been found archaeologically in Late Woodland, Mandan, and Arikara sites. Historically, they have been recorded as being cultivated by Lakota groups.

Plate 12.5-17: Cultivated Bean (*Phaseolus* sp.) (lh3.ggpht.com)

Plate 12.5-18: Indian Corn (*Zea mays*) (www.clarionfarms.com)

Cultivation of corn (*Zea mays*) began in Central America and spread northward. When Europeans arrived in North America, corn was grown from southern Canada to southern South America, usually in small garden plots. There are five different types of corn: popcorn and flint corn have high protein and hard starch; dent corn has soft, waxy starch; flour corn contains little protein and mostly waxy starch; and sweet corn stores more sugar than starch.

Corn can be prepared in numerous ways. Whole ears can be boiled. Ripe kernels are dried, parched, and ground into flour, or hulled with lye from ashes to make hominy. Corn silks were dried and ground with the parched corn kernels to add sweetness.

Plate 12.5-19: Corncobs of Indian Corn(www.sacredearth.com)

Plate 12.5-20: Tobacco (*Nicotiana* sp.) (www.chloesblog.bigmill.com)

Tobacco is native to the American Southwest and was (and still is) used for ceremonial purposes. The dried leaves are smoked, usually in ceramic pipes or carved stone pipes. The plants were grown by groups south of the Manitoba border and traded to people who camped at The Forks.

12.6 Cultural Dynamics

12.6.1 Level 3A

The earliest occupation recorded in the excavation, Level 3A, occurred nearly 900 years ago. Based upon the lithic detritus, it would appear that the occupants had recently arrived from the south where they had visited the Knife River Flint quarries in North Dakota. The waste flakes are almost entirely all Knife River Flint. The tool kit is predominately Knife River Flint with a small percentage of Swan River Chert representing tools that had not been replenished with the new supply of raw material.

The ceramics from Level 3A are internally cohesive, representing Rainy River Coalescent types. There are relatively small quantities of vessels, suggestive of a small group of people. In terms of ceramic vessel density, a value of 0.1 vessel/m^2 appears to be average, based upon the calculations for the seven occupation levels (Figure 12.2-2).

The food resources are predominately fish (Figure 12.4-1) with a calculated amount of nearly 200 kilograms of meat available. Elements of six individuals from six different species of small mammals were present, some avian material from which swan was identified, and a small number of shellfish. Given the assumptions promulgated earlier, this would provide approximately 420 person/days of food if it were all consumed at the camp and if the vegetable component of the diet was not greater than estimated.

A task group venturing south into areas beyond their normal seasonally occupied territory would not be large. It probably consisted solely of adults who would be travelling lightly, carrying little more than necessary. Once returning to traditional areas, the group would have stopped to replenish their food supply, to manufacture tools from the newly obtained raw material, to reduce larger cobbles to easily transportable trade blocks, to repair clothing, and perhaps replace broken and damaged cooking vessels.

In addition to the Knife River Flint, the group would have also returned with another valuable trade product. The presence of tobacco was identified in Vessel 91. It is unknown if the group had ventured as far south as to meet with tobacco growers but they had at least encountered an individual who would trade tobacco for some of the items that they had had with them.

12.6.2 Level 3

The next occupation is separated from Level 3A by a thin (two to three centimetre) layer of silty clay, probably deposited by a single flood event. As there does not appear to be any indication of the formation of a humic zone at the surface of this silty clay layer, the occupation likely occurred within five years of the flood event. The radiocarbon dates for Levels 3A and Level 3 are inverted meaning that both occupations occurred within the standard deviation of the two dates (40 years) and probably closer together than that.

There are very strong similarities between the cultural material of both levels. As in the Level 3A occupation, the lithic assemblage is dominated by Knife River Flint. Except for a small percentage of undifferentiated chert, the detritus is almost totally Knife River Flint. The tool kit does have a small presence of both undifferentiated chert and Selkirk Chert, suggesting some local lithic material acquisition.

The ceramics from Level 3 are internally cohesive, representing Rainy River Coalescent types which were first seen in Level 3A. In many ways, there seems to be a direct link, through the ceramic decoration styles, with the slightly earlier occupation. It may even be the same group of people, somewhat enlarged as could be the case if the earlier expedition to the south had been successful. There is a large quantity of vessels, twenty-three, suggestive of a relatively large group of people. In terms of ceramic vessel density, a value of 0.42 vessel/m^2 is considerably higher than the average density (Figure 12.2-2).

The food resources are predominately fish (Figure 12.4-1) with a calculated amount of less than 100 kilograms of meat available. Only six small mammals and minor amounts of bird were identified. Shellfish, especially Fat Mucket, were present in large quantities, although with the amount of meat available per clam, this is still a minor component in the diet. This could be calculated to provide approximately 187 person/days of food if it were all consumed at the camp. Thus, if there were ten people in the trading party, the food would support them for an eighteen day period. Given the number of ceramic vessels, it would appear that either the group was larger than the faunal resources would indicate or that the deposition of a large portion of the butchering remains occurred at a midden area beyond the area of excavation.

To summarize, the occupants of Level 3 appear to be either the same people as those who camped at this location at Level 3A or their direct descendants. The ceramic styles appear to be linearly derivative. The travel route appears to be the same and the subsistence strategy—a strong reliance on fish—is very similar.

12.6.3 Level 2C (and 2D)

The presence of Level 2C is confined to the northeast section of the excavation area plus ten isolated units (Figure 8.1-1). With the convoluted topography in the south-central portion of the excavation block, it is possible that the apparent separation of Level 2C from the subsequent Level 2B may be the result of surface run-off due to heavy summer precipitation as is postulated for the separation of Level 2D from Level 2C.

In excavation units where the natural level is rising at a slope of 1:3 in one corner, dropping at a slope of 1:2 in the centre, and rising again at a steep slope on the other side, the challenge of accurately following a natural level when the separation is 1 to 4 millimetres is great. Thus, it is possible that in some of the isolated units, an excavator discerned a sedimentary layer between cultural levels when there was really no temporal separation but just the result of two different activities at the same location at different times during the occupation.

Temporally, the radiocarbon dates place the occupation of Levels 2C and 2D at approximately A. D. 1200, about one century after Levels 3A and 3. The stratigraphic separation by sterile riverine sediments, in the western end of the excavation area, from the base of the Level 2 Complex to Level 3 was thirty to forty centimetres at the southwest corner increasing to 60 centimetres at 5N10E (Figure 2.2-1), suggesting that at the time of the Level 3A and Level 3 occupations, the 10E line was approximately the edge of the upper bank of the river or that there was a considerable run-off swale between the area of the campsite and the natural levee to the east.

There are considerable differences between the material culture of this occupation level and that of the preceding occupation levels. The proportion of Knife River Flint tools has diminished with the difference being assumed by undifferentiated chert, quartzite, and other materials (Figure 12.3-1). The frequencies of material in the lithic detritus are very different from the earlier levels: Swan River Chert, from the west, is the dominant material, followed by Selkirk Chert, which can be obtained locally, and undifferentiated chert (Figure 12.3-2). The amount of Knife River Flint can be explained by resharpening existing tools. Based upon the lithic detritus, it would appear that the occupants had most recently travelled through the upper Assiniboine River region but were familiar enough with The Forks region to know that Selkirk Chert could be quarried a short distance away from the campsite location.

Sherds from six designated ceramic vessels were curated from Level 2C, although most of them appear to originate in subsequent levels and occur in this stratigraphic position due to taphonomic factors. The sole vessel identified from this level, Vessel 79, is a Rainy River Coalescent type (Section 8.3.2.1). Little comparative analysis can be undertaken with such a small sample size, but there definitely seems to be a continuation of ceramic types from Levels 3A and 3 to this occupation level. The density of ceramic vessels (Figure 12.2-2) appears to be average but this may be a byproduct of the taphonomic factors which relocated vessel sherds and the actual density is lower.

As in the earlier two levels, the preponderance of protein was derived from fish (Figure 12.4-1). Only rabbit, muskrat, and squirrel were identified among the butchering remains (Table 8.6-1) and bird and shellfish were only minimally represented. The fish remains of nine different species indicate a broad spectrum harvesting technique such as the use of nets, weirs, or fish traps. The calculated value for the available meat, 367 person/days, appears to represent a greater population than the ceramics would indicate. An explanation could be that the main portion of the campsite lies to the north and east of the excavation area. The faunal remains could represent a fish processing area or a midden deposit with most of the remainder of the cultural debris lying beyond the limits of excavation.

In summary, there seems to have been a shift in the lithic component from the earlier occupations with western and local resources emphasized rather than southern. It may be that this occupation represents a group who camped at The Forks prior to travelling south rather than on the return, as appeared to be the case in Levels 3A and 3.

12.6.4 Level 2B

The presence of this occupation level is somewhat similar to that of Level 2C with a contiguous horizon in the northeast section of the excavation block and a somewhat irregular pattern in the south-central portion (Figure 7.1-1). The horizon was recorded in 67 excavation units and had seven distinct hearths (Figure 7.1-2). The radiocarbon dates for this occupation appear to be anomolous (Figure 2.4-4) and probably should be rejected due to probable hydrocarbon contamination, as the Law of Superposition states that a more recent geological (or cultural) event cannot occur stratigraphically earlier than a subsequent event. Interpolating between the dates for Level 2C and Level 2A, the likely date for this occupation is around A.D. 1200, very soon after Level 2C and is separated from it by one minor flood episode which deposited only a thin layer of riverine silty clay.

The frequency of materials in the lithic assemblage is generally similar to that of Level 2C. In the tool kit, the percentage of Knife River Flint is diminished with that lack being filled by Swan River Chert and 'Other' materials (Figure 12.3-1). The frequency of local material, Selkirk Chert, is equal to that of the southern, probably imported, Knife River Flint. In the detritus (Figure 12.3-2), the frequencies are closer to Level 2C with Swan River Chert and undifferentiated chert remaining constant and the lessened frequency of Selkirk Chert being replaced by the 'Other' category.

The ceramics of Level 2B are identified, to the large part, as Rainy River ware, either Coalescent or Composite, appearing to be a continuation of the styles identified in the earlier occupations. Sherds from fourteen distinct vessels were identified in the Level 2B ceramic assemblage although only five vessels are considered to originate in this horizon. Taphonomic factors have caused the vertical displacement of sherds from stratigraphically higher levels. One extra-local vessel, Vessel 72 which is a Plains Woodland type, was recovered. This could suggest that trade goods had been obtained in that vessel or that individuals of the group represented by that ceramic style were present at the occupation site.

Level 2B is the first occupation level in which mammalian resources become significant. This is due to the presence of the butchering remains from one bison. Other small mammals are also identified but it is the bison which brings the mammal component of the diet almost equal to that of the fish. Avian and shellfish are very small components. The calculated value of 850 person/days suggests either a larger population or a longer stay at the campsite. Alternatively, some of the meat could have been preserved through drying or smoking for future use, thereby lessening the probable period of occupancy.

12.6.5 Level 2A

This cultural level is present in most of the eastern part of the excavation area, except for a few isolated units. It was identified in 94 units and was separated from the preceding Level 2B by a thin (2 to 4 millimetre) layer of riverine silt and from the subsequent Level 2 by a similar thin layer. West of the 5E line, this separation was not evident, although given the pattern of presence, the occupation probably extended into that area as well. The radiocarbon dates for Level 2A indicate that it is almost contemporaneous with Levels 2C and 2D (Figure 2.4-4) and by implication, Level 2B. The dates for the three levels centre around A.D. 1200 and each falls within the standard deviations for any other level.

The lithic portion of the material culture generally is similar to that from Level 2B. In the tool kit, the proportions of undifferentiated chert, Swan River Chert, and ‘Other’ are almost equal (Figure12.3-1). In the detritus grouping, undifferentiated chert is strongly dominant with ‘Other’ being second (Figure 12.3-2). This would suggest quarrying at glacial gravel deposits and moraines. The slight presence of Swan River Chert could be the result of sharpening tools while the similarly minor presence of Knife River Flint could be the result of tool manufacture from a small amount of raw material, such as a trade block brought to the campsite by a trader.

The ceramics included seventeen identified vessels, twelve of which appear to originate in this level. Other than one Plains Woodland vessel (Vessel 63), all are Rainy River types with a continuation of one Coalescent type and others which have been categorized as Rainy River Composite. Even with the increased number of vessels, the ceramic density (Figure 12.2-2) is average.

The combined total of available meat is less than that for Level 2B while the proportions of mammal to fish remain similar. One bison plus several small mammals were identified (Table 6.6-1) with rabbit being the most prevalent. The numbers of fish were diminished but the ratio among the species remained similar. Birds and shellfish, as determined by the butchering remains, contributed very little to the diet. The calculated value of 750 person/days suggests both a smaller population and a shorter stay than occurred for Level 2B.

Based upon the lithic assemblage and the ceramic assemblage, the people whose camp residue makes up Level 2A are the same group as those who camped at this location resulting in Level 2B. This is not to say that the same individuals returned but that a group whose lithic preferences, seasonal round, hunting and fishing strategies, and ceramic expressions were almost identical to the preceding group was present. There may have been members of the same extended families or bands who returned to this same campsite.

12.6.6 Level 2

This complex level occurs in every excavated unit (149 units). The AMS radiocarbon date places this occupation approximately fifty years later than Levels 2D, 2C, 2B, and 2A at A.D. 1250. This is a relatively dense cultural layer which has a large artifact assemblage and evidence of numerous activity areas. Twenty hearths were recorded, ranging from large amorphous hearths covering more than one square metre to small pocket fires. The ceramic density was highest in the western and south-central areas while lithic tools and detritus were found mainly in the northwestern and southwestern areas. Mammal and shellfish butchering remains tended to be spread throughout the excavation area while fish remains were concentrated in the western area.

The lithic toolkit is similar to the three earlier levels but with a higher frequency of Knife River Flint tools at the expense of undifferentiated chert and Swan River Chert (Figure 12.3-1). These proportions are not replicated in the detritus assemblage where undifferentiated chert and Swan

River Chert dominate the material types. This could suggest long time curation of favoured tools made from the better material (Knife River Flint) and more rapid replacement of other implements with chert and Swan River Chert collected while the group travelled from the west to The Forks. The ceramic assemblage has indications that there are taphonomic factors at play as five of the 27 recorded vessels appear to originate in lower stratigraphic levels. These taphonomic factors probably affect other categories of artifact but cannot be as readily discerned. Two vessels, Vessel 9 and Vessel 11, are identified as Plains Woodland. The remainder are identified as Rainy River Composite except for two that are continuations of a type (Little Owl) that was designated as a Rainy River Coalescent type in Level 3A. Even with the larger numbers of identified vessels, the greater expanse of excavation means that the ceramic density (Figure 12.2-2) remains near, or perhaps slightly higher than, the average.

The faunal assemblage represented the highest calculated quantity of available meat (Figure 12.4-1) due to the presence of a minimum of two bison and a moose. However, a comprehensive pantheon of other species was also identified (Table 5.6-1) indicating a serious concentration of effort on hunting. Adding to the food supply, the highest number of fish was also recorded for this level (Table 5.7-2). The range of species, as well as the size range demonstrated within each species, indicate a non-specific harvesting technique such as netting or fish traps, although the presence of a leister prong also indicates spearing. The butchering remains indicate large numbers of shellfish but small quantities of bird, which included mallard duck and snow goose. The available meat produces the calculation of 2881 person/days which could supply one hundred people for a month.

Based on the seasonality indicators of summer to early fall, probably only a small proportion of the food was preserved for winter supply although pemmican keeps almost indefinitely. The presence of beans and corn in the ceramic residue analysis could suggest that an intermittent presence was maintained during the summer with some individuals remaining at the campsite to tend horticultural plots while others travelled. This hypothesis could also partially explain the large quantities of meat harvested with the group sequentially dispersing and coalescing at this location over the course of the summer. One contraindication of this hypothesis is the near absence of locally obtained Selkirk Chert.

One indication of long distance travel is the identification of bighorn sheep blood residue on a Swan River Chert biface. The probable range for bighorn at this time period could have included the Black Hills in South Dakota and perhaps Theodore Roosevelt National Park in North Dakota.

12.6.7 Level 1

This cultural horizon was identified in every excavation unit. The density varied from extremely dense to relatively sparse. The hearths seemed to be more widely spaced than in the earlier levels and were more numerous in the northeast corner of the excavation area. The AMS radiocarbon dates place this occupation about twenty years (one generation) later than Level 2.

This level had the highest quantity of lithic tools (Table 4.4-1). The lithic tool kit shows a slight preference for undifferentiated chert with nearly equal representation of Selkirk Chert, Knife River

Flint, and the numerous materials lumped under 'Other' (Figure 12.3-1). The detritus profile (Figure 12.3-2) is different in that undifferentiated chert is strongly dominant with Swan River Chert a distant second, followed by Selkirk Chert. This distribution suggests active gathering of tool quality chert from glacial deposits and some quarrying of local Selkirk Chert. The Swan River Chert frequency may be due to sharpening of existing tools. The lithic assemblage suggests that the occupants had been away from a major lithic source area long enough that the required replacement tools were fashioned from locally available material, with a preference for quarrying from gravel sources.

The ceramics tend to be most strongly concentrated in the southeast corner with a smaller diagonal concentration across the centre of the excavation area. The largest number of ceramic vessels, thirty-eight, were identified from this horizon and the ceramic density is approximately twice the average (Figure 12.2-2). In general, the majority of the ceramics represent a continuation of the cultural sequence established in earlier occupations with most of the vessels falling into the various newly defined Rainy River Composite types. The main difference between this level and the others is the higher incidence (7 vessels or 18%) of extra-local ceramics. Two vessels were identified as Plains Woodland, one as Mortlach/Wascana-like, and four as a newly defined type, Dogwood, which has some common design elements with Rainy River but appears to be affiliated with a different family of ceramic wares.

The faunal resources have almost the same percentages, by class, as Level 2 even though the combined total is lower. Among the mammal assemblage, a bison, an elk, and a moose contributed the most meat but the presence of large numbers of small mammals (Table 4.6-1), especially rabbit, show a reliance on small game hunting as well as large game. Only a small number of avian remains were recovered, of which only mallard duck could be identified. A large number of fish, representing all food-sized species locally available, had been harvested. This is the only level in which catfish was the dominant species (Table 4.7-2), perhaps in compensation for the higher quantity of lean animal meat. A moderate quantity of shellfish would have added variety to the diet. The calculated available meat would have provided for 1614 person/days, the second highest value for the different horizons.

The presence of beans and corn in the ceramic residues again could suggest the maintenance of horticultural plots in the vicinity. Buttressing this hypothesis is the recovery of two fragments of a scapula hoe and the presence of a squash knife. If horticultural plots were maintained, intermittent visitations would be necessary for watering and weeding, as well as a final visit for harvest. Thus, the cultural level could be a composite of several revisits to the same location over the course of a summer.

The presence of a large percentage of extra-local pottery in this cultural level could form a tenuous link with Horizon B, the Peace Meeting horizon, recorded during the Waterfront Drive Construction Project (Quaternary 1999). The difference in median dates for the radiocarbon samples is minimal and in that project, numerous different ceramic types were identified.

If this level and Horizon B were the result of the same occupation, the extent of the Peace Meeting horizon would be expanded considerably to the east from its currently known parameters—the south dugout of CanWest Global Park Baseball Facility (Quaternary 2000c) to the north, the central northern edge of Parcel 4 (gravel parking lot west of Waterfront Drive) (Quaternary 1990) to the west, the York Avenue/Waterfront Drive intersection on the southwest (Kroker and Goundry 1990; Quaternary 2000a), and possibly some of the test trenches for the Canadian Museum for Human Rights archaeological impact assessment (Quaternary 2004a) to the southeast.

To test this hypothesis, the data obtained during the archaeological construction monitoring program should be analyzed with testing of this hypothesis in mind.

13.0 AN EXPANSION OF RAINY RIVER CERAMICS IN THE RED RIVER VALLEY

- by Ernie Reichert

13.1 Introduction

Over 30 kg of ceramic sherds were recovered from eight defined occupational horizons recorded during the mitigative excavations for the anticipated subsurface impact of the Canadian Museum for Human Rights at The Forks (DlLg-33:08A). The levels excavated showed varying depositional densities. This is not unexpected as our sample area, or excavation perimeter, is static and the living occupations were obviously not constrained in this way. The density of ceramics is relative to other features, undulations in terrain, and the distributional densities of other materials. Maps illustrating the distribution of ceramics by weight can be seen in the review of findings for each level. The distribution of the identified portions of individual vessels can also be found in those sections. A total of 119 distinct vessels were identified in the analysis, 115 of these from controlled hand excavation. One was identified from a single sherd retrieved from the SW sump pit outside the excavation perimeter.

When reconstructing a sequence of events archaeologically, the last thing one excavates is the first thing to be laid down in temporal sequence. So here Level 3A is the first in the sequence and Level 1 is the last. This is also how this section will be structured. This certainly does not mean that there were no occupations before the Level 3A, or after the Level 1. This is simply what was bracketed by the physical boundaries dictated by the proposed impact, that which was excavated.

13.1.1 Distribution

The distribution of ceramics throughout the excavated portion of the site exhibits areas of higher and lower density. There could be several explanations for this. The initial surface scatter on the ground likely corresponded to occupational patterns relating to habitation areas (interior and exterior) and midden areas—a typical campsite scenario. This was no doubt complicated by the high degree post-depositional influences, both environmental and human, seen at this location. Some of the concentrations seen are quantities of sherds relating to single vessels indicating limited post-depositional movement, others are a mix of miscellaneous sherds. These are potentially post-depositionally altered midden areas or simply, natural occurring collection areas where a combination of run-off and flood waters, vegetation, and soil features funnelled and captured surface scatter. A primary feature in the portion of the occupation area that was excavated was a slope which ran along a northwest-southeast axis through the centre of the excavated area (Figure 2.2-4). The distribution of ceramics shows that this slope was influential in both occupation pattern and taphonomic dynamics. Greater detail will be gleaned from the reconstruction efforts where sherd concentrations can be linked to rim and neck sherds. This will afford the opportunity to access vessel utility and function within the camp. The vessel distribution maps give some impression of the general area from which each vessel was last deposited and shows displacement patterns to some degree as well. But, until the bulk of each vessel can be mapped, the true patterning of distribution will remain implied by only the scatter of the identified portions.

13.1.2 Approach to the Analysis

Roughly 90% of the identified vessels are typologically undefined Rainy River Coalescent or Composite. Little work has been done on the Rainy River Coalescent and Rainy River Composite since Brian Lenius' and Dave Olinyk's work (1990). The complexity and diversity seen during this period makes it difficult to find a starting point to begin defining the parameters of Rainy River ceramics concisely. Research on this material is primarily driven by the artifacts themselves. Discrete assemblages such as those that helped define Bird Lake and Duck Bay may be required to isolate other undefined Rainy River Composites. Thus far, these kinds of single component assemblages have not come to light. Whether this is because of a diversifying social/political environment from which these ceramics appear to have been born out of or typologists are simply not seeing the relevant indicators (most likely it's both), there needs to be a starting point from which to tease out the 'distinct' varieties from the diversity. Lenius and Olinyk derived their framework and placed within it Complexes from type sites isolated from the general milieu of the period in southern Manitoba. This enabled a clearer view to create the definition of those Complexes and how they might fit in to the larger picture, using assemblages that were without the 'noise' found in sites where multiple ceramic types are present. The material from this site is exactly that, noisy! …Or is it? One of the unique aspects of this site is the progression that is visible during and between the temporal intervals of the occupational layers.

Instead of leaving the report with another redundant list of 'Undefined Rainy River' vessels, the character of the assemblage dictated that an attempt should be made to identify threads of continuity and isolate apparent types held within. Thus, the analysis of the ceramics has turned into more than a list. The hope being that this could enable access into the world of Rainy River Composite/Coalescent ceramic expression, opening it up to some degree and allowing an opportunity to test the perceived typological variation that has been known to exist since the proposal of Rainy River (Lenius and Olinyk 1990). Eventually perhaps, 'pure' sites isolating the new types will be definable in detail to create new Complexes.

There is another possibility. This, in fact, may be one of those sites and this diversity is actually the norm for Rainy River with single component occupations being atypical. This also will remain to be tested. The players identified here could prove to be a consistent group and other sites from this period and area may show the same players represented but a different proportional breakdown. Eventually, a frequency analysis of the different types may be possible to help define regional proximities.

Another hope is that this effort will enable these formerly 'Undefined' types to be recognized in other collections and further our appreciation of the richness of ceramic expression in the Red River Valley and Parklands of southern Manitoba. Not to mention the relationships this material might have with the surrounding regions. What this assemblage offers is an opportunity to tease out some possible relationships and progressions and test them with further study and analysis using existing collections from around the region and from the peripheries.

Many multi-component sites exhibit succession to some degree. This assemblage is distinct in that it illustrates progression as well. The levels are close enough together in time that there are continuities and deviations observable. The amount of variation on each level presents an opportunity for insight into some parallel traditions that may otherwise be overlooked. This is one of the reasons that this particular approach to the analysis was embarked upon.

During the analysis, all identified vessels were laid out in chronological sequence based on the stratigraphy. When this is done, each vessel was considered within the context of its own level and then within the context of the sequence, the relationships of what came before and what came after can be observed. In this case, when viewed chronologically, we have Level 3A and Level 3 (two occupations in close succession), then the Level 2 Complex (a complicated sequence of as many as five or, most likely, four occupations in close succession), then Level 1 (a single occupation). To simplify, we have three major successive occupational events and, according to the dates, there could as few as forty, or as many as two hundred years between them. Two things of note should be mentioned here: archaeologically speaking, this is a short period of time; and typically, typological comparisons are made between groups who are not cohabiting.

This circumstance allows a rare opportunity for comparative analysis within a single site, or at least a small part of it. There is self contained context as described earlier, we know that the variation we are seeing is actually present at a particular moment, and all the variations are recognizable as relevant to each other at that moment, because they occur at the same place and time. This allows us to make associations that we would not typically be able to make using two vessels from two sites, even if they had the same dates. The margin of error in the dating process, even at its most accurate, can not tell you if the two vessels occurred at exactly the same time let alone whether they could have been held in the hands of one individual standing beside a campfire. In this excavation, we have that and more. We also have the vessels that that person's grandmother may have held and the vessels her daughter may have held. Of course, we cannot say that that literally happened between these levels, but that is an example of the degrees of separation we could be seeing, potentially as little as two generations. But even if it is six or ten generations, we have an opportunity to see the exchange of ideas, adaptation, continuities, and origins. We gain insight into the social dynamics and can read them at a pace which is more understandable to our own experience of time. It was decided that this should not be disregarded.

13.1.3 Considerations for Interpretation of this Assemblage

It is clear from the use of the cord-wrapped object impression (CWOI), stamping, certain decorative motifs, and the variations in form, that this material is part of the formation of the Rainy River Composite as defined by Lenius and Olinyk (1990). It is necessary to review and discuss the definitions established by them and how this assemblage relates to those definitions.

In their research, Lenius and Olinyk defined the Bird Lake Complex and devised a framework which also encompassed Duck Bay and Winnipeg River Complex ceramics. It also subsumed a significant portion of what had been previously been described as 'Late' Blackduck.

The origins of Rainy River ceramics were during an apparent period of diffusion of ceramic expressions, the bridging of decorative and vessel form traits from Blackduck and Laurel brought on by a shared heritage of mound burial ceremony along the Rainy River. Vessels exhibiting the mixing of these traits were proposed to be part of the Rainy River Coalescent, starting around A.D. 900 (Lenius and Olinyk 1990). For their framework, much of what had been previously defined as Late Blackduck would become Rainy River ceramics. They perceived a progression, where certain Blackduck traits were dropped and the proliferation of stamp decorating in combination with CWOI patterns were the fertile grounds for the emergence of the Bird Lake and Duck Bay Complexes, followed by the later Winnipeg River Complex.

13.1.4 Laurel Influence

The distinctive nature of Laurel ceramics: coiling structure, conical vessel form, smooth surface, dentate stamping, non-thickening neck to rim, among other things, would make identification relatively easy in the context of the rest of the assemblage. None was found in this assemblage. Although there are no Laurel vessels identified, Laurel traits are suggested in decorative approach and vessel form of the earliest occupations (in particular, the newly defined Otterhead type). In the assemblage as a whole, the Laurel influence is not as palpable as Blackduck. 'Laurel-ishness' became only a supporting factor in splitting Blackduck from Rainy River Coalescent in the earliest levels. Laurel primarily showed itself in form traits and subtleties of decorative approach. This tended to be largely a subjective interpretation based on experience, using rather unquantifiable judgements. At this point, the degree of coalescence (balance of traits from Laurel and Blackduck) is not predictable. It is obviously likely that it could be geographically and politically driven, or both, and therefore variable from region to region, if not site to site. What goes in will affect what comes out.

Late Laurel continued beyond the formation of the Rainy River Composite, at least until A.D. 1200 and possibly as late as A.D. 1300—based on the dates from the Ballynacree site near Kenora, Ontario (Reid and Rajnovich 1991). The one appreciable trait from Blackduck that Laurel used in its late manifestation is oblique CWOI over horizontal CWOI. This is considered to be a definitive temporal marker for late Laurel (Reid and Rajnovich 1991). The limited adoption of Laurel traits in this assemblage suggests that Rainy River traditions developed more from the diffusion of Blackduck than from Laurel diffusion in this region. As eluded to earlier, Blackduck traits form a greater portion of Rainy River characteristics. More Blackduck traits to play with equals more variations on those themes.

13.1.5 Blackduck Definition

For this report, the definition of Blackduck, used by Lenius and Olinyk (1990) in their attempt to define the Rainy River Composite, was used. Using this definition, we find that there are no 100 % convincing Blackduck vessels in this assemblage. This definition goes something like this (with some nuance added): a tall to moderately tall vertical, slightly flaring profile, increasing thickness toward the rim, with oblique CWOI above horizontal CWOI, punctates (producing bosses) on the horizontal CWOI, and occasionally vertical combing on the neck. Also included in their definition is oblique CWOI below the horizontal CWOI. In a practical sense, only two decorative elements separate this type of material from Rainy River ceramics. Rainy River never has combing and Blackduck never has stamping.

As for neck profile, it appears that there are Rainy River vessels with typical Blackduck profiles. Also, the Blackduck decorative suite appears on some vessels with more typical Rainy River profiles. This interconnectedness is responsible for a significant amount of confusion when archaeologists use these vessels as diagnostic artifacts in their interpretations. These subtleties are indicative of the intertwining of these ceramic traditions. In this collection, these types of vessels present in Level 3A/3 and the lower levels of the Level 2 Complex are closely associated with other Rainy River Coalescent materials.

13.1.6 Blackduck/Rainy River Interface - the Artificial Point of Departure

The traits being considered Blackduck here are admittedly limited, constituting drawing a line in the sand. This could be perceived as an artificial point of departure by some, but at some point, Blackduck must cease to be Blackduck in the continuum. Since it appears that the Blackduck traits are being carried by vessels that are definitely not Blackduck by the nature of the neck profiles (among other things) at the same time and in the same place, then we must assume that diffusion has taken place, which can and should be interpreted as a loosening of Blackduck conventions. So, using a definition for Blackduck which does not include non-Blackduck traits is essential to that definition and to understand where and how the departure takes place. It seems only reasonable that the people who made the Blackduck vessels would have carried on and perhaps adapted and adopted characteristics of diffusion vessels. The watering down of the classic Blackduck approach should be considered the end, at least as far as the ceramics are concerned. We can’t say it was for the people themselves of course.

Another way of looking at it is that Blackduck carries on, perhaps as several varieties, while the new expressions become the norm. Eventually, some of these develop into traditions of their own, submerged within the Rainy River diversity, and Blackduck moves further from its classic form and decoration, until at some point they are indistinguishable from the Rainy River vessels. Either way, there are likely to be non-Blackduck traits to be considered, which gives us a stepping off point again, only perhaps a little later than the simple appearance of stamping. This analyst sees the appearance of the stamp as the most straight forward marker of departure from Blackduck.

13.1.7 Rainy River Coalescent Definition

Stamping is considered by Lenius and Olinyk to have been derived from the Laurel ceramic decorative tradition. Vessels that have Blackduck traits (especially combing, but also punctates producing bosses) and the stamping, a Laurel trait, are considered to be part of their Rainy River Coalescent (Lenius and Olinyk 1990), an amalgamation of Blackduck and Laurel traits which transpired just prior to or during the birth of the Rainy River Composite where combing is abandoned and stamping fluoresces with and without CWOI.

13.1.8 Rainy River Composite Definition

Admittedly, some Rainy River vessels can be difficult to tell apart from Blackduck and vice versa when similarities outnumber differences, likewise with Rainy River Coalescent and Composite vessels. The vessels of all three can have oblique CWOI on the rim and on the upper neck below the exterior lip, and a band of horizontal CWOI, and even a second row of oblique CWOI below the horizontals. It can be helpful to temporarily disregard the patterning of the CWOI altogether and focus on the other traits of form and decoration. The ceramic assemblage from this excavation demanded that parameters to differentiate between Blackduck, Rainy River Coalescent, and Rainy River Composite be practicable. The transition, as it is seen in this assemblage, simply became a balancing act of traits. This was originally outlined by Lenius and Olinyk (1990) and it appears to bear out in this material.

We have described when a vessel is not Blackduck, so when is a Rainy River Composite vessel not a Coalescent vessel. For this assemblage, the separation was based on the number of residual Blackduck traits of decoration and form that remained. Assuming that both stamping and CWOI are present first of all, the most critical element for Composite definition is the absence of combing. Any vessel that has combing and stamping is automatically Coalescent. This may be imperfect, however, as combing is noted as being inconsistent on Blackduck (Anfinson 1979). Next, related to subtleties of form or specifically aspects of the neck profile, there is a general tendency to move away from the classic Blackduck profile described above, i.e., shorter neck, more pronounced shoulder, limited thickening at the rim or more thickening at the rim, no flaring or pronounced flare in the neck, in-curve neck also referred to as incipient-S. This drift away from 'classical' Blackduck is evident in both Coalescent and Composite vessels, though increasingly so for Composite types. In the decoration, any addition of stamping, especially compound element motifs in combination with the above mentioned traits is characteristic. There are other specific observations that relate directly to this assemblage which are mentioned in the discussion of the newly defined types below. Lenius and Olinyk (1990) pointed to the punctate and boss as a defining Blackduck trait which would not be shared by Rainy River ceramics (although stamps could be present in the same position as punctates, without bosses). The problem with that trait is that it persists into Level 1 on a few vessels, though the bosses are less prominent. The general tendency does appear to be a decline in the use of the punctate producing a boss. Using either radio-carbon date scenario (Chapter 2), that suggests that this Blackduck marker is retained longer than expected, into the Rainy River Composite at least in this assemblage. This means that if stamps and punctates are present on a CWOI vessel, it can be considered Rainy River Composite, barring the presence of combing and a typical Blackduck profile or another Laurel-like trait. For example, Vessel 78 has a Blackduck profile, decorative structure including punctates, and stamps. This would be considered a Rainy River Composite vessel but what appears to be CWOI are actually dentate stamps, a Laurel decorative technique. Therefore, Vessel 78 is a Coalescent vessel.

13.1.9 Winnipeg River

Lenius and Olinyk also connected Winnipeg River ceramics to the realm of Rainy River ceramics, positioning it as a late expression of the Rainy River Composite. As mentioned previously, Lenius and Olinyk (1990) expected other Complexes to be defined from the Rainy River Composite and Coalescent. This assemblage fills that bill. Only one vessel (Vessel 41) was defined as Winnipeg River (in Level 1). Winnipeg River ceramics are seen as an example of a late Rainy River Composite Complex. Its primary traits, flaring neck profile and lack of decoration and textile impressed exterior, lead Lenius and Olinyk (1990) to postulate that it was part of a natural progression away from the highly decorated vessels found in the earlier Rainy River Composite Complexes. The tendencies which enabled Lenius and Olinyk (2009:pers. comm.) to suggest this are echoed in this assemblage to some degree, i.e., increasing flare and a reduction in the extent of decoration. One might add to this a reduced neck height also.

The current emergent date for the Winnipeg River Complex is around A.D. 1350. From either of the date scenarios, this date would be pushed back from 100 to 200 years, more in line for parallel development with Bird Lake and Duck Bay. One complication in this view is the interpretation of undecorated vessels in general for this period (Lenius and Olinyk 2009:pers. comm.). Undecorated vessels appear regularly with assemblages from this period and region, often sharing vessel form with the rest of the assemblage that they are recovered with. This begs the question of what Vessel 41 represents. Either it is a Winnipeg River vessel and the emergent date must be reconsidered, or it is an example of an undecorated vessel from another tradition within the Rainy River Composite, something parallel to Bird Lake and Duck Bay.

13.1.10 Undefined Rainy River Definition

The earliest materials, those of Level 3/3A, are largely derivative of both Blackduck and Laurel. They meet the expected criteria for Rainy River Coalescent vessels, considered to be the formative expressions from which the Rainy River Composite would distil. The Level 2 Complex and Level 1 show the continued dropping of traits and forming of new approaches to decoration and form, but retaining key derivative traits that confirm the Rainy River Composite. The near absence of the currently defined Rainy River Composite Complexes, Bird Lake, Duck Bay, and Winnipeg River, suggest an aspect of the Rainy River Composite that thus far has remained undefined.

There are some general tendencies illustrated in these materials that appear to be fundamental in the progression and formation of the Rainy River approach. Some of these had been identified by Lenius and Olinyk in their research (1990), while others appear to contradict their observations.

Lenius and Olinyk (1990:100) identify six characteristics which they outline in ‘Undefined Rainy River Complexes’. Four of the six are present in this assemblage.

Decorative traits of the rim:

1) a row of short oblique CWOI on the interior (below the interior lip). This is present on several vessels here, but does not seem to be consistently applied to any one type of vessel or on any particular level.

2) a single horizontal or encircling CWOI on the lip (rim, for this report). This is not seen on any vessels in this assemblage.
3) an undecorated rim on a vessel having a decorated exterior. This is not seen on any vessels in this assemblage.

From the exterior neck:
1) encircling groups or pairs of stamps in the former punctate position. This is present on a few vessels (Aspen type), as is a single stamp (appears non-specific in this collection).
2) pseudo-chevron motif comprised of oblique CWOI and stamp combination. This is very common, especially in the Level 2 Complex (Rainy River Pseudo-chevron type).

From the shoulder (their Zone 1):
1) any use of stamp design elements on the shoulder/body. This appears on several vessels and was identified in Level 3. It is most prevalent in Level 1 (appears non-specific in this collection).

13.1.11 Duck Bay

The working definition of Duck Bay for Lenius and Olinyk included a wide variety of expression, and a significant portion of that was acknowledged to be undefined types seen in Duck Bay Complex sites. Only two vessels have been identified as being Duck Bay and, despite the presence of other Duck Bay-like features on many vessels, none fit the definitions laid out by Lenius and Olinyk (1990:88, 2009:pers. comm.).

13.1.11.1 Shoulder-Body

Stamp only vessels
1) single row along the shoulder. Notable on one vessel (Vessel 50), not considered a Duck Bay vessel.

2) expanding array of stamps extending from base of neck to the shoulder. Seen in Level 3 and the Level 2 Complex, but with small non-Duck Bay stamps.

13.1.11.2 Neck (Incipient-S)

Stamp only
3) Two or more rows of Duck Bay sized stamps. Vessel 8 has this, but the stamp size is too small.

Oblique only
4) at least three rows of “full length” alternating oblique CWOI elements (herring bone motif), or other pattern (an undefined Duck Bay type (Lenius and Olinyk 1990:90, #1)). Vessel 70 has this motif, but the lower two rows are CWO stamps, therefore unequal length.

Oblique and Stamp

5) at least two rows of obliquely oriented Duck Bay sized stamps (an undefined Duck Bay type (Lenius and Olinyk 1990:90, #2)). This is not present.

Horizontal CWOI and Stamp

6) an undefined Duck Bay type (Lenius and Olinyk 1990:90, #3). This is not present.

Incised Horizontal and Stamp

7) an undefined Duck Bay type (Lenius and Olinyk 1990:90, #4). This is not present.

13.1.11.3 Rim

Stamp only

8) typical Duck Bay stamps. This is not present.

9) rim/lip notching. This is not present. However, wide/flat CWOI applied perpendicular to the rim are seen on several vessels. Perhaps there is a correlation.

13.1.12 Bird Lake

Much like Duck Bay, Bird Lake ceramic identification remained restrained. Two vessels showed marked similarity to Bird Lake by Lenius and Olinyk's definitions (1990), but they also showed marked departures. Bird Lake tendencies were seen on other vessels as well but none showed as strongly similar as Vessel 28 and Vessel 74 (Section 13.4). Below is a review of the definitive Bird Lake traits laid out by Lenius and Olinyk (1990:95) with comments regarding this collection.

13.1.12.1 Shoulder-Body

Stamp only

1) one to three descending rows of small Bird Lake stamps from neck to shoulder. This is seen on undetermined shoulder sherds from Level 3 and present on Vessel 28.

2) necklace pattern between neck and shoulder. This is identified from Level 2 Complex (Vessel 28 and possibly others) and a variation from Level 1 (Holly Oblique type).

Horizontal and Stamp

3) This is not present.

13.1.12.2 Neck

Stamp only

4) one to nine rows of non-Duck Bay stamps. This is not present.

Horizontal and Stamp

5) Stamps must be non-Duck Bay. This is not present.

13.1.12.3 Rim

Horizontal only

6) two rows of parallel, encircling impressions. This is not present.

Oblique only

7) groups of alternating angle impressions. This is not present. However, the criss-crossing pattern could be construed as a variation on this motif.

Oblique and Stamp

8) pattern forming a pseudo-chevron. This is not present.

13.1.12.4 Interior

Stamp only

9) no element, shape, or pattern restrictions. This interior decoration is present on many vessels, all are not Bird Lake (Section 13.5.2.5).

13.1.13 Validation of Approach

The three main levels of this excavation give us a glimpse of the transition of Coalescent materials into the Composite materials for this region. Bird Lake, Duck Bay, and Winnipeg River traits are detectable in this assemblage which encourages the use of the definitions provided by Lenius and Olinyk (1990). Although there are some contentious issues to be reconciled, due to the radio-carbon and AMS date problems, this will be discussed later.

Much of what was recovered falls into the undefined aspects of the Rainy River Coalescent and Composite as proffered and anticipated by Lenius and Olinyk (1990) and witnessed by researchers since. Part of what was intended to be accomplished in this analysis was to determine if the variabilities seen in these vessels represented several potentially unrelated social groups or the everyday diversity of ceramics from a single social unit. So an attempt was made to look at possible internal relationships. Threads of continuity on each level and also across levels were suggestive and encouraged the isolation of vessel commonalities into new ceramic types. The cladistics approach of grouping by shared traits (decorative motifs and approaches) was used in a rudimentary way. The fact that shared decorative traits sometimes appeared on varied neck profiles (see Rainy River Pseudo-chevron for example) was inferred to represent a diversity of origin pooling to create this Rainy River assemblage at this site with cultural cohesiveness being expressed by the decoration. But, other types isolated here showed commonality of both decoration and of form distinct from others in the assemblage. These types may prove to be candidates for consideration as new Complexes at some point.

Since 1990, the general designation of Rainy River has come to be used commonly, becoming a kind of catch-all despite the fact that only three Rainy River Composite types have actually been defined: Bird Lake, Duck Bay, and Winnipeg River Complexes. Clearly at some point, efforts to define further types would have had to have been undertaken as diversity was recognized from the outset.

Researchers have been reticent to do this. Perhaps because of this, other researchers have appeared to be disinclined to utilize the Rainy River Coalescent/Composite construct, in favour of continuing to consider these materials as 'late Blackduck' (although a Blackduck that has begun to lose some of its original, or 'classical', traits). So we have two ways of looking at the diversity of expression derived from the Blackduck decorative tradition:

1) The contracted Blackduck scenario: Blackduck traits diffusing into the new expressions and subsequently dispersing all together into Rainy River; or

2) The expanding scenario: Blackduck progresses while undergoing changes under the influence of other cultural expressions (Rainy River among others) as it expands.

Depending on your perspective and the materials you are familiar with, either of these scenarios may seem plausible. This assemblage is interpreted as engaging the former and is ascribed to for this report.

13.1.14 The Identification of Threads

The trends/threads and the new types proposed here are internal observations. This approach to the analysis was undertaken to create tangible entities in order to test their validity. It is expected that some of the proposed relationships and types will be challenged by future research. These observations are being espoused as cultural indicators although their relevance will require testing against external collections.

13.2 Interpretation Section

In this assemblage, form varies between only a few variables. Likewise, the decoration retains a limited range with distinct continuities. These put together are then interpreted as a collection of materials that are likely related fairly closely. It seems plausible that this assemblage represents several culturally related groups (perhaps quite closely, but how closely is not possible to tell at this point) mixing at one campsite location and not multiple distinct groups. A third potential is that it is a mix of both of those scenarios, where most are related but there are some unrelateds mingling cohesively. At this point, the apparent progressions observed are suggestive of the third scenario, as the internal workings of a larger whole (Rainy River) with some distinct types isolatable when unique characteristics were definable, and some external traditions which appear not to be Rainy River. There are a few examples of significant departure, usually single vessels. These are interpreted as most likely trade related. But with only a small portion of the occupied locale excavated, this could be a misinterpretation of the possible reality. It cannot be discounted that there are concentrations of those particular ceramic styles outside the excavation perimeter.

13.2.1 Interpreting Decoration and Form

In this situation, we have a group of vessels that are different in form and decoration and which appear to show progressions and changes over a short period of time. The vessel types are undefined but appear to be related. So we have a pretty good idea where in the longer lineage they will fit. It is a matter of what do the changes and progressions observed represent and where, on the societal/cultural scale of magnitude, are they taking place. The radiocarbon dates are very important because it enables us to see how these particular materials fit into our accumulated knowledge of temporal sequence for defined ceramic types.

To understand the significance of the progressions and changes observed, we need to know how they relate to the already defined materials. This is another challenge established for the analysis of this assemblage.

At this time, we do not really know how directly ceramic approach and expression reflect societal structure. We do not know to what extent the decoration represents a method of personal expression/identification or if it is only related to group identification. We also do not know specifically what the pressures are that force personal expression to be restrained. We would expect that these things would be affected by the structure and mobility of a given group and the proximity of related and unrelated groups that may share the same or parts of the same area. Another potential interpretation for the decorating of pots relates to the specific utility of the pots themselves, labels essentially. This would imply that certain vessels had a specific function, which may be the case. But to this point modality, as it is called, has not been shown to correlate to decorative variation. In a campsite such as this, one might presume that modality/decorative variation would be observable, but it was not detected in this analysis.

For this analysis, the decoration on ceramics is treated as reflective of group identification with smaller groups creating vessels that identify themselves as being separate, yet still part of the larger whole (in this case, the Rainy River Tradition). This arrangement likely varies to some degree based on the structure and dimensions of the larger group and how the smaller groups within relate. But it appears that the decoration is an identifier of sorts. Decoration has been linked to regionality or, at least, it is regionally variable.

Ideas have been proffered linking shifts in ceramic expression to intermarriage with external groups (exogamy) causing alterations in the decoration and/or form. This could happen repeatedly over time, accumulating changes, and eventually leading to ceramics with a distinct appearance from the 'ancestral' or 'traditional' type. It seems logical that the degree of influence this might have would depend on the size of the group into which the new traits are introduced. It seems plausible that this could be seen to cause a gradual drift within a more static cultural environment. Conversely, a mechanism that might maintain continuity could be a social arrangement which allowed for little or no external infiltration, where marriage is maintained within an already confined network of familiar parties (endogamy).

But, even without intermarriage, change could be effected simply by the degree of interaction between disparate groups, i.e., awareness alone could be enough to affect alteration of tradition incrementally, particularly if the groups are not adversarial and sharing is commonplace, and especially if the general cultural condition is that of change brought on by external but non-vital pressures unrelated to the normal interaction of associated groups.

Regardless, these scenarios are likely to be simplifications of the true extent of interrelation and cross influence. These kinds of variables are likely active, changing over time and space, depending on the nature of larger group to group interaction in a given region in concert with internal dynamics. It is not clear at this time what the political dynamics of the larger social environment might be, nor can we propose to understand the scale of the social/cultural entity that the perceived distinctions might represent. We are still attempting to define the parties that may have been involved (at least as they might be represented in ceramic variation), and are far from understanding specific political conditions. But the growth of understanding of both happens incrementally and at the same time.

13.2.2 Expectations for Form and Cultural Interaction

If the form and decoration are indicators of group affiliation, then one would expect that groups who interact with other unrelated distinct groups on a regular basis would be far more conservative, likely holding more tightly to a particular identity. And, thusly, there would be more pressure on the individual to conform in this scenario. If, on the other hand, a given group operates largely on its own and interacts only with related groups with a similar heritage, expression might be more open, allowing for a greater range of variability and personal expression. It seems that both scenarios may be part of the general conditions for this assemblage as we see apparent examples of both by way of vessels produced by single makers.

If expression on vessels is more specific to individuals in the latter scenario, then this could shift the interpretation of ceramic assemblages from focussing on decorative traits and motifs and their combinations (which would likely become extremely complex), to more fundamental, and presumptiously less expressive, aspects of form as the primary mode of differentiation for the typologist. Form could be seen to be driven by practicality and traditional (or learned) approach to manufacture.

Manufacturing decisions guide the maker through the process of production and is derived from a need for efficiency. This is also referred to as manufacturing technique. In general, there is little opportunity for individual expression when technique is derived primarily from efficiency, and that is largely the assumption for this material. This is not to say that opportunities for change or variation could not transpire, but the production and firing process is labour intensive and generally once a process is settled on that meets the needs, there is little reason to alter it.

Form varies here, but arguably only subtly especially when compared to the great variability of form in the greater surrounding region of the Northern Plains and Parkland as a whole. There seems to be relatively little drift or modification, or cross-influence with the larger geographic area, at least during the temporal range that this site encompasses. In that light, it seems very likely that form probably accompanies decoration as the societal/cultural marker rather than decoration alone.

The variability of form considered here is primarily the neck profile, and our current understanding of vessel construction points out that this portion of the vessel is a free modelled section, with the body constrained and supported within a bag and/or support system. The forming of the neck is essentially finished by hand with far less physical constraint. The approach to modelling the final profile contours and stance would be open to a number of options, or at least having a high potential for variability. In that light then, the range of profile variation seen in this assemblage is actually fairly limited. The options here are degrees of curving outward (flaring), straight, or curving inward (incipient-S) and the extent of these are limited by neck height. This might suggest that neck form is significant to the typologist because the maker of a vessel would have to decide how the neck would be formed which affects not only the manner in which the maker proceeds, but also the final outward appearance of the vessel. In this sense, the form of the neck becomes a fundamental part of vessel expression and, therefore, should be considered significant in the consideration of new types. At this point, it seems that the new types outlined here are mostly reflective of smaller groups within a larger and fairly cohesive whole. That being said, we have an interesting issue with motifs that then are not constrained to particular profiles (see the discussion of the pseudo-chevron motif and the Rainy River Pseudo-chevron type), as well as profile/decoration combinations that do not appear to vary significantly existing in the same place and the same time (more or less). This is interpreted as different social conditions (or pressures) allowing or disallowing opportunities of expression for the maker. This could be indicative of an unsettled cultural environment.

The conditions seem to be allowing expressions in decoration and neck profile that might be considered interchangeable modes of expression/identification. For example, the larger group is defined by form, and the decoration speaking more specifically to the smaller group. But also, in some circumstances, it appears to be the reverse. This seems to be the nature of this particular suite of Rainy River ceramics.

It is expected that there are likely anchor motifs and decorative approaches (i.e., proportioning, positioning, or element combinations/motifs) that may function as group identifiers within the larger cultural milieu, but also may be seen bridging across group identities as a unifier, as proposed with the pseudo-chevron motif. Further embellishment and/or additional components to the vessel decoration could then be considered a further indicator of discrimination for those attempting to sequence development or place individual vessels into a broader context. The complexity illustrated above characterizes the dynamic conditions under which the production and decoration of pottery is perceived to have changed during the period observed.

13.2.3 Comments on the Radiocarbon Dates as They Relate to the Ceramics

13.2.3.1 The Unadjusted Scenario

As discussed in the Stratigraphy section (Chapter 2), the dates place all excavated levels within a one hundred year period. If the unexpected peak deviations seen from the Level 2 Complex are ignored, we end up with a potential span of less than 50 years, that is essentially only two generations. The implications from this, the unadjusted scenario, suggest a surprisingly rapid shift in ceramic technology and in vessel form and decoration. It would mean that we have been seriously underestimating the speed at which cultural and social shifts can transpire and their manifestations in the ceramics. It also means that Coalescent materials co-existed with Composite materials which would have already been well defined. The ramifications for this would be significant and would cause major reconsideration of how the Rainy River ceramic expression arose and how the Rainy River materials seen here might relate to those from the surrounding region. The problem is that some of these dates do not correspond well to the actual stratigraphy and, as such, are hardly reliable. The above speculations are just as erroneous. Levels 3/3A dates would be around A.D.

1175, much later than expected for Coalescent vessels, and Level 1 dates are surprisingly early for Rainy River Composite materials, and nearly contemporaneous with Levels 3/3A.

13.2.3.2 Adjusted Dates-Scenario Two

It appears that the dates for Level 3 and Level 3A are more or less where they should be in this scenario, based on the characteristics of the ceramics. According to Lenius and Olinyk's estimations, A.D. 900 was the start of the transition into the Coalescent material, with a stronger sense of Blackduck and Laurel. The Composite ceramics had not yet come into focus and this is essentially what we see reflected in the ceramics here. In this version, the dates for Levels 3 and 3A hover around A.D. 935, Lenius and Olinyk's cut off point for the Coalescent would be pegged at sometime before A.D. 1100, the proposed date of emergence for Bird Lake and Duck Bay (both Composite Complexes). Coalescent vessels appear in the Level 2 Complex , possibly into as late as Level 2A, but unfortunately due to the taphonomic issues we can't say assuredly where some vessels should truly reside. The temporal separation between Level 2D and Level 2 would be approximately 150 years. Level 2 holds the most convincing Duck Bay material and one vessel which has the greatest resemblance to Bird Lake (though technically not Bird Lake proper), including Level 1. If we infer from this first appearance that these are first generation expressions, which they don't appear to be (not that we particularly know what those early vessels might have looked like), then this would be a later emergence, by 100 years for these Composite Complexes. Another problem for this interpretation is that these vessels are all from the K-line of the excavation. This part of the site was not fully excavated and the occupation level is not physically tied to the main excavation block. The K-line material levels may not correspond so an argument could be made to exclude them. If they are excluded, we see that Duck Bay and Bird Lake traits begin to appear in Level 2 and again in Level 1, but none are particularly convincing. If we use this as our guide, we might assume that Bird Lake and Duck Bay had not yet come into focus, at least in this assemblage. In this date scenario, this would mean that the emergence date for these Complexes would be pushed forward over a hundred years. This would shorten the temporal span of these Complexes, which is already only 250 years down to 150 odd years. Based on what we know of these Complexes elsewhere, this seems quite unlikely. The over all time span for this scenario is roughly 290 years.

13.2.3.3 Adjusted Dates-Scenario Two Variant

In the set of adjustments laid out in this version Levels 3A, 3, 2D, 2C, and 2B remain in the same positions as before, which as mentioned works reasonably. Level 2A, Level 2, and Level 1 are pulled back in time hovering around A.D. 1100. Again, if we assume that the lack of the definitive Bird Lake and Duck Bay vessels means that these two Complexes have yet to emerge, then the presence of '-like' traits could be interpreted as precursors. Then, Lenius and Olinyk's estimations are correct. This scenario provides a roughly 190 year window for the observed shifts and progressions in the assemblage. But, it is unclear what these Bird Lake and Duck Bay traits represent. It is probably more plausible to suggest that these Complexes are reflected here as peripheral expressions of those Complexes. That is, they are vessels showing a mixture of definitive traits with some atypical traits adopted through interaction with groups on the boundary of their range.

A statement needs to be made regarding Lenius and Olinyk's configuration and the placement of Bird Lake and Duck Bay in a temporal sequence. It is clear that these are correct in the context of the presence and the associated dates from which they were defined, but reconciliation needs to be achieved for the Bird Lake and Duck Bay traits in this assemblage. The materials in this collection are very likely peripheral to those defined Complexes and, as such, it is important to understand the significance of the presence of strongly similar vessel attributes and traits that are unexpected. This tends to support the notion that this assemblage represents a distinct movement of Rainy River ceramics, more typical of this particular region— the Red River Valley corridor. It also supports the 'tertiary influence' concept.

The Level 2 Complex of occupations is pivotal in the interpretation of temporal sequencing against external data, but at least we have Level 3/3A and Level 1 bracketing it to give us internal typological context. The already challenging taphonomy and stratigraphy of the Level 2 Complex is unfortunately complicated further by probable hydrocarbon contamination during the excavation of 2008.

13.2.3.4 Discussion of Dates and Ceramics as They Relate to the Levels

13.2.3.4.1 Level 3 Dates

Level 3/3A dates are around A.D. 935-1080 (A.D. 1007, mean). This correlates well with Lenius and Olinyk's expectations for Rainy River Coalescent materials. For Level 3A/3, Rainy River Coalescent is the dominant vessel identification. Most of the vessels of Level 3/3A and some from the lower levels of the Level 2 Complex are Coalescent (Lenius and Olinyk 2009:pers. comm.). The fact that there appears to be strong and visually distinct traditions present (Otterhead, Little Owl, DDC, etc.) suggests that the crossing of traits was happening prior to this time. It also suggests that the diversity, not unlike that described in the later levels with Composite materials, was also typical of this period. The Blackduck and Laurel influences appear to be strongest here. One vessel in particular, Vessel 90, raises questions about the origins of the straight, outward leaning neck with a well defined shoulder within the Rainy River ceramic tradition. This form is usually associated with later Composite materials, but its presence at this early date and immersed within the Coalescent is suggestive of other origins for this form. This form is not considered a Laurel or Blackduck trait and points to another influence in the formation of Rainy River range of expression in the Coalescent phase.

13.2.3.4.2 Level 2 Dates

As mentioned, the radiocarbon dates for the Level 2 Complex are askew. Picking and choosing which of the level dates might be closer to accurate is speculative. When earliest and latest dates encompassing all scenarios of interpretation are used, we find we have to live with A.D. 1030-1215 (A.D. 1122, mean). Although the lack of specificity is unsatisfying, we find that this range makes some sense with our expectations for the typological sequence. It appears to correlate with the emergence of Rainy River Composite ceramics (Bird Lake and Duck Bay) around A.D. 1100 (Lenius and Olinyk 1990). The upper occupations of the Level 2 Complex show that Coalescent patterns are no longer present and the Blackduck characteristics generally continue to diminish. Non-Blackduck traits are added to the range of expressions and Laurel influence is imperceptible.

In these levels, Bird Lake and Duck Bay characteristics begin to be apparent. But non of the vessels with the greatest similarity to Bird Lake and Duck Bay can be unequivocally placed into those two Complexes (Lenius and Olinyk 2009:pers. comm.). However, these three vessels were all recovered from the K-line, a portion of the site which is not well understood and not physically linked to the main excavation block. So the context of these is vessels is uncertain. So it is unclear how Bird Lake and Duck Bay, as they are currently defined relate to the ceramics seen here in the Level 2 Complex of occupation horizons. All in all, the Level 2 Complex appears to illustrate a period of transition from Coalescent to Composite expression.

13.2.3.4.3 Level 1 Dates

The period of occupation for Level 1 is bracketed by upper and lower dates of A.D. 1125-1225 (A.D. 1175, mean). With this date range we would expect to see Bird Lake and Duck Bay Complex ceramics, but no vessels can be classified as such. A single Winnipeg River vessel, a late Rainy River Composite Complex supposedly originating around A.D. 1300 (Meyer and Russell 1987) is represented in Level 1. Even if the latest date in the range is ascribed to, this is an early manifestation. But, there is an issue with a known phenomenon of undecorated vessels appearing within assemblages containing Rainy River ceramics (Lenius and Olinyk 2009:pers. comm.). So what this vessel truly represents is up in the air to a certain degree, despite the positive identification, until reliable dates are obtained.

13.2.3.4.4 AMS Dates

Some AMS dates were returned after the analysis for this report was completed. Parks Canada submitted faunal material to Beta Analytic Inc. The mean date for Level 1 came back as A.D. 1240 and the mean date for Level 2 is A.D. 1195. This makes the separation between Level 1 and Level 2 roughly 45 years, perhaps two generations. The A.D. 1240 date for Level 1 is not problematic and still places the Winnipeg River vessel (Vessel 41) in an early placement some 60 years earlier than estimated by Meyer and Russell (1987). This is not a big stretch but still of some significance. The Level 2 mean date of A.D. 1195 is very close to the other dates for the Level 2 Complex, except for that of Level 2B which stands out as an anomaly. The other Level 2 Complex horizons however cluster well around A.D. 1200. With the addition of these dates, it seems that we are comfortably into the period in which we would expect to see the defined Rainy River Composite Complexes—Bird Lake and Duck Bay. But since neither appear overtly, we are left with the question of why not? This perhaps gives further credence to the idea of Rainy River ceramics being a large cultural shift from which we have thus far only isolated two Complexes, that of Bird Lake and Duck Bay.

13.3 Defining New Types and Selecting Names

The trends/threads and the new types proposed here are internal observations. This approach to the analysis was undertaken to create tangible entities in order to test their validity. It is expected that some of the proposed relationships and types will be challenged by future research. These observations are being espoused as cultural indicators although their relevance will require testing against external collections.

Naming types essentially allows permission to compare and discuss vessels from other sites more freely. In doing so, the contexts of two separate vessels can be compared, testing the validity of the isolation of the type and over time the type is either confirmed, where it may become a Complex of its own, or it is absorbed into the variabilities defined for another type or Complex. In this work, many distinct types have been isolated. At first, the idea of naming was rejected for fear of confusing what is currently understood until more detailed research could be done such as searching regional collections and excavation reports for supporting vessels and dates. However, what was eventually decided was that the breadth of the sample and the tight temporal sequence for the occupational layers actually created a situation where the variation that was seen was actually self-supporting. For example, a certain type from Level 2 is distinct in its characteristics, but it shares ancestral trait(s) with another identified type from the same level, with the ancestral type showing shared characteristics of both identified in Level 3. With this kind of context, which is not particularly common and thus far appears to be unique for this period, there is, in a sense, a duty to present observed relationships for later comparison and reference. Naming enables the discussion, whether the names remain after being tested against other evidence or not, or interpretation becomes irrelevant.

The names were chosen as acknowledgments and reflections on the excavation, the site, the region, and personal expression of the analyst. Names were chosen that would be respectful, in the eyes of the author, and are hoped to reflect something of the environment within which the people from whom this material originates thrived. Names were considered carefully, as the names themselves can imply more than intended. Apolitical terms were hopefully chosen, in order to avoid implied ownership. Aboriginal language terms were not used, not out of disrespect, but because we do not know which current language group to use, and choosing one over another is in a sense a declaration, and because the analyst is not Aboriginal.

The rational for splitting and naming new types is based on a few things. It is clear that this period is characterised by the rapid adoption of new approaches to decoration, form, and technique. And it seems apparent that this was leading to new traditions, where particular traits or combinations of traits continued to be used over time, represented more than one occupation. These perceived continuums, or threads, were observed once all vessels were laid out based on their stratigraphic sequence. In some cases, these threads were interpreted to merge into others creating larger bodies sharing a common new trait (see Rainy River Pseudo-chevron). It is understood that this may be perceived as highly speculative to create linkages based on pattern recognition alone, but the circumstances were considered sufficient to warrant this approach:

1) the shift seen in the surface treatment, indicating a shift in manufacturing approach;
2) the commonalities of decorative elements and decorative structuring;
3) the reappearance of certain motifs between occupations;
4) the limited variation in vessel form and neck profile;
5) the very tight temporal sequence; and
6) the emerging understanding of the cultural dynamics of the period.

This context seemed adequate to assume that the sequence of occupations excavated at this location likely represents the return of related peoples. How these occupations are related to each other is unknown at this point. How much time transpired between occupations? Where might these apparently independent types exist as dominant in the surrounding region? These are just two questions that arise from this assemblage. The ceramics can potentially allow us to build and test frameworks enabling us to dissect this period further. The Rainy River Composite is currently only partially understood, as is the Rainy River Coalescent phase. Blackduck type site assemblages need revisiting in the light of these new findings.

13.3.1 Rainy River Coalescent to Composite Threads/Patterns

Viewed simplistically, there are three occupational periods represented in this assemblage. Three might be seen as the minimum number required to evaluate relationships in progression, with a beginning, a middle, and an end. When viewed in this light, the middle occupations theoretically have the greatest contextual reference with materials coming before and after. The latest level would have the benefit of a longer sequence of 'predecessors' to give opportunity for evaluation. The first level in the sequence, obviously, has only possible 'successors' to give context. The observations documented in this report were based on these potentials. The materials identified in Level 3/3A are referenced to the larger typology by particular characteristics. These place the Level 3/3A occupation(s) into the Rainy River Coalescent developmental boundary, a period where the Rainy River Composite ceramics (as we understand them) begin to come into focus. This area of ceramic development is not well understood however, nor well defined, which leaves the door open for speculation. As such, the distinct varieties observed there are not described as new types *per se* but are left defined as 'patterns'.

First, to be isolated as a type, more than one vessel had to share the same multiple traits, these typically appeared in the same level. Second, if a type showed vessels sharing significant traits before, after, or both it was considered confirmation of that type. Vessel types with internal relationships like this are suggestive and may hint at the manner of dispersal of distinctive characteristics such as decorative motifs, decorative structure, or form variation. Third, a new type could be entirely distinct from the rest, and maintain this distinctiveness through multiple occupations without signs of co-mingling. In Level 3/3A, the distinctive varieties do not have observable predecessors as mentioned, but three patterns in particular were interpreted as influential in the later levels. Because of this, they remain defined here not as types but as patterns.

Three patterns were identified as threads of a continuum involved in the interpreted Rainy River Coalescent to Composite development and transition seen in this assemblage: Kroker Mid-neck, Soft-Shoulder, and Coalescent DDC (Plate 13.3-1). They are recognised as patterns only, because they are most likely not temporally contained within the assemblage. They may at some point be functional as types on their own, but without antecedent types in this assemblage to compare to, their exact taxonomical position is somewhat uncertain. It appears that Blackduck isn't far away, but how far removed is not understood at this point. The multitude of expressions seen with the vessels in this collection are interpreted as part of a continuum where some forms or decorative approaches ('traditions') are modified, carried forward, or abandoned in whole or in part. A perceived process of on-going adaptation of the 'original' traditions and adoption of new traits might characterize the flow of tradition versus the need or desire to create new expressions. This assemblage is specific to only a small aspect of the greater cultural landscape, however, and there are likely many parallel 'traditions' and offshoots thereof which do not figure into this assemblage overtly and are not accounted for in this report. Several individual vessels and a couple of groups of vessels do appear to be examples of these parallel lineages and these are noted in the text. Much more research is required to test these possibilities and their connotations.

For now the three patterns named below are a starting point which help give context to the progression envisioned for the three occupational events revealed in this excavation. They appear to be reflected in the ceramic expressions which come afterward but they are not the only patterns that influence this progression. The significance of these 'outside' patterns this assemblage is undetermined at this point. But they appear to represent a bridging of Blackduck into Rainy River Coalescent ceramics. They are viewed here, in a sense, as founding vessel patterns carried forward and modified either purposefully or by diffusion (i.e., repetitive reproduction within a changing social/cultural context) or by adding new traits of form and decoration from surrounding influences.

13.3.1.1 DDC Pattern

Decoration

This type is quite distinctive within the Level 3/3A assemblage. DDC is an acronym for deep, dense, and controlled, which describes the approach to the application of the decoration. Decorative approach is not typically considered a trait by which to judge relatedness amongst vessels, because it is not measurable. However, in this case the decorative approach was characterized: deeply impressed elements, densely applied (close together, the width of the tool or less), and controlled (precisely measured and aligned, very even). Characterized in this way, the decorative approach can be evaluated, albeit subjectively. But the distinctive appearance of this decorative approach is usually easily isolated. Only two vessels were identified here in the earliest occupational event, but they no doubt have antecedents whether it is Black Duck or even earlier Rainy River Coalescent examples. The fact is that this decorative approach is identified in the Level 2 Complex and also in Level 1. Both of these Level 3 vessels exhibit a strong emphasis on the CWOI to provide a highly graphic appearance, reminiscent of and derivative of Blackduck. Oblique CWOI on the rim and below the exterior lip, above a band of horizontal CWOI, punctates producing bosses positioned between the top two rows, and a row of oblique stamps characterize the suite of elements on these vessels. The stamps are either above or below the horizontal CWOI. It is unclear from the examples here whether stamps can occur in both positions on the same vessel. Further identification of the DDC type will likely answer that question and help clarify when both positions come into use. The use of two rows of stamps, upper and lower, may prove to be a marker of the Composite phase. Combing is present on both. This and the CWOI give a strong Blackduck-like appearance which means the two could be easily confused but for the stamping. On both of these vessels, the oblique CWOI on the exterior are atypically angled to the left, with roughly equal lengths and angles. This, among some other characteristics, might suggest these two vessels could have been produced by the same person.

Form

These vessels have what might be described as a Blackduck-like profile. They thicken towards the rim. This is expressed mostly at the rim and is interpreted as thickening due to compression during the formation of the flattened rim prior to decoration. In general, the neck thickness does not change markedly from bottom to top. The final appearance could be interpreted as slightly flaring. The stance of the neck is essentially vertical, though Vessel 94 angles inward somewhat. One of the two vessels allows us a profile of the shoulder as well, which illustrates a transition from the neck to shoulder that is not abrupt, the slope of the shoulder gives way to a gently rounded transition to the body. The thinnest portion of these vessels appears to be the region of the upper shoulder, prior to the transition to the neck. The two vessels from Level 3 are similar enough in form and decoration, as well, that they might be considered the work of a single maker. This can not be substantiated, it is only speculative.

The form of these two vessels is distinct in Level 3, but similarities are seen into the Level 2 Complex and also in Level 1. The proportional ratio of neck height to diameter at the interior rim for these two vessels (Figure 13.5-8) shows a similarity to similar vessels in those levels.

Surface
Only one of the two vessels has body sherds that have been identified for certain and they are sprang weave impressed. This, and the minimum observed thickness at the shoulder to body transition (the widest part of the vessel), help to enforce the assertion that it was formed in a bag.

Internal Typological Relationships
There are many traits shared by these vessels which appear to carry over into the later materials of this assemblage. The DDC approach to the application of decoration is seen in Level 2A (Vessels 57, 66, and 69), Level 2 (Vessels 31 and 38), and also in Level 1 (Vessels 23, 39, and 54). The DDC decorative approach was identified because of its reoccurrence throughout the assemblage and not solely based on the Level 3 vessels. Due to the apparent linear and successive relationship we have between all levels, and the identification of these two vessels as examples of Rainy River Coalescent, and the later vessels identified as Rainy River Composite, it appears that the Level 3 examples are part of a decorative lineage or tradition with a similar decorative approach. As with most of the new types introduced here, their veracity will have to be tested by further research. The form of these two vessels is distinct in Level 3, but similarities are seen into the Level 2 Complex vessels.

External Typological Relationships
As touched on above, the vessels of this type could be identified as Blackduck, but for the presence of stamping. As this analysis ascribes to the Lenius and Olinyk Rainy River model, the stamping precludes Blackduck as a typological designation.

Vessels Identified
Vessel 94 and Vessel 113.

13.3.1.2 Kroker Mid-neck Pattern

Decoration
These vessels maintain the oblique CWOI on the rim and below the exterior lip, horizontal CWOI, oblique stamping above and/or below the mid-neck, and punctates typical for this assemblage. The combinations of elements vary, except for the oblique CWOI on the rim and below the exterior lip which are always present. The mid-neck has either horizontal CWOI or is blank. The blank neck

version highlights this region by the use of negative space and in that sense it is considered a decorative motif. The proportions of the decorative structure emphasize the mid-neck as does the use of the rows of oblique stamps which often bracket this zone. When punctates are present, they are high on the mid-neck.

Form

This type is characterized by a straight to slightly flaring, vertical to angled outward stance. The neck thickness expands above the mid-neck, almost entirely on the exterior providing the appearance of flare. The interior line of the profile maintains a limited curvature. The mid-neck portion is mostly vertical—a form which helps to emphasize the mid-neck, setting the stage for the decoration. The transition from neck to shoulder is somewhat more abrupt than the Soft-Shoulder Type described below and the slope of the shoulder still seems to imply a gradual transition to the body. The neck height on this type is proportionately taller than the other Coalescent varieties described here.

Surface

Sprang weave is predominant for this type.

Internal Typological Relationships

The mid-neck decorative structure is seen on some of the Rainy River Pseudo-chevron vessels of the Level 2 Complex, and may even be expressed into Level 1, although there it appears to dissipate, perhaps due to the general tendency toward a shorter neck height (Figure 13.5-9). Many vessels share a decorative structure based on this mid-neck band as it serves a limiting marker for placement of decorative elements both above and below. One particular group of vessels has not been formally placed in this type, but could very well be. These have been isolated as the Willow type, but share form and proportioning in common with the Kroker Mid-neck type. The blank neck approach is seen down the line as well, but, on the later vessels, the mid-neck emphasis is not as strong. Or at least, the decorative proportioning does not function on the delimitation of the mid-neck.

External Typological Relationships

The neck profile and extrapolated body form are again closely related to those of Blackduck, but the decoration, while using the Blackduck suite of motifs, includes stamping which requires placement into the Rainy River nexus. Vessel 73 and Vessel 78 have been identified as Coalescent, the rest are Composite vessels. This decorative proportioning and neck profile combination played a role in the formation of, and transition into, the Rainy River Composite in the Red River Valley region at the very least.

Vessels Identified

Vessel 73 (Level 3), Vessel 78 (Level 2B), Vessel 35 (Level 2 Complex).

13.3.1.3 Soft Shoulder Pattern

Decoration

Oblique CWOI over horizontal CWOI with punctates and a row of stamps below are the design elements recorded on the Level 3/3A vessels. The vessels showing this form/contour in the Level

2 Complex do not have the horizontal CWOI—instead they are blank—but maintain punctates in the typical location. Stamping is prevalent on these later vessels. The decoration is seen as secondary in the identification of this type. It is seen as part of a group of vessel types which appear to merge into the Rainy River Composite types, in particular the Rainy River Pseudo-chevron type described below.

Form
The neck/shoulder profile seen on these vessels stands out in the Level 3 materials. The high angled shoulder slope of these vessels is considered here as an adoption of a Laurel-like vessel trait. The complete form is visualized as a vertically elongate, globular vessel with minimal constriction at the neck and little to no flare. This form and the above decoration combined create a perceived hybridization of Blackduck-like traits and Laurel influence. The neck stance is described as angled out to vertical, with a curvature from slight flare to incurved.

Surface
Sprang is identified on both of the identified vessels.

Internal Typological Relationships
This type, based on form, was chosen to be highlighted because of its perceived role in the transition from Coalescent to Composite within this assemblage. The decoration, though following the same general rules as much of the other material here, is variable, particularly between the Coalescent variety and the later Rainy River Composite varieties where decorative motifs are dropped, specifically the horizontal band of CWOI and the appearance of the pseudo-chevron.

External Typological Relationships
The significance of the appearance of this pattern is unknown at this point, but it appears that this vessel form was present before and during the Rainy River Composite transition. The soft-shouldered form is illustrated commonly as typical for Blackduck. This may represent evidence of direct transition of Blackduck into Rainy River, but we should exercise caution in that regard. The relationship between Blackduck and Rainy River ceramic transitions is still, if not more, awkward taxonomically speaking than it was before the appearance of this collection. Blackduck assemblages need to be revisited and reconsidered. In this case, it may be a product only of this short period, after which this vertically elongate vessel form is relinquished in favour of the squatter, globular, constricted neck varieties with well defined shoulders more typical of Rainy River Composite types. There are likely other types which, from a typological point of view, are transitory, serving to illustrate the adaption of traditions and adoption of traits yet to be identified both in this assemblage and in other existing collections.

Vessels Identified
Vessel 91 (Level 3A) and Vessel 85 (Level 3).

13.3.1.4 Notes on Coalescent Varieties

In the isolation of continua based on shared traits within this assemblage, it was observed that the DDC, Kroker Mid-neck, and the Soft Shoulder Coalescent patterns (Plate 13.3-1) were likely progenitors to the later expressions of the Level 2 Complex and Level 1 ceramics, and likely not the only ones. These varieties, as described here, do not continue past the transition point into the Rainy River Composite unaffected. This internal dynamic is a large part of the motivation for expanding this analysis into taxonomical considerations. These types are referred to in the discussion of the Composite types below.

The combination of oblique CWOI and counter oblique stamps creating a pseudo-chevron motif is first seen on the vessels of the DDC and Kroker Mid-neck patterns. This motif carries over and fluoresces in the Level 2 Complex and becomes the basis for the isolation of the Rainy River Composite type Rainy River Pseudo-chevron. The Otterhead and Little Owl types do not appear to be significantly involved in the development of the Composite types, at least within the context of this assemblage, especially the Otterhead type. There are suggestions that the Little Owl type may be somewhat influential as some vessels exhibit some resemblance in decorative composition and character but with alterations. The observation that this type gets larger could possibly represent the adoption of the Little Owl decorative approach onto a more practical sized utilitarian vessel. This is entirely speculative as the intended purpose of the smaller vessels is unknown. There may well have been a larger companion that simply does not appear in this assemblage.

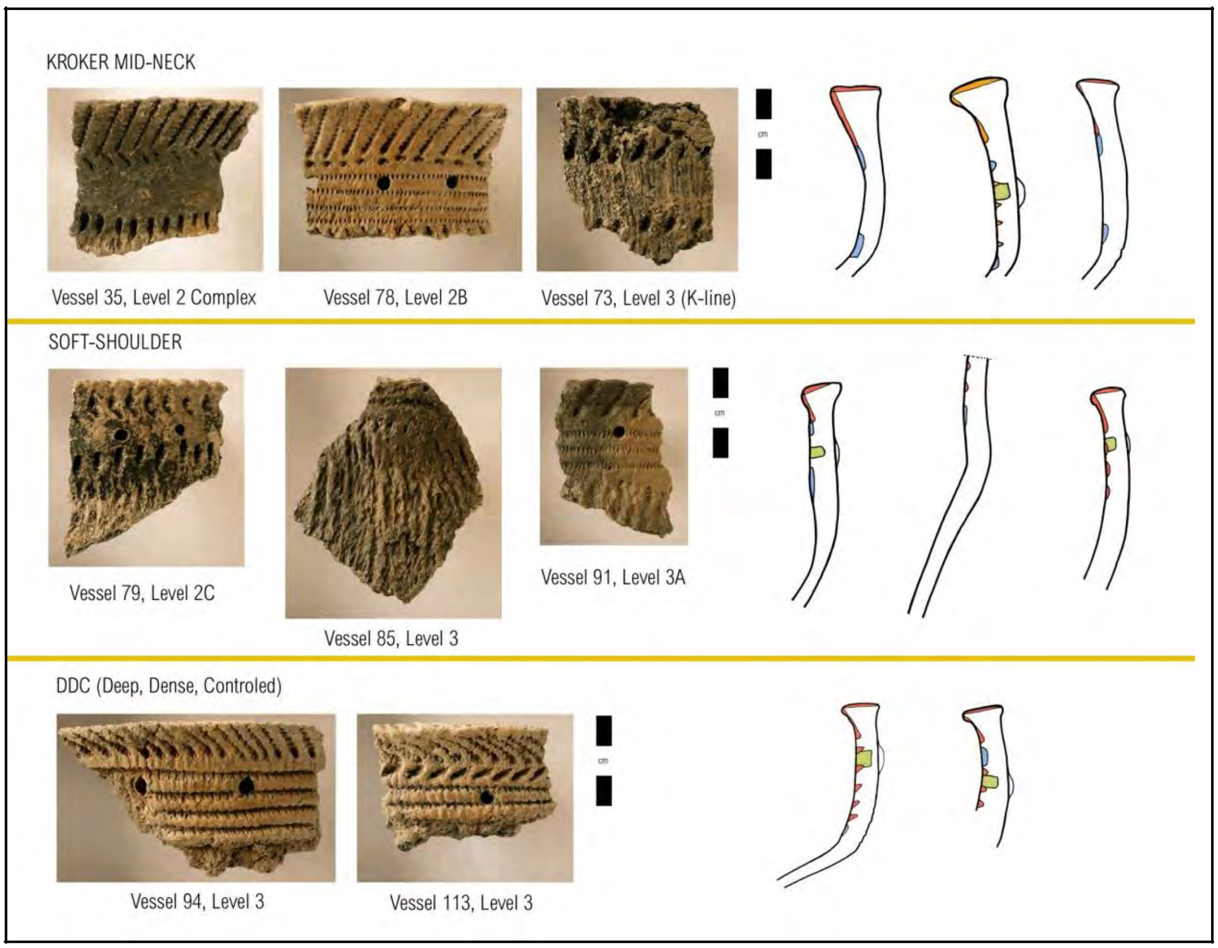


Plate 13.3-1: Rainy River Progenitor Patterns

13.3.2 New Coalescent or Parallel Types

13.3.2.1 Otterhead

Decoration
This type was described from nine vessels from Levels 3 and 3A. The decorative characteristics were created with CWOI, a lower row of stamps, and punctates producing bosses to varying degrees. All present short oblique CWOI below the exterior lip, often very oblique. There are no stamps below these oblique CWOI and above the horizontals. Horizontal CWOI are high, the uppermost row generally falls between 5 and 11 mm from the lip and five or six rows is typical. The dimensions of the cord-wrapped object can vary, but are generally quite fine. The combination of small diameter cord and either a sharp-edged or a small diameter tool create a distinctive appearance. There are examples where the CWOI have a larger dimension, i.e., larger cord and, in some cases, the wrapped object appears to be larger as well. Punctates are also high, on the top row or between the first and second row. The bosses are pronounced on most. For a few of these vessels, round stamps are in place of the punctates and these have no bossing. On a few of these vessels, but not all, there is a row of very small obliquely angled stamps (ovoid seems typical) below the horizontal CWOI. On some of these vessels, this row of stamps appears to be at the transition of the neck to the shoulder. Combing is seen on a few of these vessels in this sample, but it is not seen as a primary trait.

Form
The profiles of the necks show that there is no thickening toward the rim and the finish of the rim is typically square. The neck curvature is typically straight to very slightly flaring with an angled inward or vertical stance, and of moderate thickness. Following the line of transition from neck to shoulder, it appears that the shoulders were typically sloping, suggesting a soft shoulder to body transition. The body of the pot would likely not be significantly larger than the mouth aperture of the vessel, but the variations remain somewhat up in the air.

Surface
At this point, it appears that sprang weave textile impression is typical. No reconstructions were attempted. Textile impression was not the preferred treatment for the ceramics recovered from Level 3 and Level 3A.

Internal Typological Relationships
There appears not to be a continuum related to the Otterhead type within this assemblage. However, in Level 1, the very short and oblique CWOI on or below the exterior lip is present on the Holly Oblique type of Rainy River Composite wares. The similarities between these two types end there.

External Typological Relationships
There is a stronger Laurel influence on these vessels than with the remaining vessels recovered from this level. The vertical tendency of the unthickening neck, the lack of emphasis on the oblique CWOI of the exterior, and horizontal CWOI and punctates encroaching on the rim support this assertion. The single row of stamps, the apparent globular vessel form, and the sprang weave impressed exterior, in conjunction with the Laurel-like traits, positions these vessels in the Rainy

River Coalescent context. Of note is the similarity of the approach to decoration and neck form to vessels considered as early Blackduck Bossed variety, though those vessels have a substantially taller neck, no stamping, and a temporal range which is very likely outside the possibilities for this excavation, i.e., too early. This vessel type appears to be neither Laurel nor Blackduck. In the sense that it borrows from both, it is Rainy River by definition. There are surface similarities to the Clam River Ware (Anfinson 1979), an east-central Minnesota type defined from a small area (the St. Croix River Valley), with a very broad temporal range of A.D. 700 to A.D. 1750(?). If and how Otterhead relates to Clam River Ware is not established. If it is, then it is further evidence of a connection to the central Minnesota river systems.

Vessels Identified
Vessels 87, 89, 92, 95, 98, 99, 105, 112, and 118 (86 is likely) (Plate 13.3-2).

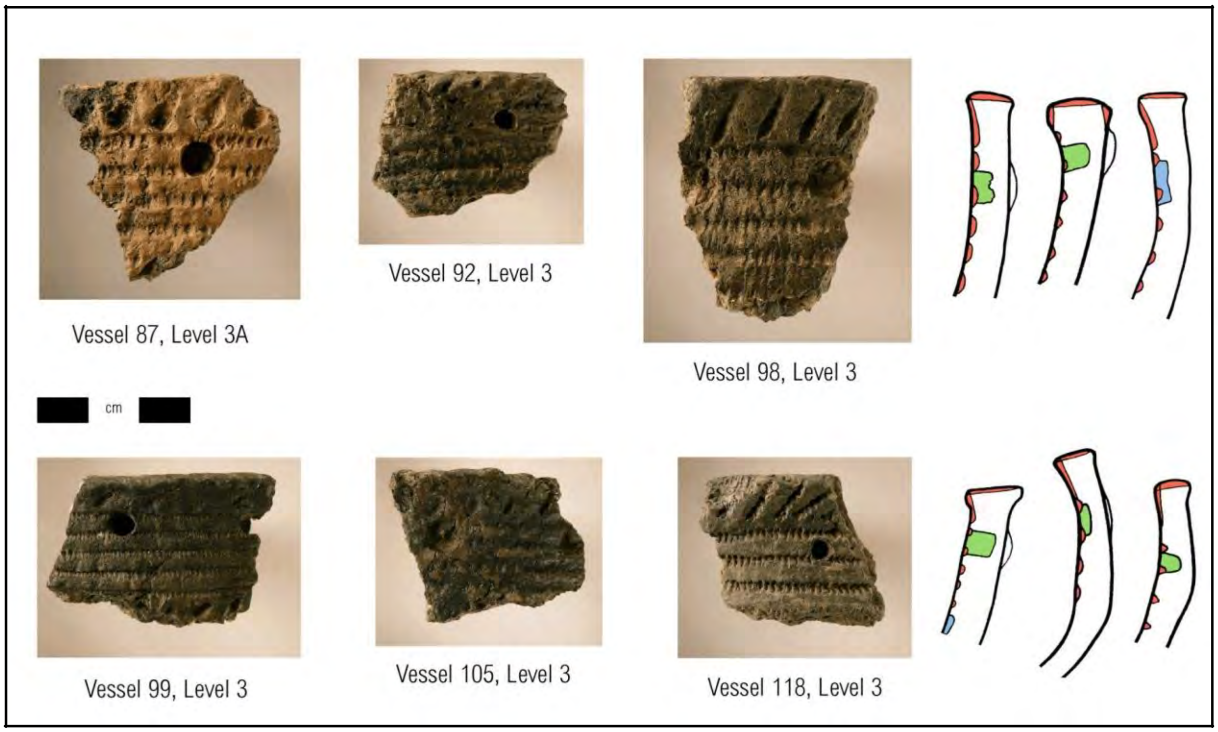


Plate 13.3-2: Otterhead Vessels

13.3.2.2 Little Owl

Decoration
The small size of these vessels restrains the dimensions of the impressions which make up the decoration on these vessels. The decorative structure of these vessels essentially divides the neck into two halves. The upper portion is devoted to a chevron motif, comprised of two equal length impressions at reverse angles. This is not to be confused with the pseudo-chevron where the components are of unequal length. The chevron motif's components appear to be typically both CWOI. Below this is a set of horizontal CWOI (two to four rows) which often, but not always, contains singular stamps or punctates, which are generally small and are widely spaced. Below that,

at the neck juncture, there is a row of oblique CWOI or stamps with a shape capable of expressing an oblique angle. The rim usually has oblique CWOI. The interior of the neck is occasionally also seen with decoration, oblique CWOI or stamps below the interior lip. In one case, there are two rows of stamps at angles contrary to each other (Plate 13.3-3).

Form
A straight to slight incipient-S profile with a vertical stance appears typical. These are thin walled vessels that do not expand toward the rim and some appear to taper. Observations of this type through the levels of this assemblage indicate an increase in size over time. The vessels identified on Level 3 are significantly smaller than those that come after. These vessels have a gracile character which makes them stand out in the assemblage.

Surface
Surface treatment is expected to be typically sprang, although the later examples may not be.

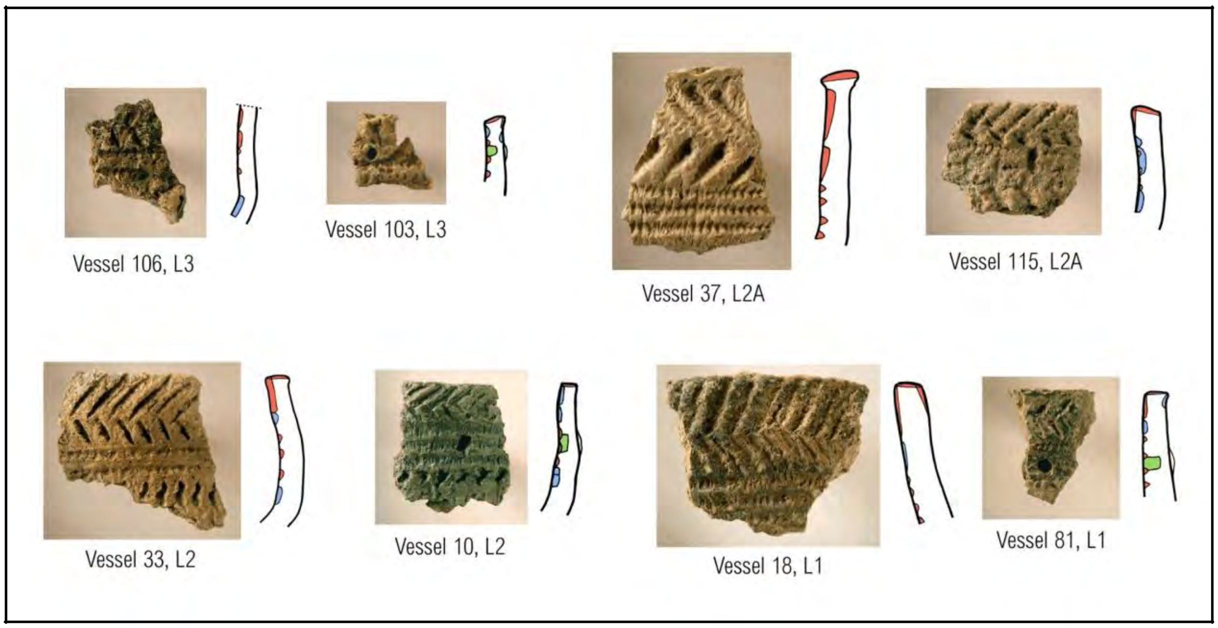


Plate 13.3-3: Little Owl Vessels

Internal Typological Relationships
The Little Owl type has been placed in the Coalescent period of Rainy River expression by its presence along side other Coalescent vessels. But the fact that it appears to hold its decorative structure for a significant period, more or less unaffected by the changes occurring around it, suggests some degree of separation. Whether this is a reflection of functionality or cultural differences is unknown at this point. While it does share the CWOI, stamping, and occasional punctates with other Rainy River ceramics, this does not mean it must be related. It is also unclear how the pseudo-chevron might relate. In this assemblage, the chevron and the pseudo-chevron are both present on Level 3. The pseudo-chevron becomes a very prevalent motif in the Level 2 Complex, while the Little Owl type appears consistently in small numbers. In Level 1, the pseudo-

chevron becomes less significant and the Little Owl type again appears in consistent but low numbers.

External Typological Relationships
It is unclear how the Little Owl type fits in the larger picture. There is a possibility that this type may be external to the Rainy River tradition, but at this point it seems unlikely.

Vessels Identified
Vessels 103 and 106 (Level 3), 37 and 115 (Level 2A), 10 and 33 (Level 2), 18 and 81 (Level 1).

13.3.3 New Rainy River Composite Varieties

13.3.3.1 Rainy River Pseudo-chevron Type

Decoration
As the name implies, the pseudo-chevron is the primary trait (Plate 13.3-4). This motif, comprised of oblique CWOI over shorter counter oblique stamps (or CWOI stamps), is always located on the upper neck. The origin of this motif appears to be in the Coalescent phase where the addition of stamping between the usual band of oblique CWOI below the exterior lip and horizontal CWOI on the mid- neck first appears. It seems, in this collection, the earliest expressions of this combination do not focus on the pseudo-chevron as a motif unto itself. The row of stamps appears to simply be a further embellishment, an enhancement separate from the typical combination CWOI over CWOI. That said, stamps or CWO stamps are tagged onto the bottom of the upper neck. Oblique CWOI also appears on vessels without the horizontal CWOI band, where the mid-neck is blank. The earlier expressions do not create convincing pseudo-chevron motifs. In the Level 2 Complex, the pseudo-chevron is more defined—it becomes a deliberately created motif. The stamp row is given more space and the pseudo-chevron becomes visually stronger. The total commitment to this motif is illustrated on some vessels where the stamp element is individually aligned with each CWO impression. The pseudo-chevron motif is usually combined with other elements and motifs in the earlier expressions, including combing and punctates on Coalescent vessels. On later expressions, the pseudo-chevron occasionally stands alone as the sole decoration on the exterior. In the upper levels, this motif appears to degrade in significance.

Another decorative component observed on vessels with the pseudo-chevron is a lower row of stamps, below the horizontal band just above or at the neck juncture with the shoulder. On some vessels, this row appears to be applied with no visual regard for the pseudo-chevron above, but others appear to treat it as a visual extension of the pseudo-chevron either continuing the zigzag by being impressed at the reverse angle to the above row of stamps or they are vertically oriented linear stamps. The significance of these modifications or additions is not understood, but might be worth noting in future research. Regardless, these kinds of adaptations, and perhaps particularly with this type, further illustrate an ongoing development, where certain traits are maintained while others come and go.

Punctates creating bosses were identified, by Lenius and Olinyk (1990), as a Blackduck decorative element which excluded Rainy River Composite materials, i.e., Rainy River Composite vessels would be expected not to have punctates and bosses. It appears from this assemblage that this is not necessarily so. In fact, it appears that the punctate is carried over well into the temporal range of Composite materials, at least on some vessel types, the Rainy River Pseudo-chevron type in particular. This is part of the motivation for isolating this type, but at this point it is considered a secondary trait.

Form
Along with the commitment to the pseudo-chevron motif, this type marks the advent of vessel profiles commonly associated with Rainy River Composite vessels in southern Manitoba. Both straight and slightly flaring neck profiles appear in a vertical or leaning outward stance as well as the incipient-S neck profile. These appear moderately thickened in relation to the bodies of the vessels. However, there is also a fourth variety which is shared with some of the vessels having the DDC decorative approach. These vessels have necks which are thickened fairly evenly from the base of the neck to the rim and tend to be proportionately taller. One form with this tendency that appears here is quite distinctive. These vessels, in the Level 2 Complex only, have an in-curving neck, distinguished from the incipient-S form in that it does not curve outward above the neck juncture. The curvature appears primarily in the upper half of the neck. Also, these particular vessels have a rounded approach to the rim. Some are flattened with an inward bevel and stamping on the rim. The relationship between the vessels with these quite different neck forms is not understood. Confirming or denying their inclusion within the Rainy River Pseudo-chevron type will require further comparative analysis and research. At this point, they are tied together by the pseudo-chevron motif and the punctate.

In general, the juncture of the neck and shoulder on the Rainy River Pseudo-chevron type becomes more pronounced. Thusly, the shoulders are more pronounced as well, suggestive of a more globular body. There appears to be a transitional trend from a soft shouldered, more vertically oriented vessel form to a rounder, constricted neck form over time. The use of the pseudo-chevron as a decorative motif appears to coincide with this transition in form, although it may only be a parallel development. The diversity of neck profiles and the subtle variations between, in conjunction with variations in the combining and utilization of the CWOI and stamp, appears to characterize this assemblage in general, but this is most apparent when looking at the vessels which utilize the pseudo-chevron.

The rim angle or finish is typically perpendicular to the neck or levelled off perpendicular to the vertical centre line of the vessel. Rim decoration is somewhat variable, oblique CWOI is most common, but variations include criss-cross CWOI and, in one case, a chevron motif. This is further suggestion that the Rainy River Pseudo-chevron type is a fairly cosmopolitan group.

Surface
Sprang weave appears to be predominant, particularly in the earlier levels.

Internal Typological Relationships
Echoes of three of the Coalescent varieties identified above appear in Rainy River Pseudo-chevron vessels. There appears to be a continuation of form from the DDC, Kroker Mid-neck, and Soft-Shoulder Coalescent patterns. The pseudo-chevron motif appears to be born out of the expressions

first illustrated in Level 3 vessels of the DDC and Kroker Mid-neck patterns. The punctate is carried forward on many Rainy River Pseudo-chevron vessels. The Soft-Shoulder form appears to disappear in the Level 2 Complex. In this assemblage, the pseudo-chevron appears to diminish in the upper levels of the Level 2 Complex and especially in Level 1 where only three vessels have what might be described as a degraded pseudo-chevron. This may illustrate the transitory nature of some decorative motifs in the continuum of ceramic expression, or it may be that this type is more culturally significant and the groups who used it simply were not as well represented on these later occupational levels. Again, more research is required.

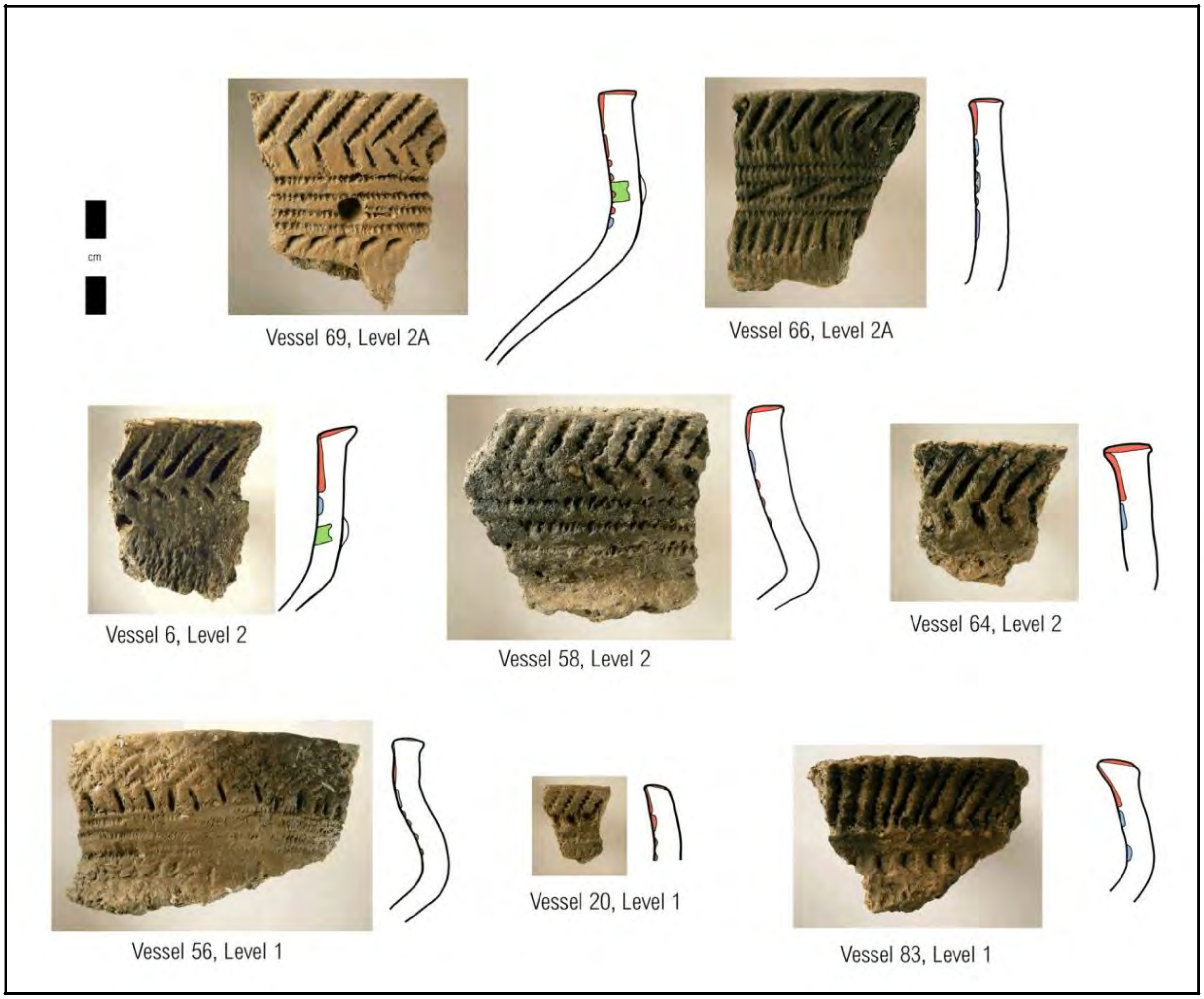


Plate 13.3-4: Rainy River Pseudo-chevron Vessels

External Typological Relationships
It looks like this is one of the first Rainy River Composite expressions, distinctly marking a departure from Blackduck traditions. The earliest vessels in this assemblage have been identified as Rainy River Coalescent but the pseudo-chevron appears to be primarily a Composite expression. The pseudo-chevron motif appears to be a unifying trait, staying consistent while other traits vary. On that merit, this type could be considered as a new Complex. A problem for that level of

designation is the extent of variation which is present, especially neck profile. It is perhaps more likely that it represents an effort to identify broader cultural cohesion among smaller groups.

Vessels Identified
Vessels 20, 56, 83 (Level 1), Vessels 6, 58, 64 (Level 2), and Vessels 48, 57, 69, 71 (Level 2A), and Vessels 45, 61 (general Level 2 Complex).

13.3.3.2 Rainy River Composite DDC Type

Decoration
The decorative makeup of the Rainy River Composite DDC type appears to be similar to the Rainy River Pseudo-chevron type. These vessels don't have the pseudo-chevron, but have the three distinctive decorative characteristics, deep, dense, and controlled impressions, creating strong shadow lines and a highly graphic appearance indicative of the DDC tradition. The punctate figures prominently on these vessels as well. Differentiating between the Coalescent type and the Composite type would hinge on the degree of Coalescent decorative traits, or more specifically Blackduck decorative traits. In this case, basically that would be the presence of combing.

Form
In this assemblage, the Composite DDC type does appear to retain the vertical to slightly flared curvature, but not with a compression widened lip. The stance is angled out to vertical. The necks of the Composite DDC vessels are generally proportionately tall and thick. They tend to be straight, either vertical or with an outwardly angled stance, with a square rim. But, as mentioned above, there are vessels which have an incurved neck profile with the pseudo-chevron and the DDC decorative approach or patterning.

Surface
Surface treatment is only recorded on one of the four vessels. Vessel 54 of Level 1 is textile impressed. Reconstruction efforts could indicate if the others are as well.

Internal Typological Relationships
The DDC-like Rainy River Pseudo-chevron type vessels and the Rainy River Composite DDC type are primarily differentiated by the absence of the pseudo-chevron motif. This separation was made to indicate that the DDC decorative approach continued to appear after the Coalescent phase without the pseudo-chevron. The two vessels of Level 2 which are ascribed to this type are different from the Level 1 pots in that they have stamping on the rim and not oblique CWOI. Vessel 38 has an upper row of stamps that have the same angle as the accompanying oblique CWOI above. This is unusual. It seems possible that the stamped rim vessels of Level 2 may be another distinct type not formally isolated here. It is assumed that the DDC approach transcends, to a certain degree, as it is identified in all three occupational events, but always in minor quantities. What this observation represents is not known point, but it is mentioned as a possible starting point for future research.

External Typological Relationships
It is assumed that this type is largely responsible for the confusion regarding visually distinguishing between Rainy River and Blackduck in circumstances where a limited sample is available.

Following the rules of trait reduction and the presence of stamping, it seems that separation should be consistent. Our confusion will likely continue as it is expected that this period of transition will be typified by diversity. As this work shows, it appears that there are some motifs, form traits, and decorative approaches which may provide inroads into identifying linear relationships and possibly isolating new Complexes. It also seems highly likely that there will be more vessels discovered which challenge these distinctions.

Vessels Identified
Vessels 23, 39, and 54 (Level 1) and Vessels 31 and 38 (Level 2) (Plate 13.3-5).

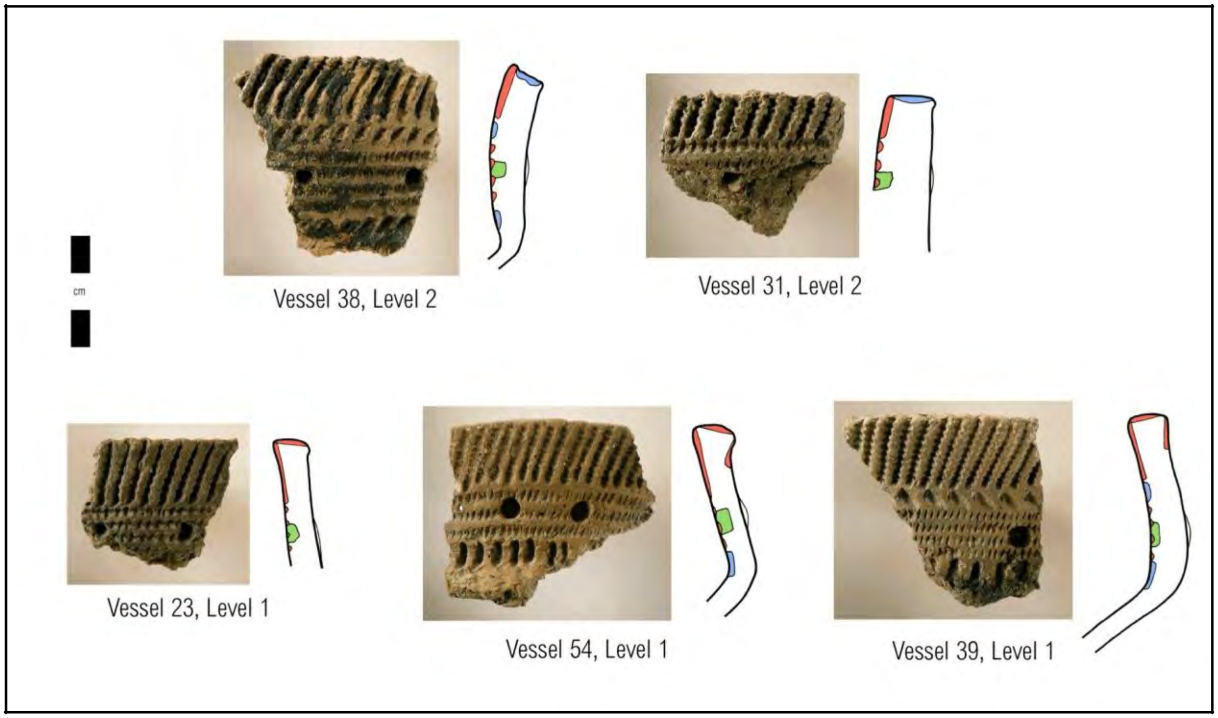


Plate 13.3-5: Rainy River Composite DDC Vessels

13.3.3.3 Rainy River Plain Type

Decoration
In Level 1 there are vessels which carry the oblique CWOI with stamps directly below, positioned on the upper neck, which do not create a pseudo-chevron. Although they could have done so, the row of stamps is deliberately not applied at an oblique angle. This vessel type is also missing the horizontal CWOI, thus the Rainy River Plain moniker. This type has a formal, and pared down, appearance with small round to oval stamps on the Level 2 vessels and larger ovoid and linear stamps which are vertical or non-directional, on the Level 1 pots. Thus, the combination of oblique CWOI and stamps on these vessels does not resemble the pseudo-chevron seen on some of their contemporaries. This deliberate avoidance of creating a pseudo-chevron is interpreted as meaning that the decoration of these vessels is an intentional distinction.

Form
These vessels have a thickened, straight to slightly flaring neck curvature, vertical to angled outward. The body form is interpreted as being similar to the Rainy River Pseudo-chevron type—rounded shoulder and globular body. The rim angle is either squared or perpendicular to the vertical centre line of the vessel.

Surface
Sprang weave is identified from the Level 2 examples and textile impressed on Level 1 vessels.

Internal Typological Relationships
This type, like the Rainy River Pseudo-chevron type, is perceived to be a descendant variation combining traits of types seen earlier, in particular the Kroker Mid-neck, but with reduced neck height. The stamp size on vessels of this type seems to increase in later expressions.

External Typological Relationships
Unknown.

Vessels Identified
Vessels 1, 15, 19, and 49 from Level 1 and Vessels 7 and 117 from Level 2 (Plate 13.3-6).

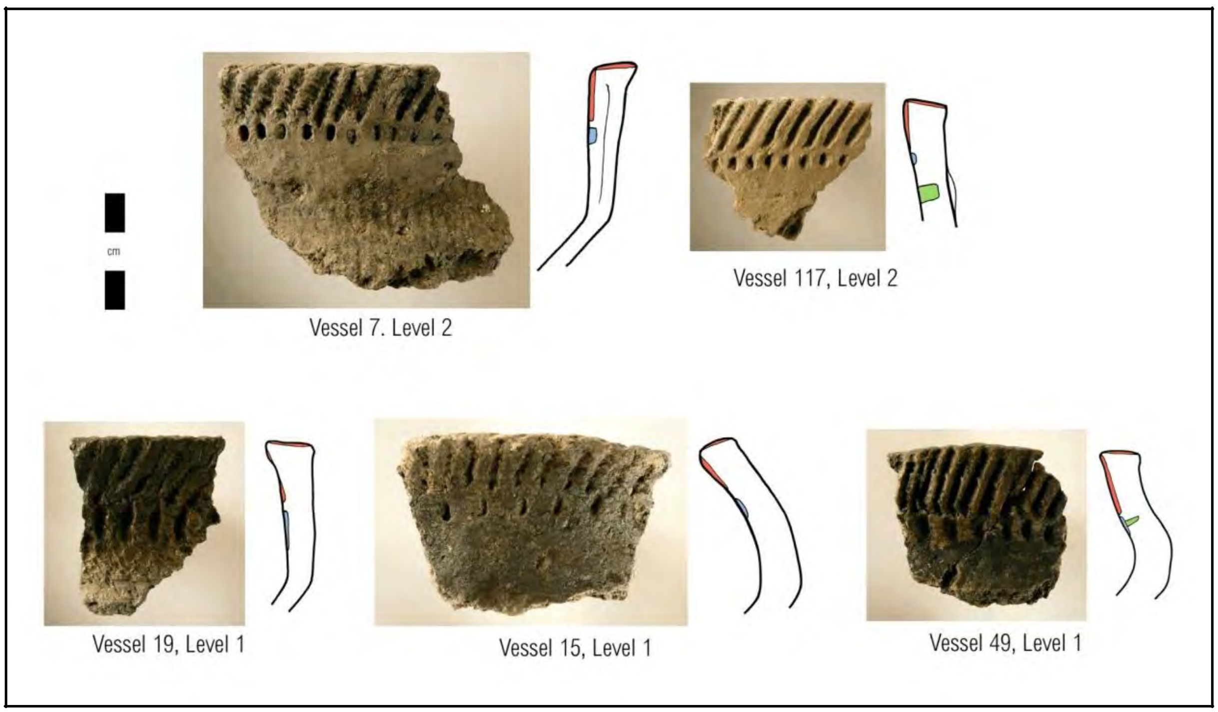


Plate 13.3-6: Rainy River Plain Vessels

13.3.3.4 Holly Oblique

Decoration

The distinct very short and oblique CWOI on or just exterior to the outer lip is the distinct feature of this type (it appears on all sub-types), as is the correspondingly high location of the horizontal CWOI (when used). The Holly Oblique type is comprised of three sub-types, based on the decoration:

> CWOI only - The CWOI only variety, as seen here, has oblique CWOI above horizontal CWOI, above oblique CWOI or CWO stamps, with oblique CWOI on the rim.
>
> CWOI/Stamp - As above, with stamps in the place of the CWO stamps and an encircling stamped pattern on the shoulder.
>
> Stamp only - A simple execution of rows of stamps around the neck. In one case, there is a single row near the base of the neck. On the other, there are three rows- two on the neck and one at the base of the neck. Stamp size and spacing varies.

The rim decoration is either oblique CWOI or wide, flat CWO impressions, which when used are applied roughly perpendicular to the rim.

Form

These vessels exhibit a relatively short neck which varies subtly between slightly flaring, straight, slightly in-curved, and incipient-S. The stance is always angled outward despite the neck curvature. They seem to fit into a general trend toward a more squat, less vertical, presentation which appears in the Level 1 assemblage. This tendency was given the term, collapsed-neck, as the typical neck profiles seen earlier in the temporal sequence of this assemblage are still present, but in these vessels (among others) they are shorter and the curvatures are more pronounced. The rims are angled inward relative to the centre line of the neck, which appears to enable this surface to come closer to perpendicular to the vertical centre line of the vessel. The body of these vessels are globular and the transition from the shoulder to the body appears to be rounded. Two vessels of this group have a disproportionate diameter (Vessels 16 and 30), this might suggest functional modality or different utilitarian purpose from the smaller vessels.

Surface

Textile impressed, obliterated textile, and sprang weave impressed are recorded for those vessels where the surface treatment was observable. More analysis is required to establish if this range is due to limited sample size or observer error or, if in fact, these vessels were constructed using these different techniques.

Internal Typological Relationships

The short and very oblique CWOI on the exterior lip or just exterior to this edge and the high horizontal CWOI are traits seen only on the Otterhead Coalescent type from Levels 3 and 3A. There appears to be no other similarities, so no particular relationship is suggested at this point. Vessel form is not comparable.

External Typological Relationships
The general combination of traits places this type into the Rainy River realm. The combinations of oblique and horizontal CWOI and stamps and the use of stamp decoration on the shoulder point to some similarity to the decorative traditions of the Bird Lake and Duck Bay Complexes. But, no linkages can be made at this point. Unfortunately, our dates have not clarified if Holly Oblique was contemporary or was a precursor to these known Complexes. The AMS dates with a mean date of A.D. 1240 for Level 1, places the Holly Oblique type as present during the proposed period of emergence of both the Bird Lake and Duck Bay Complexes, around A.D. 1250 (Lenius and Olinyk 1990). How Holly Oblique might relate to non-Rainy River Composite traditions is unknown at this point.

Vessels Identified
Vessels 3 and 111 (CWOI Stamped), Vessels 16 and 30 (Stamped), Vessels 14, 17, and 24 (CWOI) (Plate 13.3-7).

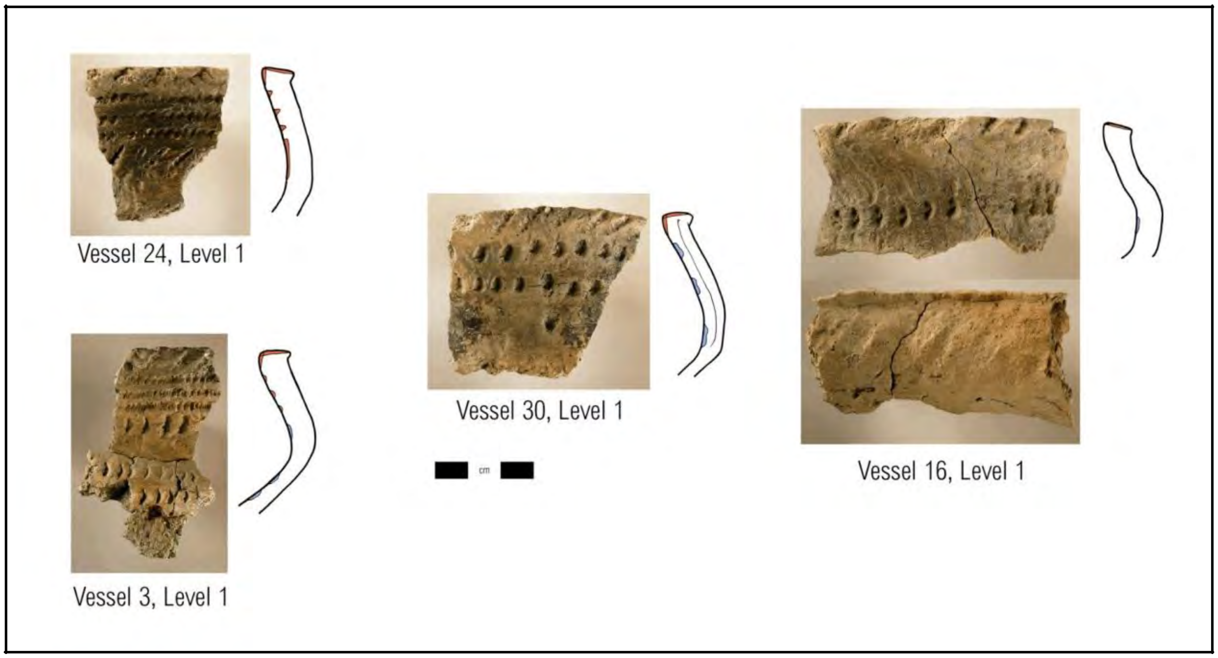


Plate 13.3-7: Holly Vessels

13.3.3.5 Rainy River Composite, Aspen Type

Decoration
These vessels are characterized by very dense and small scale impressions, comprised of combinations of stamps, often different sizes and shapes (ovoid to linear), and CWOI (Plate 13.3-8). The typical banded appearance of oblique CWOI over horizontal CWOI appears to be the derivative foundation. More specifically, the upper neck is typically decorated with oblique CWOI with one or two rows of stamps (often different shapes and sizes), sometimes applied directly over top of the lower part of the previously applied oblique CWOI. It appears that this may or may not create a pseudo-chevron, implying that this vessel type was external to the Rainy River Pseudo-chevron type

tradition with which it is contemporary. This type also survives into Level 1, unlike the Rainy River Pseudo-chevron type. The horizontal CWOI of the mid-neck appears to be somewhat constrained to a proportionately narrow band (similar to the Little Owl type). On this motif is impressed stamps, singular or in pairs, encircling the neck in the manner of punctates (whether this could also include sets of stamps hasn't been established). Again, the scale of the impressions is small. Below this is typically another row of stamps on or just above the neck juncture with the shoulder. The rim is decorated with oblique CWOI, seen here as either basic or in a criss-crossing motif. No decoration is identified on the interior of the vessels seen in this assemblage. One vessel (Vessel 34) also has a trailed design drawn on the shoulder and descending over the curve of the shoulder. This may be unique to this one vessel. The other appears, by spatial association only, that it may have had rows of small stamps descending onto the shoulder, but this has yet to be confirmed.

Form

These vessels seem to have minimal thickening through the neck compared to some of the other vessels in this assemblage. That being said, the necks are thicker than the shoulder. The profiles seen on the two vessels identified with this new type are vertical and angled outward, both with a slight flare. The neck retains an even thickness from bottom to top and the rim is more or less perpendicular to the vertical centre line of the vessel. The slope of the shoulder is moderate and the transition to the body is rounded.

Surface

The Level 2 vessel is identified with sprang weave impression and the Level 1 vessel is textile impressed.

Internal Typological Relationships

This type does not configure into a direct relationship with any other types in this assemblage in terms of progression or transition. The appearance in Level 2 and Level 1 indicates a well defined tradition was present despite the limited number of vessels identified.

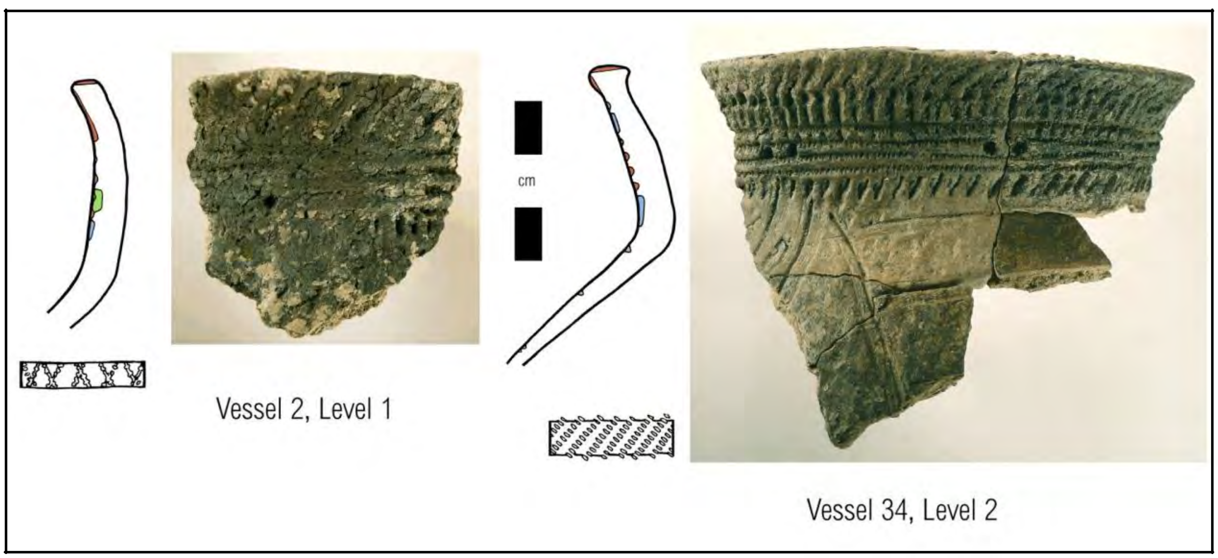


Plate 13.3-8: Aspen Vessels

External Typological Relationships
This type has decorative similarities to Bird Lake Complex vessels, but there are several things that preclude that designation. When Lenius and Olinyk (1990) established the definition of Bird Lake, paired stamps on the horizontal CWOI band, criss-crossing CWOI on the rim, and the profiles described above were not considered Bird Lake attributes. The paired or sets of stamps on the horizontal was mentioned as part of an undefined Complex expected by Lenius and Olinyk (1990). These vessels do not have the pronounced flare typical of Bird Lake and neither pot has interior decoration (despite the fact that it is seen on other distinct types of vessels in the assemblage). Trailed geometric designs on the shoulder are not part of the Bird Lake Complex range of expression either. There is clear association with the Rainy River Composite, however it is quite apparent that these two vessels are distinct.

Vessels Identified
Vessel 2 on Level 1 and Vessel 34 on Level 2.

13.3.3.6 Rainy River Composite, Willow Type

Decoration
The vessels of this type are anomalous. They don't ally well with any other type identified here, at least visibly. The decoration is limited to oblique CWOI on the rim and on the exterior, below the exterior lip, and on one of the four vessels there is a single row of reverse oblique linear stamps below the oblique CWOI (the latest vessel, from Level 2). The commonalities of traits and execution suggest these four vessels may be the work of one individual. This minimal approach to the decoration is unusual, but not entirely unique. There are other vessels in the assemblage which have very restrained decoration, but beyond that there is little in common between them. The decorative boundary above the undecorated mid-neck produces a visual effect similar to that seen on some of the Kroker Mid-neck vessels.

Form
Two of the four vessels have enough of the profile preserved that we can see a resemblance of form with the Kroker Mid-neck Coalescent type: an angled outward stance and straight to slightly flaring neck curvature. The upper neck widens toward the exterior and the rim is flattened perpendicular to the vertical axis of the vessel. The other two appear to be similar in that regard. One of the former, although nearly identical to the other visually, is a smaller vessel. It is thinner and has a shorter neck, indicating a certain range of variability in overall dimensions for this type.

Surface
All of the vessels represented by this type are sprang weave impressed up the neck to the exterior lip. With little decoration, this becomes a distinctive characteristic of this type as seen here. On one of the four vessels, there is some surface smoothing, though not enough to obliterate the weave.

Internal Typological Relationships
As discussed above, the greatest similarity is seen between this type and the Kroker Mid-neck variety. There is some similarity with the Rainy River Plain type as well. Depending on how the Level 2 Complex is interpreted, these two types could be considered contemporaries, or the Rainy

River Plain type could be viewed as a descendant in the context of the transfer of traits, such as the decoration limited to the upper neck and aspects of neck profile. This is a tenuous observation at this point, but is worth noting for future analysis.

External Typological Relationships
Unknown.

Vessels Identified
Vessel 52 from Level 2, Vessel 43 from Level 2B, Vessels 60 and 62 from undesignatable levels within the Level 2 Complex (Plate 13.3-9).

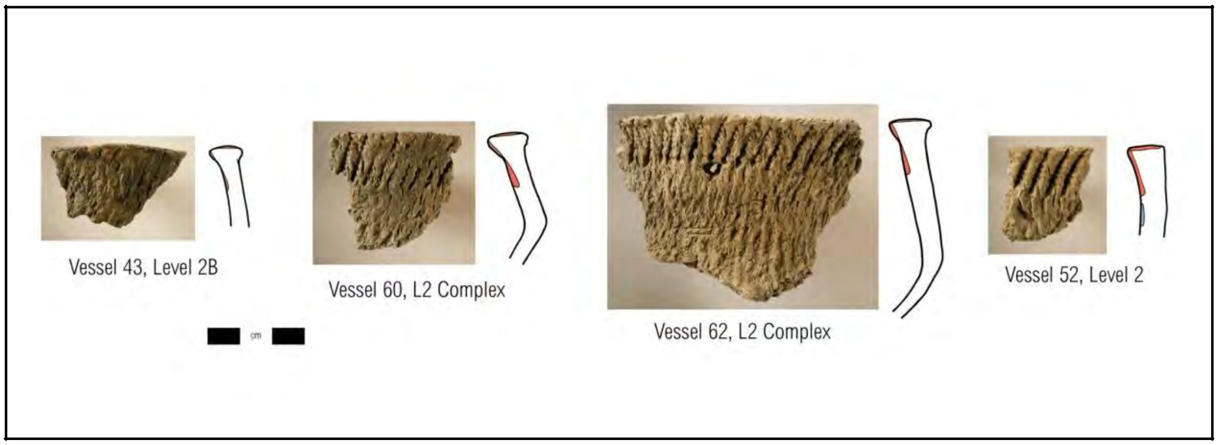


Plate 13.3-9: Willow Vessels

13.3.3.7 Notes on New Composite Types

There are nuances of form and decoration that have been deliberately overlooked, because of a lack of internal context and limits to the extent of external comparative analysis. These are vessels which remain as Rainy River Undefined and they do not figure into the above scheme of new types. In the vessel descriptions, they are identified as either Coalescent or Composite where possible. It is likely that some have lineages of there own, external to this assemblage. This is the primary reason for not incorporating them into this scheme. It is highly probable that some of these may be namable types on their own. They are mentioned in the vessel discussion section (Section 13.4) to raise flags for future research into Rainy River ceramics in this region.

13.3.4 Non-Rainy River Ceramic Type

13.3.4.1 Dogwood Type

Decoration
The decoration on these vessels is constrained to the rim and the immediate area below the interior and exterior. The decoration is sometimes on the interior or exterior lip also. The impressions are comprised of very short CWOI and stamps of various sizes (Plate 13.3-10). Typically, the oblique

CWOI are restricted to the rim (criss-crossing on one vessel) and lips. Where decoration is apparent below the interior or exterior lip, the mode of decoration appears to be typically a linear stamp.

Form

The neck profile on three of the four pots placed in this group have a straight neck, either vertical or slightly angled outward. The neck height appears to be moderate. One of this group (Vessel 93) has a short neck, but the scale of this vessel is smaller. The neck profile for this vessel is straight with an outward angle. This is the only vessel that gives some idea of the slope of the shoulder. For this pot, the shoulder is steeply sloped, indicating a very soft transition to the body. Whether this can be expected for the other three vessels is undetermined at this time, but it is expected that the more vertical neck stance would correspond to a vessel form with a more defined shoulder.

Surface

Textile impressed is recorded on all four vessels.

Internal Typological Relationships

There appears to be no precedent types in this assemblage. The Willow type might be the most similar.

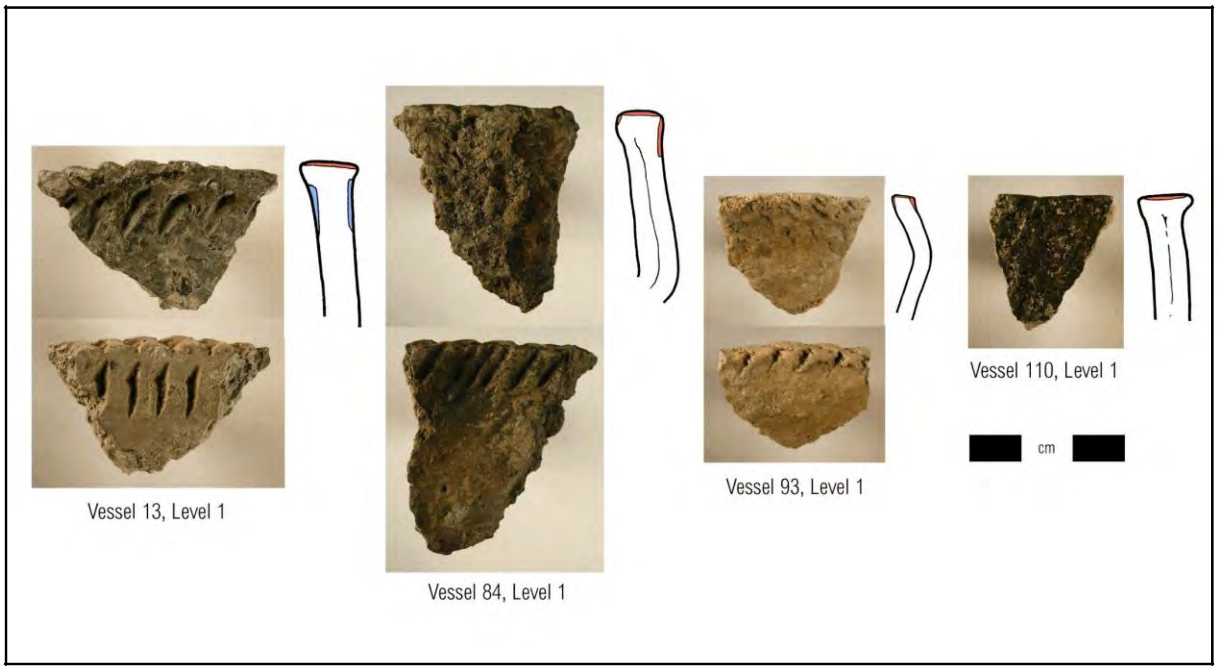


Plate 13.3-10: Dogwood Vessels

External Typological Relationships

A very restrained decorative approach like that seen on these vessels is not typical for Rainy River Composite. It is expected that these are not of the same tradition. A similar approach to decoration, limited to the upper neck and rim, on straight necks has been identified in the Kenosewun Complex

(McKinley 2001). However, this is a simplistic visual comparison and the current dates for the Kenosewun Complex hover around A.D. 1400, much later than A.D. 1280 AMS date for Level 1).

Vessels Identified
Vessels 13, 84, 93, and 110.

13.4 Vessel Discussion by Level

Table 13.4-1 lists the designated vessels by type and notes the level in which the vessel was determined to have originated. Each vessel is illustrated at actual size. If relevant, the interior of the vessel is also illustrated. Each photograph is accompanied by the profile drawing and sketch of the rim decoration. Figure 13.4-1 provides the legend for the annotations and colour coding for the profile drawings.

Figure 13.4-1: Legend for Profile Drawings Accompanying Vessel Plates

LEVEL		1	2	2A	2B	2C	2D	2 Comp	3	3A	Qty
COMPOSITE	Duck Bay-like	42	8, 70, 119								4
COMPOSITE	Bird Lake-like	55	28, 74								3
COMPOSITE	Winnipeg River	41									1
COMPOSITE	Holly Oblique	3, 14,									7
COMPOSITE	Aspen Type	2	34								2
COMPOSITE	Rainy River	1, 15,	7, 117								6
COMPOSITE	R. R. Composite,	23, 39,	31, 38								5
COMPOSITE	R. R. Psuedo-chevron	20, 56,	6, 58, 64	48, 57,				45*,			12
COMPOSITE	Willow Type		52		43			60, 62			4
	Rainy River Undefined	25, 50, 80	12, 29, 32, 116	66*	46				88, 100, 101, 108	90	14
	Rainy River Undetermined/ Incomplete	4, 21, 22, 40	36, 44, 76, 77, 96	47, 51, 82	75				97, 102, 104, 107, 114	86, 109	20
COALESCENT	Little Owl Type	18, 81	10, 33	37, 115					103, 106		8
COALESCENT	Otterhead Type								89, 92, 95, 98, 99, 105, 112, 118	87	9
COALESCENT	R. R. Coalescent, DDC pattern								94, 113		2
COALESCENT	Kroker Mid-neck				78*			35	73		3
COALESCENT	Soft Shoulder					79*			85	91	3
OTHER	Dogwood Type	13, 84, 93, 110									4
OTHER	Mortlach / Wascana-like	53									1
OTHER	Plains/Woodland	27, 67	9, 11	63	72						6

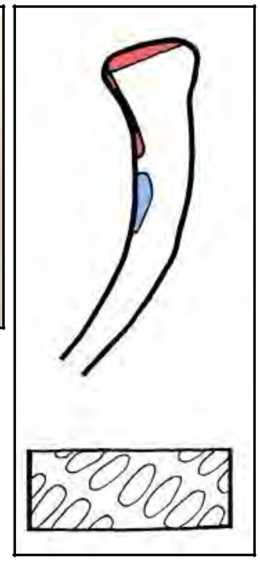
Table 13.4-1: Presence of Designated Vessels by Level
(Note - * = Rainy River Coalescent present above Level 3)

13.4.1 Level 1

Vessel 1

A generalized observation is that from Blackduck to late Rainy River Composite expressions there was a tendency for neck height to reduce and neck flare to increase (Lenius and Olinyk 2009:pers. comm.). Vessel 1 could be seen to illustrate both of these suggested trends. The only decorative motif is the combination of oblique CWOI over asymmetrical crescentic stamps. The stamps are oriented vertically. The impressions are large, disproportionate to the neck height. These two elements consume most of the available neck space typically utilized on Rainy River Composite vessels. The angle of the CWOI is more oblique than most vessels from Level 1. This vessel also exhibits a crack repair, clay was compressed and moulded onto the surface of the interior and exterior to reinforce the defect which likely occurred during drying.

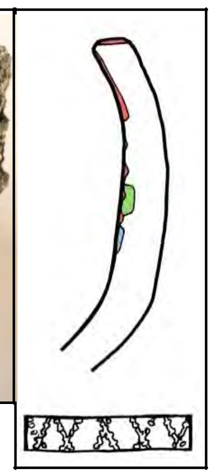
Plate 13.4-1: Vessel 1



Vessel 2

Comparing this pot to Vessel 34 of Level 2, we see a lot of similarity in form and decorative approach, although the combination of elements is reduced somewhat. They are both identified as a new Rainy River Composite variety, the Rainy River Aspen type. Vessel 2 has an obscuring deposit of charred residue on the exterior making it difficult to delineate elements. This has been removed selectively on part of DlLg-33:08A/2006 to clarify details of some of the impressions. There appears to be no stamps above the horizontal motif, just oblique CWOI, contrary to that on Vessel 34. Single linear stamps are placed on the horizontal band in punctate position similar to the paired stamps seen on Vessel 34. On this vessel they are low which is unusual. Below the horizontals are a row of vertically oriented linear stamps. The rim is decorated with criss-crossing CWOI which is seen on several different types of pots, from Level 3 and in the Level 2 Complex.

Plate 13.4-2: Vessel 2

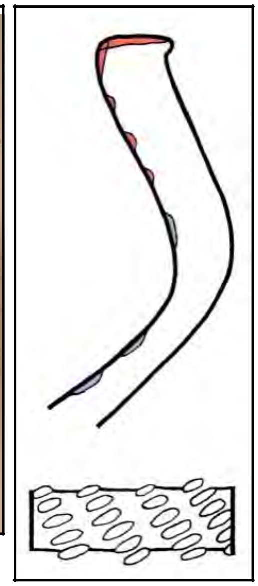


As with Vessel 34, this vessel does not conform to the definition of Bird Lake, to which they might be considered most similar. The oblique CWOI without definitive Bird Lake stamping below (i.e., multiple rows of stamps on the neck and/or stamping on the shoulder), and the rim treatment would keep this vessel from being defined as Bird Lake. An argument could be made that the difference between alternating groups of right and left oblique CWOI and criss-cross CWOI as rim decoration is minimal, a simple pattern change using the same two impressions. This vessel may have had descending rows of stamping on the shoulder. Shoulder sherds with this pattern were identified in the proximity of the rim sherds, but do not refit (reconstruction efforts could help resolve this). If this was established, it would point toward a possible relationship with Bird Lake. Vessels 2 and 34 are a type that is known from other sites, including Lockport (Reichert: personal observation).

Vessel 3

This pot, along with Vessels 14, 16, 17, 24, 30, 111 (and possibly 40), are eight vessels which are isolated as defining a new type of Rainy River Composite vessel called Holly Oblique. Within that group, six vessels share form and profile characteristics that are very similar and one particular decorative element, a very oblique and short CWOI on the exterior lip. This element remains nearly identical on all six vessels while the rest of the decorative treatment changes. Vessel 3 is a combination of CWOI and stamp (Holly Oblique, CWOI and Stamp type), including stamps on the shoulder, forming what appears to be a variation on the necklace pattern (see also Vessel 111) seen on some Bird Lake stamped vessels. Vessels 17 and 24 are CWOI only (Holly Oblique, CWOI type) and the other two, Vessels 16 and 30, are the stamp variety (Holly Oblique, Stamp type). There is some size variation within this group. Vessel 3 appears to be one of the smaller pots. The bottom row of elements on Vessel 3 are crescentic stamps, vertically oriented rows descend onto the shoulder. The horizontal CWOI is positioned high on the neck, close to the rim. The short oblique CWOI and high horizontal CWOI are seen in Level 3 on the Rainy River Coalescent vessels, Otterhead type. This combination is not seen in the Level 2 Complex, except perhaps on Vessel 29, which is not what one would expect to see as a vessel transitioning between the forms seen with Holly Oblique and Otterhead. Thus, connection between the two types is not being suggested. Other than the decorative attributes there is nothing to imply that they are connected in anyway.

Plate 13.4-3: Vessel 3



Vessels 3, 24, 14, 16, and 30 are being interpreted as being made by the same person. The same slightly oblique finger impression can be seen circling the interior neck, repeated at even intervals. This is interpreted as impressions left by one hand holding the rim of the vessel while rotating the vessel at regular intervals, perhaps while the other hand applies the decoration. The even spacing of this repetitive action is interpreted as vessel support and positional guidance for the location and application of the decorative impressions on the exterior.

Vessel 3 and the others share the same character of manufacture, made with what might be described as deft expedience. The air of casualness these pots share suggest competence and experience.

Vessel 4

A small sherd from the juncture of the neck and shoulder, it has distinct large vertically oriented stamps. The stamps are more or less straight sided but the ends are rounded. Descriptively, it falls between linear and ovoid. These prominent stamps are unique, despite the fact that little more is interpretable, including which way is up. A small impression appears as an oblique cord impression. Not enough is present to tell if it is cord from surface textile impression or from a decorative element. Vertically oriented linear or crescentic stamps at the neck juncture are seen commonly in this assemblage on the Pseudo-chevron and Composite DDC types. The size of the impressions and the wide spacing is unique.

Plate 13.4-4: Vessel 4

Vessel 13

This is one of a small group of vessels, the Dogwood type, which do not seem to fit with Rainy River Composite (Vessels 13, 84, 93, and 110). Unfortunately, this vessel is not represented by a complete profile. What makes this vessel distinct is the combination of stamp form and position and the CWOI impressions on the rim. The oblique CWOI on the rim are not of typical Rainy River proportions and are impressed on an angle with a sharp edged tool, creating a 'V-groove' form. The stamps are deep and are also of an atypical form. All decorative impressions are in close association to the rim. Vessel 13 is dense and well consolidated and is textile impressed up to the rim.

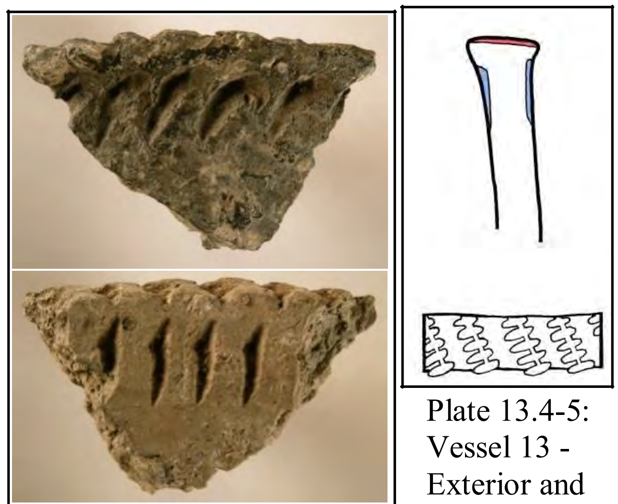


Plate 13.4-5: Vessel 13 - Exterior and Interior

Vessel 14

This is a Holly Oblique vessel, but this pot seems not to have CWOI or stamping on the neck. It shares the same rim decoration with Vessel 16, a wide and flat tool making impressions nearly perpendicular to the rim. Vessel 14 also is distinctive for the red ochre or hematite staining on the interior and also on the exterior to some extent. The profile is straighter than the others identified as the same type.

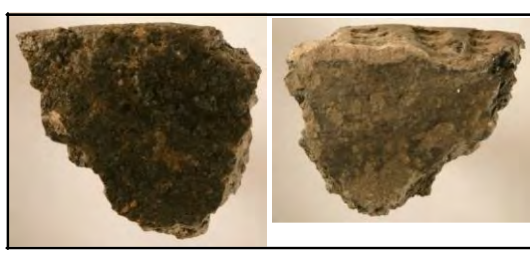
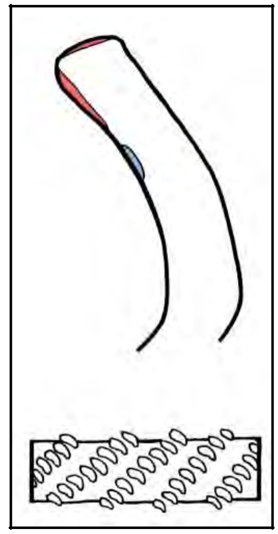


Plate 13.4-6: Exterior and Interior of Vessel 14

Vessel 15

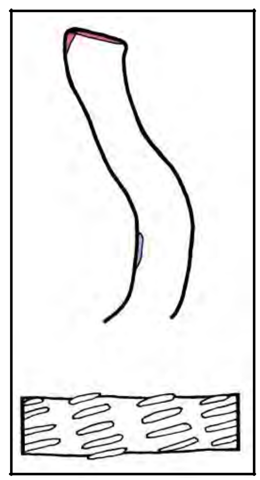
Plate 13.4-7: Vessel 15



This pot has a fairly pronounced flare to the neck. The decoration seems to follow a trend established in the Level 2 Complex on Vessels 7 and 117. That would be a combination of oblique CWOI with the same angle and direction on the neck as the rim, and a row of stamps below, not creating a pseudo-chevron, on a smoothed neck. As with many of the other vessels like this of Level 1, it is slightly flaring. Vessel 15 is like Vessel 49 but with a taller neck and the neck is also slightly thicker than most. It appears to be a large vessel with an estimated mean mouth aperture at the interior lip of 30 cm. It has been identified as one of the new varieties, Rainy River Plain.

Vessel 16

Plate 13.4-8: Exterior and Interior of Vessel 16

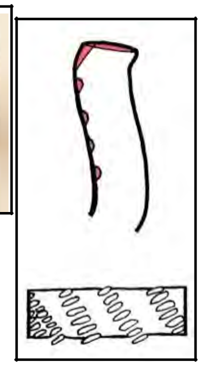


This vessel is identified as Holly Oblique, Stamp type. It has a flaring neck that curves back to the interior slightly, creating an almost incipient-S form combined with flare. An in-curved flare is perhaps the simplest way to describe it. This peculiar form might be particular to this maker but may prove to be an identifying trait in a broader sense also. The profile range on the Holly Oblique vessels deemed to be by a single maker illustrate a certain degree of variation. Vessel 16 has wide perpendicular CWOI impressions on the rim and what appears to be only a single row of asymmetrical crescentic stamps near the bottom of the neck. This vessel shows impressions from the length of a finger on the interior neck, this repeats evenly. It likely is indicative of the manner in which this maker manipulated the pot during the finishing of the rim and may have been related to the positioning and spacing of the decoration. This unique trait is seen on a few other vessels identified as Holly Oblique and it is considered evidence of single maker production.

Vessel 17

Vessel 17 is represented by a single sherd which does not illustrate the full profile of the vessel. It appears similar to Vessel 3, also a Holly Oblique vessel. The distinctions between the two are that Vessel 17 has four rows of horizontal CWOI as opposed to three, and seems to have had a shorter neck height than Vessel 3. It is not clear if this vessel possesses stamping below the horizontals.

Plate 13.4-9: Vessel 17



Vessel 18

One of the Little Owl type, this vessel illustrates a perceived tendency for this type to get larger while retaining the definitive traits. With the increased size comes more area to cover with decoration and, one could argue, more opportunity for expression. This vessel retains the tight series of impressions (CWOI above stamps) to create the chevron which varies in evenness somewhat, but other impressions on the rim and on the interior have a very different feel than earlier examples of this type. The rim impressions are oblique CWOI, but are of the wide, shallow variety. The interior CWOI, likely made by the edge of the same tool, are open spaced. The neck stance appears to lean outward and the neck itself is straight. Four horizontal CWOI rows are visible. The number appears to be relative to the size of vessel, the smallest might have one or two rows. A curiosity of note is found on DlLg-33:08A/5260, a small fish spine can be seen embedded on the exterior surface. Interestingly, it did not burn out during firing, leaving a void. The spine (Plate 13.4-11) retains its natural colour as well, apparently not charred or calcined. This suggests a very low firing temperature which is contrary to the apparent quality of the surrounding matrix of the sherd itself. It shows no suggestion of being under fired.

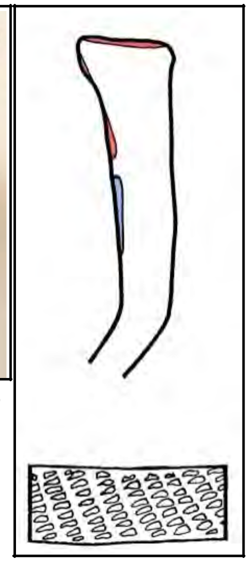
Plate 13.4-10: Exterior and Interior of Vessel 19

Plate 13.4-11: Embedded Fish Spine

Vessel 19

Along with Vessel 15, this pot is considered an example of the Rainy River Plain type. On this particular vessel, the lower stamp is large, near the upper end of typical Duck Bay stamp dimensions. This vessel has no other Duck Bay traits. It has a comparatively tall neck with a vertical stance and slightly flaring curvature. The neck thickens toward the rim. The rim itself widens further with more projection on the exterior lip than the interior giving it the appearance of a subtle flare. This harkens back to the Kroker Mid-neck and Rainy River Coalescent DDC types. On this vessel, the neck is not smoothed, leaving the impression of a fine weave textile.

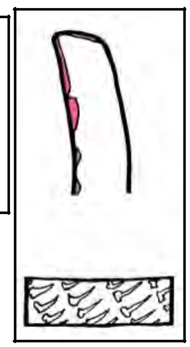
Plate 13.4-12: Vessel 19



Vessel 20

With an incomplete profile, this pot can't tell us much, but based on the visible motifs it would be considered the Rainy River Pseudo-chevron type. Of note, is the generally smaller proportions and the flare it appears to exhibit in the neck. These are not typical of the type as seen on the earlier levels. The CWOI on the rim are the wide and shallow variety which is more common on this level than the earlier occupations.

Plate 13.4-13: Vessel 20



Vessel 21

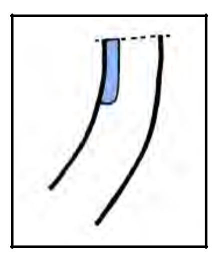
Plate 13.4-14: Vessel 21

This vessel is represented by a single, somewhat friable, sherd which remained distinct enough to be isolated from vessels with a similar combination of decorative elements. Crescentic and vertically oriented stamps are seen repeatedly on several pots, but this sherd does not match well with any.

Vessel 22

Also based on an incomplete profile, in fact without a neck, this vessel has distinct stamping at the neck juncture as its only attribute of note. The vertically oriented linear stamp below the horizontal becomes increasingly common towards Level 1. The stamps on this pot are large and deep.

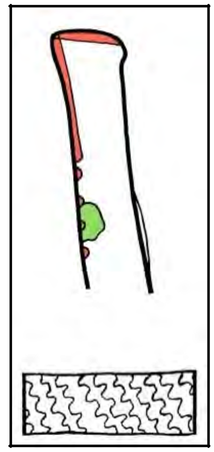
Plate 13.4-15: Vessel 22



Vessel 23

This vessel represents another variant which appears to be a carry-over from Level 3 materials. It has the characteristic DDC approach (deep, dense, and controlled decorative approach) and is considered to be of the same tradition as the Coalescent DDC type, which appears to dissipate into several variations observed in subsequent levels. The punctates on this pot are asymmetrical and not deeply impressed, they create only slight bossing. The CWOI are very evenly measured as is the impression depth. The profile is straight and comparatively tall, and angled outward. Vessels 39 and 54 also exhibit the DDC approach. This group of vessels is segregated with the name Rainy River Composite DDC type.

Plate 13.4-16: Vessel 23

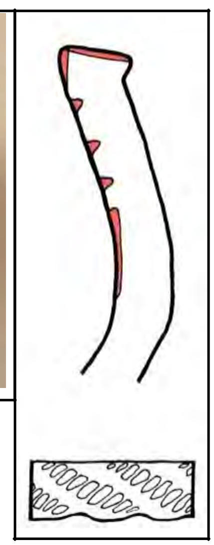


Vessel 24

Another of the Holly Oblique types, this one is CWOI only, no decoration was defined below the neck. It has the identical decorative make up on the neck and rim as Vessel 3, but for the oblique CWOI below the horizontal motif in place of the stamps. This was a larger vessel than Vessel 3 with a taller neck and wider mouth aperture. It also shows similar finger impressions on the interior neck to other vessels identified as Holly Oblique. The neck is somewhat taller on this pot than the others There is evidence of the use of a hard scraper for shaping the interior in the area of the neck juncture.

As with others of this type, the maker appears to have been quite adroit. The production traits of these vessels indicate expedience and aptitude, a casualness one associates with much experience.

Plate 13.4-17: Vessel 24, Exterior and Interior



Vessel 25

Distinctive, this pot does not fit any of the proposed types. The neck is short for the apparent diameter and the approach to the decoration is unusual. In some ways, it is similar to the Little Owl type, primarily impression density, minus the chevron and straight neck. The balance or proportioning of the decoration to the neck height harkens to that type as well, as does the limited number of horizontal CWOI typically seen on the shorter neck examples of the Little Owl type. However, CWOI on the interior are atypical—atypical for this assemblage as well. The short vertical CWOI on the upper neck are a decorative approach seen on some ceramic types in southern Ontario, such as Princess Point (Wright 1972) and some Laurel. These types are improbable for this vessel, but similarities are there regardless. Whether the approaches seen on this pot are derivative of those, or related traditions, will require further research. Another angle to consider for this vessel is a relationship to the Bird Lake decorative tradition. This is more likely although it would also be aberrant under that typological designation.

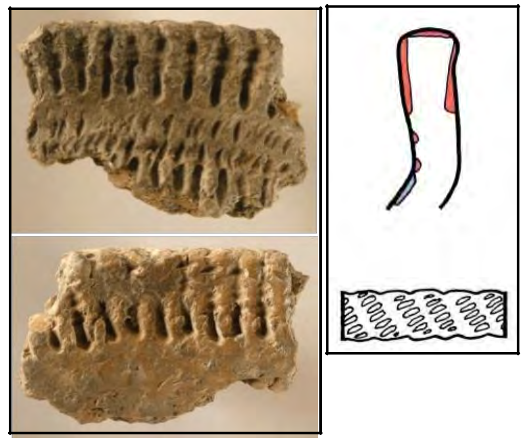
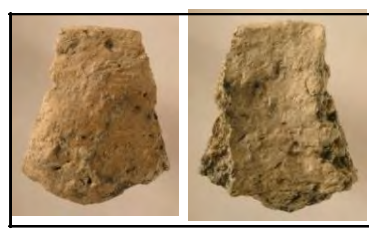


Plate 13.4-18: Exterior and Interior - Vessel 25

Vessel 26

A small finger moulded vessel, approximately 2.5 cm high with an estimated diameter of 5 cm, Vessel 26 is being interpreted as the product of a child. It shows a tentative unfamiliarity with the form and the material, illustrated by its small size, uneven wall thickness, and basic shape. No decoration is visible in the recovered portion. One other finger moulded vessel, from Level 2A, was identified.



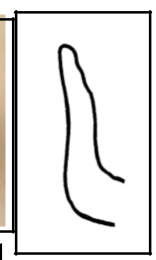


Plate 13.4-19: Exterior and Interior of Vessel 26

Vessel 27

All that was identified for this vessel was a small sherd of the upper portion of the neck including the rim. The exterior of the neck is not intact. In profile, it shows a unique formation of the rim, reflective of the technique of manufacture. It appears that the neck of this vessel was formed by laminating the neck of the vessel, doubling the wall thickness. In this case, the finishing of the rim is simply rounded over and left undecorated. This rim finish is atypical for Rainy River materials and is unique in the collection. Unfortunately, we do not have more of the neck for this vessel, which would enable us to see how far down the neck this lamination proceeded, and allow further insight into cultural origins. The vessel is being categorized as Plains/Woodland, a generalized description indicating likely influences from both realms.

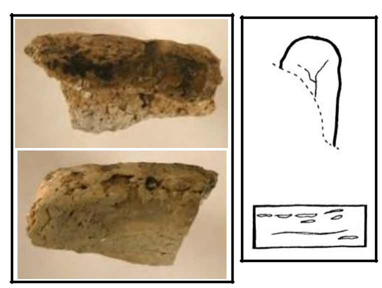


Plate 13.4-20: Vessel 27 - Both Sides

Vessel 30

This is another example of Holly Oblique, Stamp type. Like Vessel 16, the neck decoration is restricted to stamps alone. In this case, there are two rows of ovoid stamps, positioned so as to define

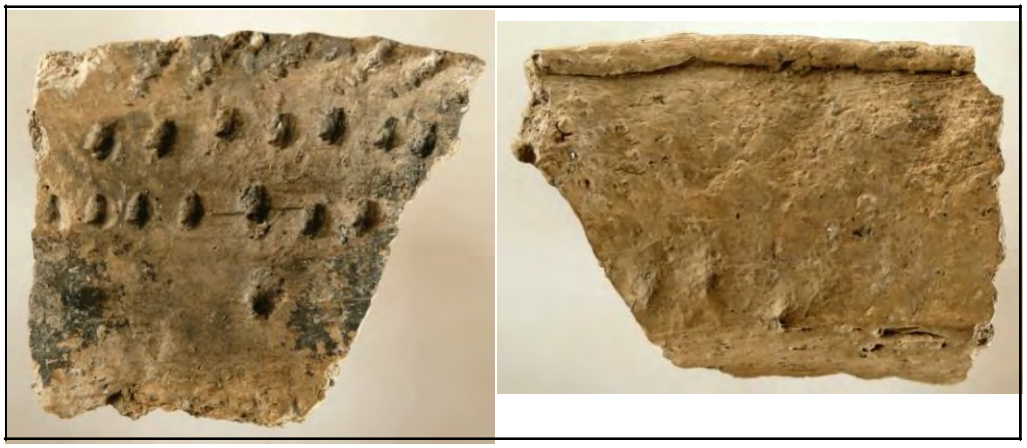


Plate 13.4-21: Exterior and Interior of Vessel 30

the same area as the horizontal CWOI on the CWOI type. Below this is a row of widely spaced larger stamps. On the rim are oblique CWOI, nearly identical to those found on Vessel 24. The neck on this vessel is taller than that on Vessel 16, but retains the same general profile and finger impressions on the interior. The consolidation of the clay matrix is very good.

Vessel 39

Vessel 39 is interesting in that it exemplifies two types in one. It is identified as a Rainy River Composite DDC pot, but carries the pseudo-chevron, a motif perceived to decline in use through the occupations of the Level 2 Complex. This vessel in particular shows discipline in the execution of the decoration (exemplary of the DDC type). The punctates (though here they are stamps by definition, i.e., wider than deep) have bosses that are not well defined, but they are present, like Vessel 23. The profile is straight to slightly flaring with a slight outward angle. The neck is fairly thick and uniform from top to bottom. The structure of the decoration on this vessel is 2:1, that is, the pseudo-chevron and the combination of the horizontals and the lower stamps are evenly balanced, with the dividing line between the two being almost exactly at mid-neck. Balanced proportional structure is quite apparent on some vessels and may be a diagnostic characteristic for some types. This vessel and Vessel 54 both have short interior CWOI below

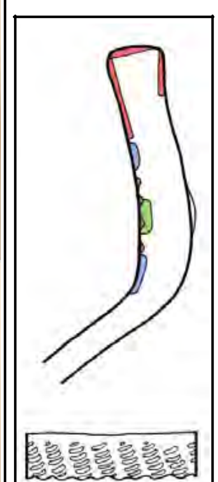


Plate 13.4-22: Vessel 39, Exterior and Interior

the interior lip. This appears to be a Rainy River Composite trait and possibly a Coalescent trait as well, as it was identified on Vessel 108 from Level 3.

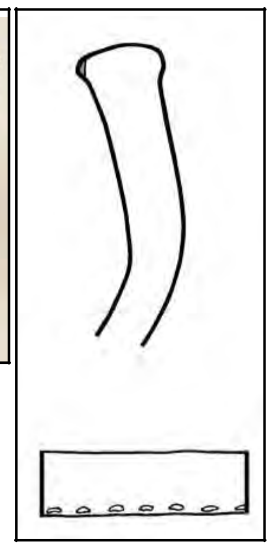
Vessel 40

Plate 13.4-23: Vessel 40

Vessel 40 is another distinct vessel identified without the rim portion being present. Horizontal CWOI were present on this vessel and they were high enough to allow room for very long vertically oriented crescentic stamps below that which still terminate above the neck juncture. The lower portion of the neck is near vertical and appears to be continuing to a slight flare. These attributes might place it with the Holly Oblique types, but without the upper portion it will have to remain as an undetermined type. The stamp dimensions are narrow and long, in the Duck Bay range when compared to Lenius and Olinyk's stamp size graph for Bird Lake and Duck Bay vessels (1990:102, Figure 8.14).

Vessel 41

Plate 13.4-24: Vessel 41



This is one of the few undecorated vessels. At this point, it is unclear if these fit into the Rainy River Composite, although superficially it appears as though they may. The fabric impression goes up to the exterior lip and the rim is undecorated. The gently flaring profile seen on this particular vessel is somewhat moderate for Winnipeg River Complex vessels with which it is most similar. In fact, on the whole it is a straight neck with an outward angle, the expanding width at the rim creates the impression of slight flare. With no decoration at all, it is not possible to place this vessel into one of the sub-types within the Winnipeg River Complex. A problem for this identification is the temporal range for the Winnipeg River Composite is currently set at A.D. 1350 to 1650 (Meyer and Russel 1987). Our dates for Level 1 come in significantly earlier than this, one to two hundred years earlier. If this vessel is in fact related to the Winnipeg River Composite, it would be an early expression, placing the origins in line for parallel development with Bird Lake and Duck Bay. Two of the three sherds linked to this vessel were actually recorded from Level 3. Despite this, they refit to each other. The single sherd (DlLg-33:08A/7795) was excavated from a footprint, the sherd compressed beneath the heel. The deposition context for this sherd is considered to be correct. The Level 3 sherds were recovered during an exploratory test pit to define the depth of Level 3 and, in doing so, they may have been dislodged from the adjacent unit wall where Level 1 had not yet been excavated.

Vessel 42

This vessel could be interpreted as an early expression that would eventually develop into Bird Lake or Duck Bay or both. It fits neither, but there are traits suggestive of both. The form of the vessel

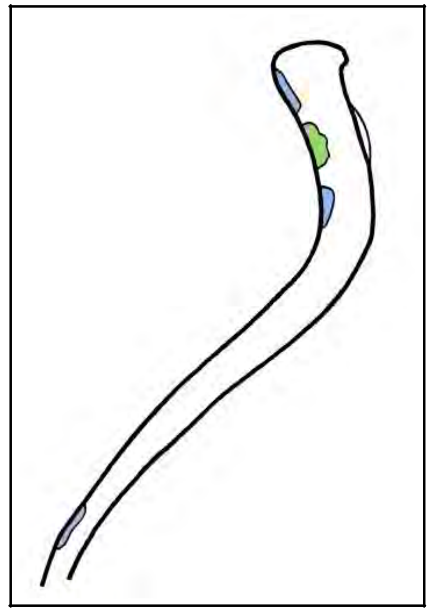


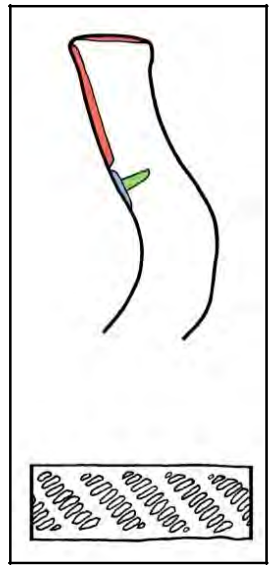
Plate 13.4-25: Reconstructed Portion of Vessel 42

starting with the neck profile (straight to slightly flaring) could be seen as intermediate between the two, albeit short. The shoulder transition is gradual and rounded, typical of Bird Lake vessels but the short neck and absence of flare is not. The decoration is ambiguous sharing traits of both. There are rows of stamps at the top and bottom of the neck and also stamps below the neck creating a pattern on the shoulder made up of descending rows (Duck Bay-like) linked at the bottom by a draped or swagged row, looping around the shoulder, commonly termed a necklace pattern (this is Bird Lake-like). The round stamps, proportionately large for the neck, do create slight bosses, but are definitely positioned in a typical punctate manner, roughly in the middle of a central horizontal band on the mid-neck. The neck is smoothed. The rim is smoothed also, rounded and undecorated. The pot is small with an estimated mouth aperture of only 11 cm. This is not in the size range of the miniature vessels associated with mound interments, which would typically be half that size or less.

This vessel shares some qualities, neck profile and proportion, and vessel size with Vessel 50 and, although the decorative elements and motif are different, the decorative area on each vessel is the same. More work needs to be done to understand the relationships between this pot and the rest of the collection. There is always the possibility that it is a trade vessel, but at this point its origins are unclear. The combination of CWOI and stamps as decorative elements suggest it at least originates within the same realm as other Rainy River materials. It is possible that this may prove to be a new type or even a new Complex. Or it may expand the definition of Duck Bay or Bird Lake.

Vessel 49

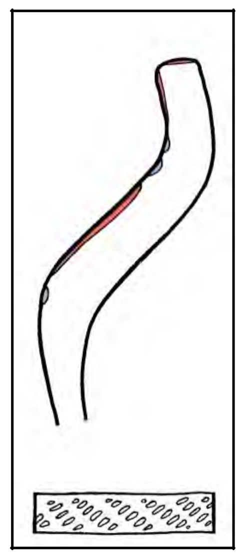
Plate 13.4-26: Vessel 49



Along with Vessels 1 and 83, Vessel 49 is being interpreted as a descendant type developing out of the Rainy River Pseudo-chevron type (found primarily in the Level 2 Complex) and developing alongside the Rainy River Plain type. This particular vessel has abandoned the horizontal CWOI and punctate and the neck is proportionately collapsed. The neck thickness is essentially the same as that of the tall neck variety which is already thick. With the shorter neck height, the thickness is more pronounced. Vessel 49 has an angled out stance and an incurved neck profile, similar to that described for some of the Holly Oblique vessels (Vessel 17 in particular). One deep impression on DlLg-33:08A/14067 nearly perforates the neck. It is positioned in the stamp row, roughly at mid-neck. The purpose behind this intentional act is unclear, perhaps it was intended to completely perforate. Regardless, it is the only identified impression of this type on this vessel.

Vessel 50

Plate 13.4-27: Vessel 50



As mentioned above, there are some similarities in proportion and form between this pot and Vessel 42. However, it is unlike any other vessel in the assemblage. It has the unique characteristics of a zigzag motif made of CWOI, circling the shoulder below the neck. The triangles created are in-filled with rows of horizontal CWOI. This motif is framed with rows of small ovoid stamps at the bottom of the neck and at the shoulder transition, which is abrupt. The short neck is vertical but slightly flaring. It is only high enough for a single row of oblique CWOI and the smooth rounded rim has oblique CWOI as well.

Plate 13.4-28: Shoulder of Vessel 50

The zigzag-infill motif is known on vessels of the northern Plains, along the Missouri River for example, and has found its way into the lexicon of groups on the northern periphery. The vessel appears to be a hybrid of Plains design and vessel form and Woodland form and decorative elements, the stamp and CWOI. The surface finish is smooth. Other than the finger moulded pinch-pots, it is the only vessel identified as smooth. There are similarities with Wascana ware of southern and central

Saskatchewan (which dates later), primarily the geometric shoulder decoration. At this point, this vessel will remain identified as Rainy River Composite, but undefined and further research is required. A shoulder sherd from this vessel was submitted for residue analysis and came back as strongly positive for beans, both cooked and dry stored.

Vessel 53

All that was identified of this vessel is a single small sherd, but from this sherd we can tell that it is the rim portion of a vessel with a wedge profile. This form of pot is peripheral to this region and is not considered part of the Rainy River lexicon. It has been defined in western Manitoba as an extension of more common occurrences in Saskatchewan and North Dakota. The exterior is smooth, where visible, and the interior is rough as if incompletely smoothed. The rim, or lip as it is defined in the taxonomies that encompass this form, is decorated with incised lines perpendicular to the rim spaced approximately 8 mm apart. The presence of this form is further suggestion of Rainy River Composite contact with western groups.

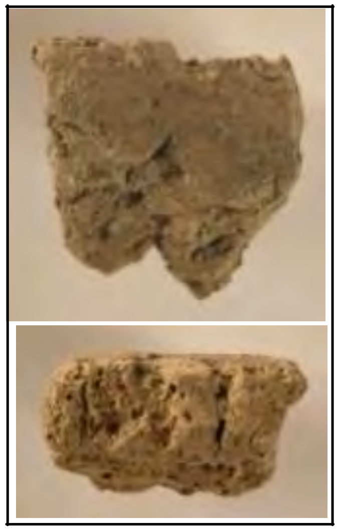
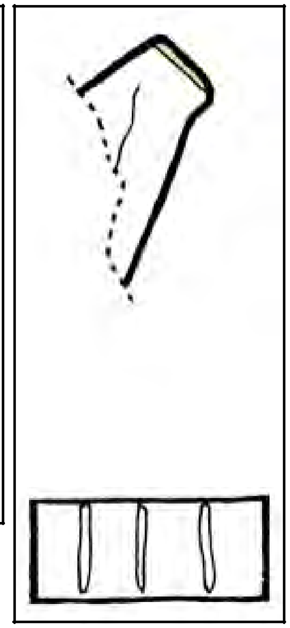


Plate 13.4-29: Exterior and Rim of Vessel 53



Vessel 54

This pot is being designated as a Rainy River DDC Composite type. Like Vessel 23, it does not have the pseudo-chevron, but has the interior CWOI decoration like Vessel 39. It is distinct from both in that the punctates, or stamps by definition, create definitive bosses. The neck profile for Vessel 54

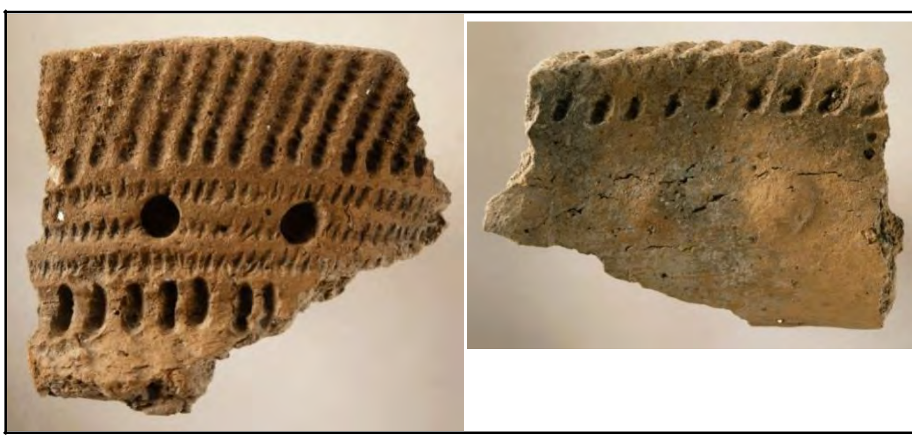
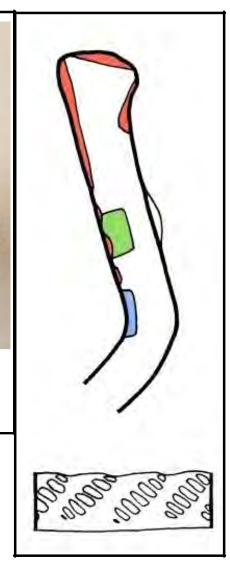


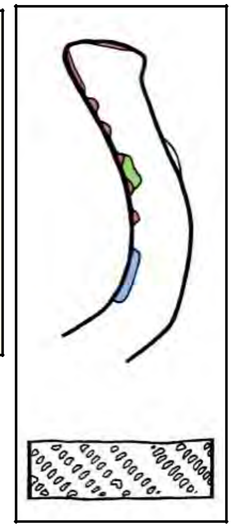
Plate 13.4-30: Exterior and Interior of Vessel 54



is straight but angled outward, perhaps a bit more that the others. The thickness is consistent from the top to the bottom of the neck, but is thinner than the others. This likely contributed to the bosses being prominent. It also has vertically oriented linear stamps beneath the horizontal CWOI, a trait which appears on several vessels in the earlier levels.

Vessel 55

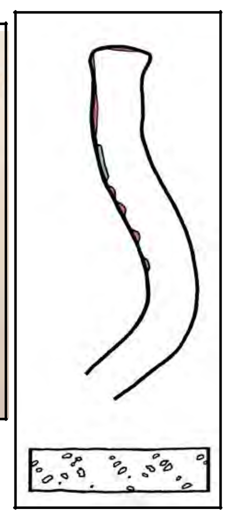
Plate 13.4-31: Vessel 55



Many traits suggest that this vessel should be considered in the light of Bird Lake Complex ceramics. There are several vessels in this assemblage which have Bird Lake-like traits, but most of these present themselves on vessels that don't make the cut using the type site definition (Lenius and Olinyk, 1990:93-96). Vessel 55 has CWOI below the exterior lip, in combination with a single row of small stamps, and the stamp in punctate position creates a slight boss. These attributes are enough to disqualify it from being considered as Bird Lake, especially when it does not have any of the other definitive Bird Lake traits as described by Lenius and Olinyk. The rim on Vessel 55 has single direction oblique CWOI and the neck has slight flare and is angled out. The rim width is somewhat wider than the upper neck. The execution of the decoration on this vessel is somewhat erratic, at least as it is seen on the sherds that were recovered. It does not have any traits that are absolutely not acceptable as Bird Lake on their own, but nor does it have any traits or combinations of elements that are definitive indicators. This vessel will carry the Bird Lake-like designation until we understand how the expressions of the known Rainy River Complexes are manifested during this period and in this area.

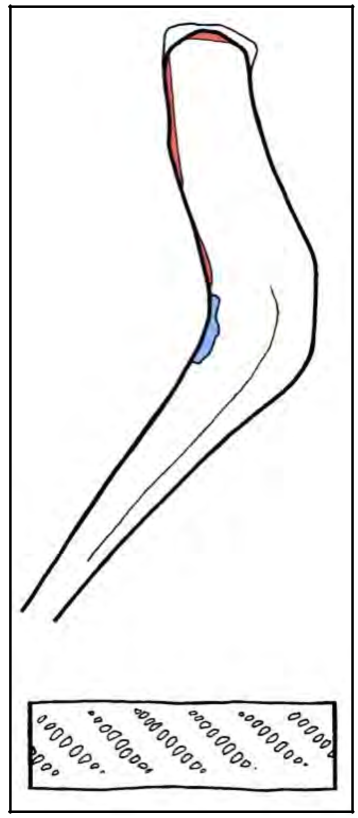
Vessel 56

Plate 13.4-32: Vessel 56



The incipient-S neck profile has been identified as one of the typical profiles exhibited in Duck Bay ceramics. This vessel is not a Duck Bay vessel however. The decoration on this pot does not match the competence shown by the vessel itself. It is a well made and well fired pot, but the decoration is tentative and inconsistent. The generally recognizable Rainy River motifs are present, but ill formed. The pseudo-chevron elements are disjointed and uneven, as is the depth of the impressions. If the combination was meant to be read as a single motif, it was not particularly successful. The horizontal CWOI are also poorly executed. The rim has oblique CWOI, in some areas they are even criss-crossing. Because the decoration is what it is, it cannot help us place this vessel into context with other vessels in the assemblage. All that can be said for sure is that the incipient-S form was present in Level 1 and in the Level 2 Complex, maintaining the same proportions (see Vessel 80 and Vessel 45). One might postulate that this vessel was made by an experienced potter and decorated by an inexperienced decorator, perhaps a child. There is a high temper content in this pot.

Vessel 67



An aberrant vessel in several ways, Vessel 67 does not follow the Rainy River Composite rules, even in a general sense. The neck and rim are suggestive of a kind of casualness not seen in other vessels. The difference in thickness between the neck and the shoulder is dramatic, as much as 9 mm, between the lower neck and the shoulder. Neck height varies around the vessel, and the decoration is very inconsistent. The decoration is unlike anything else in the collection, although they are recognizable in the Rainy River vocabulary at a rudimentary level. The combination of left oblique CWOI over right oblique CWOI with a gap in between does create a chevron of sorts, although quite unlike that on a typical Rainy River Composite vessel. The stamps below at the base of the neck are in an acceptable position, but they are asymmetrical and coarsely applied which again is not typical. There is also oblique CWOI on the rim which helps add credence to speculation of some association to Rainy River traditions.

Plate 13.4-33: Vessel 67 (75% actual size)

This pot has a high proportion of temper and is not well consolidated in the neck, perhaps due to the exceptional thickness. In contrast, the shoulder and body sherds show greater compaction and density. A patched crack can be seen on DlLg-33:08A/ 21710, running from the base of the neck up to the rim. The patch, like the others seen in the assemblage, consists of clay applied to the interior and exterior. Whether this was done prior to the initial firing or was applied after is difficult to tell. There is some carbonization that has permeated the crack from the exterior.

Vessel 80

This pot is a companion to Vessel 56 with the same dimensions, profile, and quality. Conceivably, it was made by the same individual. It is completely undecorated giving us even fewer clues than Vessel 56. This profile enters into the Rainy River Composite repertoire during the Level 2 Complex, but where it was adopted from is beyond the analysis of this material. Undecorated vessels appear commonly in Rainy River ceramic assemblages (Lenius and Olinyk 2009:pers. comm.) whether they served a particular purpose, or were simply the result of a vessel drying inadvertently before decoration could be completed, or perhaps they represent an as yet unidentified tradition, is all speculation with very different connotations at this point. Whatever the case, they were present. Some may even represent the formative explorations of what was to become what we understand as the Winnipeg River Complex. None of these questions can be answered at this point and unfortunately, again, the radiocarbon dates can not be reliably applied to the recoveries.

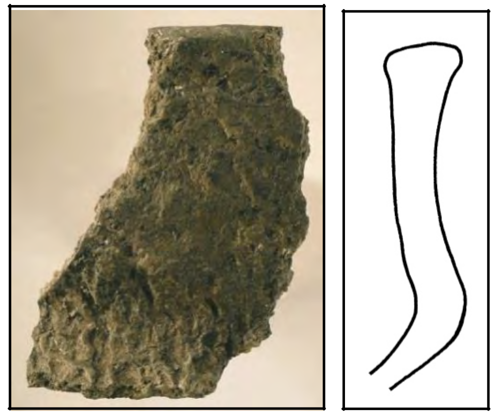


Plate 13.4-34: Vessel 80

Vessel 81

This is the smallest expression of the Little Owl type on Level 1, comparable in size to the vessels of this type recovered from the lower levels (see Vessels 10, 106, and 115). This may be a cause to consider this pot as having been displaced by rodents, brought up from a lower occupation. The punctate and boss and the small size are indicators that point to a possible relationship with materials found in the lower levels of the Level 2 Complex or Level 3. One possible indicator of this vessel being later is the presence of decoration on the interior, which does appear in Level 3 but on a completely different vessel type. It is more common in Level 2 and Level 1 (Section 13.5.2.5).

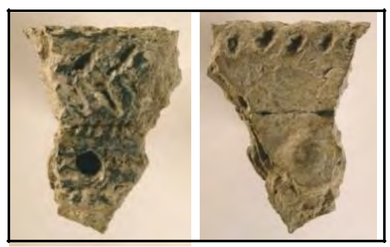
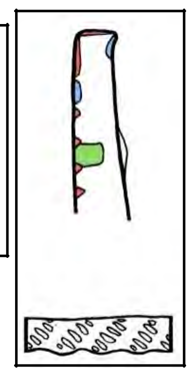


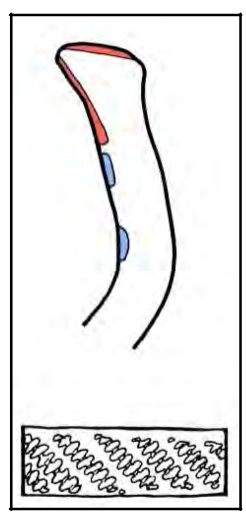
Plate 13.4-35: Exterior and Interior of Vessel 81



Vessel 83

This is another vessel considered as part of the 'collapsed' or 'shortened neck' tendency seen in Level 1. This pot has the pseudo-chevron consisting of CWOI and smaller stamps and a row of stamps near the base of the neck without horizontal CWOI. This combination is seen in vessels with a much taller neck all the way back into Level 3, Kroker Mid-neck. On those vessels, this decorative combination

Plate 13.4-36: Vessel 83



brackets the mid-neck, helping to emphasize the mid-neck zone or band, whether the area is blank or has horizontal CWOI. On this vessel, the mid-neck band is not entirely ignored but the contrast of decorated and undecorated bands is lost along with the strong sense of negative space. And, whereas, the pseudo-chevron defined a proportional zone on the Rainy River Pseudo-chevron type, in this case the lower row and upper row of stamps seem to work together opposing the oblique CWOI and essentially visually disassembling the pseudo-chevron, despite the fact that it is well executed. When viewed in this way, the decoration takes on a balanced 2:1 split of the available neck space as opposed to something closer to 3:1. Whether this was intended, or the neck height reduction simply forced the desired decoration to be compressed, is what makes this vessel curious in the context of the other vessels.

Like the other pots of the collapsed neck tendency, this vessel has similar thickness to the taller neck vessels and the diameter is similar as well. There also appears to be a lamination seam through the neck.

Vessel 84

Plate 13.4-37: Vessel 84, Exterior and Interior

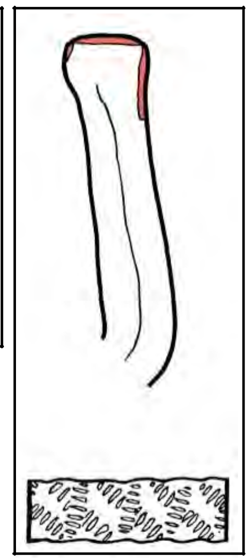


Plate 13.4-38: Rim

This vessel is likened to Vessels 13, 93, and 110 (Dogwood type). This group may not be part of the same lineage as the other Rainy River Composite types. As pointed out in the discussion of Vessel 13, these vessels exhibit a minimalist approach to decoration, the expressions are confined tightly to the areas just below the interior and exterior lips, the lips themselves, and the rim. It appears that not all these zones need to have impressions on any one vessel, as some don’t. Of the four vessels isolated for this group, three have at least three impression sequences. In two cases (including this vessel), there are compound impressions in the same location (or decorative zone), i.e., criss-cross CWOI on the rim (Vessel 84). This vessel has very small CWOI impressions on the exterior lip, perpendicular to the rim. On all four, the exterior textile impression runs up to the exterior lip which is not smoothed. The necks are straight and vertical to angled outward. If this group is representative of a distinct type or Complex, it has yet to be defined. There may be a connection with Kenosewun Complex (McKinley 2001), a horticultural component defined from materials recovered from the Lockport West Site (EaLf-2), with later dates of circa A.D. 1400. Much of the decoration found on vessels committed to that Complex exists on the rim and lip area. Further research is required to evaluate a possible ancestral relationship between the Dogwood type and the Kenosewun Complex materials.

Vessel 93

This is deemed to be of the same group as above based on the decorative approach. The smallest vessel of the group, it has a straight but outward angled neck and it is the only one that has a portion of the shoulder intact. It appears that, when extrapolating the curvature, the shoulder transition to the body would have been negligible. The vessel would have very little constriction at the neck. This creates a very different vessel form. Essentially a globular form with a slight in-curve at the neck juncture, then flaring out again quickly, it appears as though the mouth aperture would have been roughly equal in diameter to the maximum of diameter of the body. This type is most likely originating from outside the Rainy River tradition. It also has some similarities in appearance to Psinomani vessels, a Plains Village vessel type (Syms, Skalesky and Fleury 2009; Skalesky, Syms, and Fleury 2009).

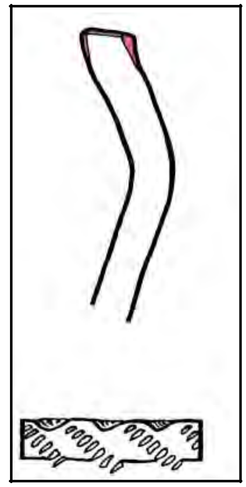
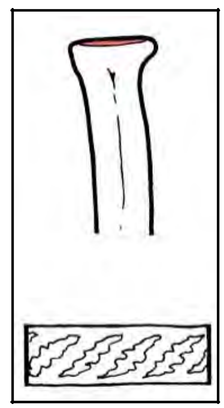


Plate 13.4-39: Exterior and Interior of Vessel 93

Vessel 110

This vessel has been placed into the same category as the previous two. It is, in some ways, the odd one out. It has oblique CWOI on the rim and possibly small stamp-like impressions on the exterior lip. There was some modelling of the rim after the decoration was applied, the ends of the CWOI on the rim are obliterated from the lips being smoothed. It is difficult to confirm from one small sherd, but that seems to be the extent of the decoration. The neck is straight, the stance appears to be vertical, but below the neck is complete conjecture as there is no hint of transition. Like the others, it is well consolidated and textile impressed to the exterior lip.

Plate 13.4-40: Vessel 110



Vessel 111

From the decorated lower neck and shoulder, it is clear that this is a Rainy River Composite vessel, but it has been identified from only that, no rim has been identified. From what is visible, this pot was distinctive. The stamps would be best described as asymmetrical-crescentic to bi-lobed and vertically oriented in horizontal rows circling the lower neck and continuing in draping necklace pattern around the shoulder. On the neck, above the stamps, can be seen the distinctive impression of horizontal CWOI on the

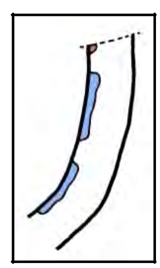


Plate 13.4-41: Vessel 111

edge of the fracture line. The quality of the decoration, the pattern, and clay characteristics point to a marked similarity to Vessels 3 and 16. When the physical associations with other vessels are reviewed, we find that two vessels in particular surround Vessel 111, those are Vessels 24 and 30. All four of these vessels were identified as Holly Oblique type, but none of these vessels are refits with Vessel 111. These things combined are highly suggestive of a linkage. The profile stance of Vessel 111 appears to have a very similar neck profile to Vessel 30. The combination of CWOI and stamps would place it as the same type as Vessel 3, the Holly Oblique, CWOI and Stamp type. The stamps on this vessel are larger than those on Vessel 3, more akin to those on Vessel 16. Without the rim portion, it is impossible to say if this vessel also had the single trait which ties these vessels together, the short and very oblique CWOI on the exterior lip.

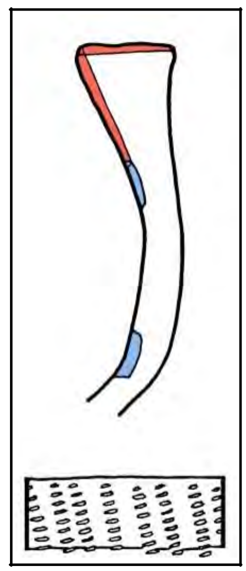
13.4.2 Level 2

13.4.2.1 Vessels Uncommitted to a Single Level from the Level 2 Complex

Vessel 35

This vessel was recovered from Levels 2, 2A, and 2B. The majority of the sherds (nine sherds) were recovered from Level 2A. The sherds of Level 2A had the lowest average sherd weight. If the average sherd weight is relevant to vertical position, which it may be, Level 2B would be the first choice for level of origin at 10.9 grams/sherd for three sherds, and they were widely dispersed. The Level 2 sourced sherds statistically fall in between those of Levels 2A and 2B, with fewer sherds than Level 2A and lower average weight than Level 2B. An argument could be made for any of the levels.

Plate 13.4-42: Vessel 35

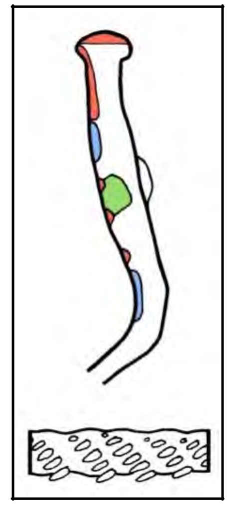


Vessel 35 is one of the tall neck vessels with mid-neck emphasis (Kroker Mid-neck type) isolated as part of a trend which runs from Level 3 through the Level 2 Complex and possibly into Level 1. This vessel also is of interest in tracing the pseudo-chevron trait (Rainy River Pseudo-chevron type). The CWOI on the rim range from perpendicular to slightly left oblique and the mid-neck is smooth and undecorated.

Vessel 45

This vessel was recovered from nine different excavation units and four levels. In an attempt to decide which level to assign it to, it was found that the greatest mass and average sherd weight was found in Level 2B, but the greatest quantity and lowest average sherd weight was found on Level 2. Level 2A material had an average sherd weight in between that of Level 2 and Level 2B, but had the fewest sherds except for Level 2C which had only one sherd. Thus, Vessel 45 also remains uncommitted to a specific level.

Plate 13.4-43: Vessel 45



With a thin, incipient-S profile, stamps, punctates, and combing, Vessel 45 is categorized as Rainy River Coalescent. The Coalescent designation infers that this vessel would be more fittingly placed originating on one of the lower levels of the Level 2 Complex. The incipient-S neck profile with combing suggests that this neck form was present quite early in the development of Rainy River expression. The decoration on this vessel is a pseudo-chevron comprised of right oblique CWOI above left oblique linear stamps, above three rows of horizontal CWOI, with vertically oriented linear stamps below that at the neck juncture. It is considered for this report as a Coalescent expression of the Rainy River Pseudo-chevron type. The punctates are positioned between the top two rows of horizontals, more or less centred on the neck. Paste quality suggests that the clay was well worked and consolidation is very good.

Vessels 60 and 62

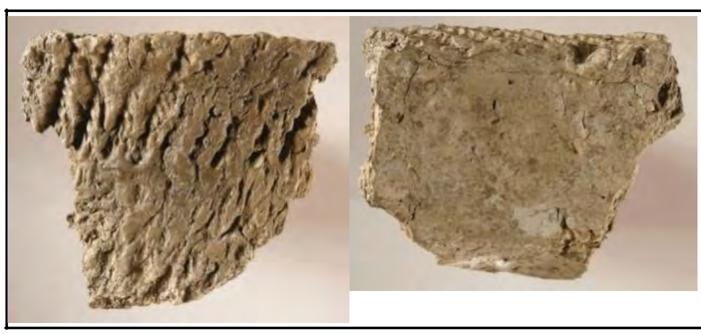
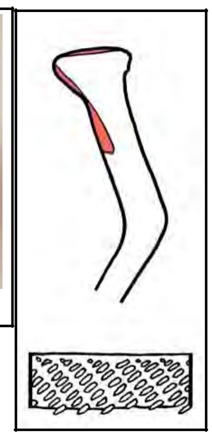
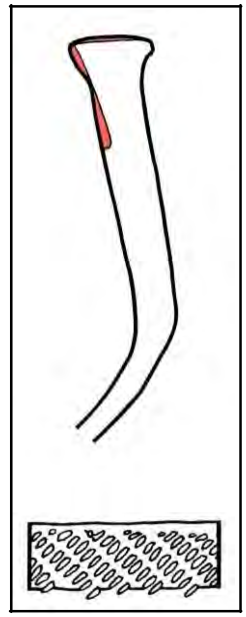


Plate 13.4-44: Exterior and Interior of Vessel 60



These were at first confused for the same vessel. They are sprang impressed up to the exterior lip with oblique CWOI on the rim and below the exterior lip. The profile is vertical and straight to slightly flaring on Vessel 62. Vessel 60 is thinner and smaller, with a shorter neck height and angled outward stance. Other than the neck height and profile stance, the differences are subtle. But in general, Vessel 60 is slighter. The cord wrapped tool used on both appears nearly identical. The width of the tool including the cord wrapping is the same, the wrap spacing is the same, (a measurement from the outside of the third winding to the outside of the sixth winding from the tip is the same on both vessels), and the cord width appears the same. This suggests the same tool was used to decorate the sherds from both vessels.

If reconstruction efforts reveal that Vessels 60 and 62 are in fact one vessel, it would without doubt be a very lop-sided pot. When taking the overall quality exemplified by these vessels into



consideration, this does not seem probable. It is almost certain that these two vessels were made by the same person. Vessels 43 and 52 are likewise considered to be examples of this same maker's work. These vessels exhibit an extremely restrained range of expression, the possibility that this limited expression is found on vessels that could be ascribed to a single maker raises some interesting questions (Section 13.5.3.6).

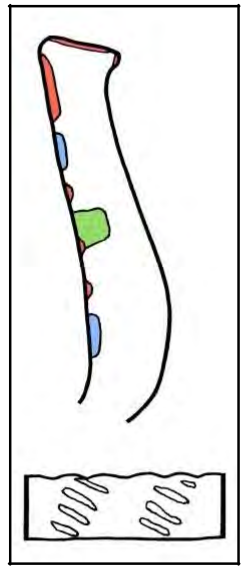
The few units from which these two vessels were recovered are considered taphonomically problematic. Units E15, E16, E17, and F16 are central to a major disturbance in the stratigraphic sequence of the Level 2 Complex. Only one sherd, from Vessel 60, was recovered from outside this group of units, Unit C15 (Level 2). This same sherd is also the only sherd from either vessel to appear in Level 2. This could be an example of rodent displacement. But, as the only sherd from outside the highly disturbed area, it may actually indicate more accurately the proper occupational level.

Plate 13.4-45: Vessel 62, Exterior and Interior

Assigning cultural affiliation is also difficult. The tall neck profile of Vessel 62 is Blackduck-like but that is where the similarity ends. At this point, these pots will be placed in the Rainy River Composite because of the lack of supporting Blackduck-like or Laurel-like traits. The vessels of this group have been segregated as a type unto themselves to highlight their distinctiveness. For this report, they will be referred to as the Rainy River Willow type.

Vessel 61

Plate 13.4-46: Vessel 61

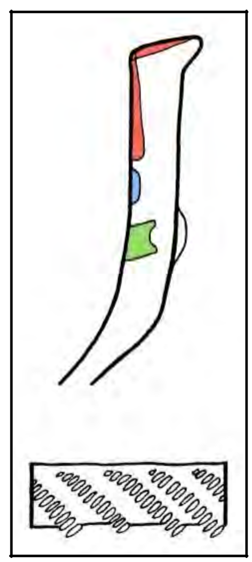


Two rim sherds were recovered from the SW sump pit and one was refitted to a rim sherd from within the excavation area, Vessel 78. The other (Vessel 61) is a vessel not identified within the parameters of the excavation area. Despite this sherd not coming from an excavated context, it is very likely that it belongs to the Level 2 Complex, possibly one of the lower levels due to its Rainy River Coalescent characteristics. It is distinctive in several ways, but also has many similarities to other vessels of the Level 2 Complex. From the standpoint of the decoration, the combination of motifs, proportioning, and positioning, this vessel is very similar to Vessel 45. Where it differs is the angles of the oblique elements below the exterior lip and the rim decoration. Large, slightly right oblique CWOI on a very smooth rim, plus the very small CWOI on the interior lip, are attributes seen in the later levels, but this vessel also is combed which ultimately will place it into the Rainy River Coalescent. This vessel is significantly thicker than Vessel 45 and the profile is straight and perhaps angled outward slightly. The interior is brushed horizontally. The consolidation is very good and there appears to be a structural lamination seam, suggestive of a 2-ply approach to building the neck portion of the vessel. It has been placed with the Rainy River Pseudo-chevron type, although as mentioned, a Coalescent and presumably an early expression.

13.4.2.2 Level 2 Vessels

Vessel 6

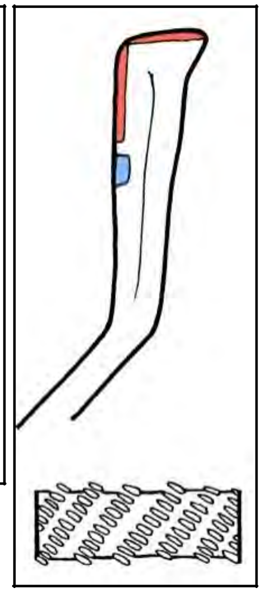
Plate 13.4-47: Vessel 6



Comparatively similar to Vessel 71 of Level 2A, these two vessels share the same combination of decorative elements but the profile is subtly different. This vessel has a straight to slight inward angled neck, creating a soft transition to the shoulder like Vessel 71 seems to have, although Vessel 71 is more vertical than Vessel 6. This profile suggests a connection to the Coalescent Soft Shoulder type. No stamps are found near the very subtle neck juncture and the mid-neck is somewhat emphasized by the margin of textile obliteration. Whether this margin was a decorative consideration is hypothetical. The presence of punctates on this Rainy River Pseudo-chevron vessel and the lack of a defined neck/shoulder juncture combine to push it into the Coalescent. The punctate is apparently carried forward on certain vessel traditions, as it is seen on all levels. The frequency of its appearance in this collection diminishes from Level 3 to Level 1.

Vessel 7

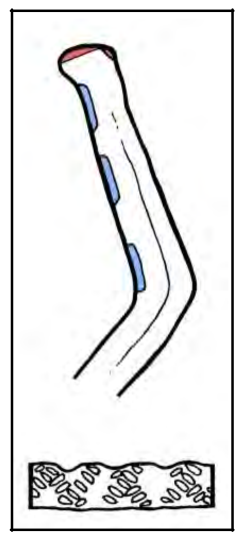
Plate 13.4-48: Vessel 7



Right oblique CWOI on the rim and below the exterior lip creates the distinctive look of continuous lines wrapping over the two planes. This does not appear on many vessels in this assemblage. A single row of small vertically oriented ovoid stamps on a smoothed neck create a look distinct from the pseudo-chevron. Vessels 117 and 7 share this combination of decorative elements and a straight vertical profile. The absence of decoration on a smoothed neck appears to be a motif of its own on some vessels. These two vessels are unique in the collection and represent yet another distinct variation. Vessel 117 shows that a different cord wrapped tool and stamp was used, weakening any consideration that they may have originated from the same maker. These two vessels and similar vessels in Level 1 prompted their isolation and type designation under the Rainy River Plain name.

Vessel 8

Plate 13.4-49: Vessel 8



This pot is another which floats in the grey areas of currently defined Rainy River ceramics. It is Duck Bay-like, but the stamps are small according to Lenius and Olinyk's comparative plotting of Duck Bay versus Bird Lake stamp dimensions (Lenius and Olinyk 1990) and they are actually on the Bird Lake side of the curve. This, and the fact that it has criss-cross CWOI on the rim, which is atypical for Duck Bay vessels and Bird Lake also, point away from it being considered Duck Bay without reservations. The vertical neck and sharp transition to the shoulder are a Duck Bay vessel form however. Are we seeing parallel or ancestral expressions, or a regional variety? Unfortunately, we can't say because of the hydrocarbon contaminated radiocarbon dates.

Vessel 9

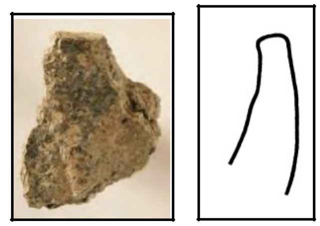


Plate 13.4-50: Vessel 9

The small size of the single sherd that represents this vessel offers only suggestions, but it appears unique in the collection. No decoration is clearly defined, though two vertical lines are possibly shallow trailed markings. The undecorated rim is smooth as is the exterior surface. The neck profile tapers upward to a fairly narrow rim. The sherd is too small to estimate profile stance or vessel dimensions but it appears that this vessel did not have a well defined or constricted neck juncture typical of most Rainy River ceramics. Some of the miniature vessels from burial mound contexts show a profile that could be considered familiar to this pot, but this does not appear to be a miniature. Cultural affiliation would be entirely speculative, but there are also vessels with similar attributes known from the northeastern Plains/Woodland boundary region, south of this site which share similar characteristics.

Vessel 10

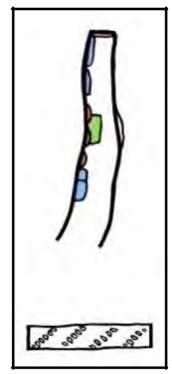


Plate 13.4-51: Vessel 10

This vessel has the symmetrical chevron motif below the exterior lip like Vessel 33 of this same level. It has a small rectangular punctate and the stamps below the horizontals are two rows of very small individual stamps creating a chevron running in the opposite direction to that above. Whether this was intentional is difficult to tell as the stamps are small and the execution is variable. This lower chevron is unique amongst the Little Owl type vessels from Level 3 into Level 1, and the rest of the collection.

Vessel 11

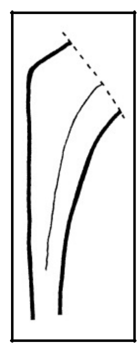


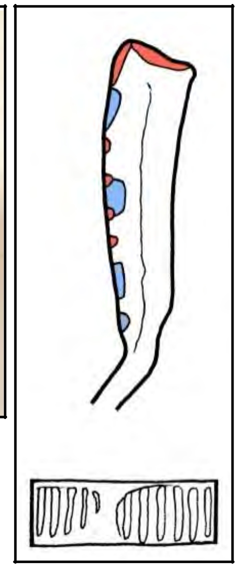
Plate 13.4-52: Vessel 11

This vessel is likely of western origin. This single sherd illustrates the sharp shoulder transition found in materials from Saskatchewan and even into Alberta. A similar shoulder form is found on a vessel from the Snyder Dam Site, on the Souris River (Syms 1979). That vessel has an associated date of circa A.D. 1200. The vessel wall below the shoulder junction appears to be vertical and cord marked as opposed to a woven impression. Speculating on the cultural significance of a single sherd which does not illustrate the rim or neck is probably unwise, but this is not a Rainy River Composite form and it implies a relationship with peoples from the north-central plains and the Parklands boundaries. More research will be required before this possible connection can be evaluated. Vessel 53 from Level 1 likely has similar origins.

Vessel 12

Although this vessel is most likely Rainy River related, it has peculiar decorative and structural characteristics. While the decoration is like that of the Little Owl type (see Vessels 10 and 33 from Level 2 and Vessel 37 from Level 2A), several other characteristics set it apart from those. Instead

Plate 13.4-53: Vessel 12



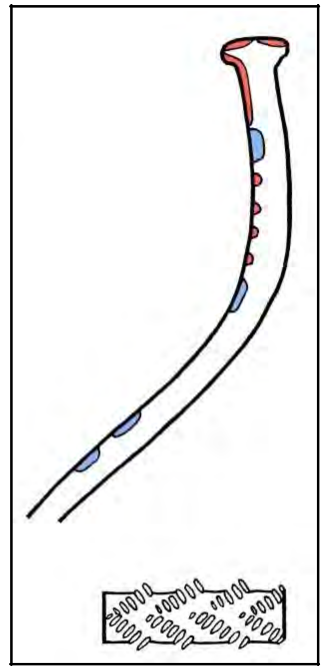
of a single stamp or punctate on the horizontals this vessel has a continuous row or perhaps a set of at least five ovoid stamps. Below the horizontal CWOI, it appears that there are at least two sets or rows of ovoid stamps. The presumption is that these would have encircled the pot. The lower portion of the neck is represented by a smaller sherd that refits to the larger upper sherd. Unfortunately, the decoration is difficult to assess from the smaller sample size of the lower sherd, but it appears that there may have been further decoration onto the shoulder. One impression looks like a horizontally oriented ovoid stamp, larger than the others, and below that a linear horizontal trailed mark. These last two elements are not complete enough to describe the intent definitively. The decoration on the rim is unique also. The cord-wrapped tool created wide impressions that are aligned parallel to the rim, instead of the usual oblique or perpendicular orientation. The neck is much thicker than the shoulder, quickly tapering down from 9 mm, just below the horizontal CWOI, to 4 mm just below the neck juncture, a vertical distance of only 16-17 mm. This disparity of thickness and the rapid thickening above the neck juncture is interpreted as a 2-ply laminated neck with the lamination applied to the exterior. The angle of transition from the neck to the shoulder is comparatively slight, but again, we are only able to assess the lower portion of the neck through a single small sherd. It appears, however, that this vessel had a very soft shoulder. This is a trait shared with certain vessels from Level 3, perhaps a latent Laurel influence. Despite the unique traits this vessel has, its decorative structure is more akin to the Little Owl type than anything else. If this vessel is considered as that, it expands the range of potential expression suggested in the definition of that type. But, as it appears with much of the rest of the material from this site, there is the possibility that there are multiple influences affecting the formation and decoration of this vessel, and it is likely that they are not all accounted for here.

Vessel 28

This pot has several features that indicate strong ties to the Bird Lake Complex. The stamp size is 2 mm wide by 4.5 mm long, slotting into the middle of the Bird Lake stamp dimension cluster illustrated in Lenius and Olinyk (1990:Figure 8.14). The shoulder stamps on this vessel create a necklace pattern. The CWOI on the rim creates a symmetrical chevron pattern encircling the mouth of the vessel. The neck profile is angled out with only a slight outward flare and this is not a typical Bird Lake form which would usually have a more pronounced flare. The pseudo-chevron on the upper neck is not considered to be a Bird Lake motif, especially when produced with CWOI (Lenius and Olinyk 1990).

The dates proposed for the fluorescence of the Rainy River Composite (including Bird Lake and Duck Bay) of A.D. 1100-1350 (Lenius and Olinyk 1990) compared with our working date range could suggest that the Level 2 Complex occurred early in the establishment of Rainy River Composite expressions. The ceramics appear to be manifested with expressions that would logically fit into that scenario also.

Plate 13.4-54: Vessel 28



Lenius and Olinyk also identified a broad trend for neck flare angles to increase over time. This particular vessel in the context of this assemblage seems to be hinting that it should be considered as an early form of what would later be defined as Bird Lake. This vessel also adds credence to the speculation put forth in this report that the pseudo-chevron below the rim on the upper neck was a commonly adopted motif in the earliest expressions of the Rainy River Composite.

The pseudo-chevron may have been part of the range of expression of Bird Lake, later to be abandoned, disassembled, or simply modified and added to. At this point, this vessel will be assigned affiliation to the Bird Lake Complex as Bird Lake-like. Another possible arrangement to explain this vessel and its apparent Bird Lake affinity would assume that it is a parallel Parklands expression of an otherwise Boreal Forest entity. The Bird Lake qualities being tempered by cross influences with Plains/Parkland traditions. Neither of these scenarios can be resolved in this report, though in the light of this assemblage the latter seems probable.

Vessel 29

There is an obvious range of quality in the individual vessels. Vessel 29 appears to have been manufactured with expedience. The control of form and decoration are not precise, but it was completed with confidence and no doubt functioned well. The body portion of the pot is very well consolidated, though less care was paid to the neck area during its formation. This vessel may have been purely utilitarian—function before form. The neck profile shows a straight neck with an outward angle. The aperture estimate for this pot is around 18 cm, but the body was significantly larger than that, around 25 cm at the apex of the shoulder. There is no stamping above the horizontal motif which is unusual for Level 2 Complex vessels. The punctates are casual and some bossing occurs, though not pronounced by any means. This combination of decorative elements alone could place a vessel into Blackduck, but this vessel has enough atypical Blackduck characteristics that it sits more comfortably into the Rainy River Composite progression that it is surrounded by. The smoothed and rounded rim is also a departure. The surface appears to be sprang impressed, but it is quite coarse.

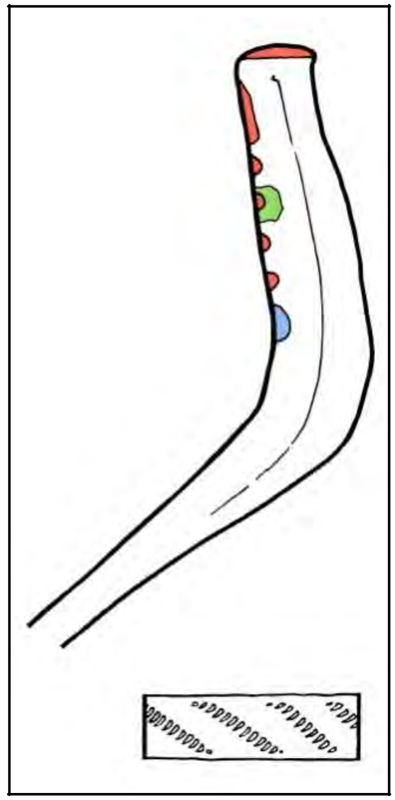
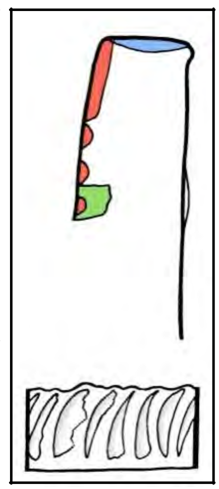


Plate 13.4-55: Vessel 29

Vessel 31

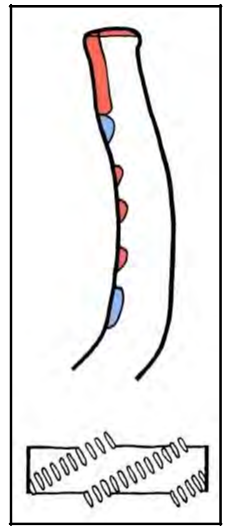
This vessel is part of the identified Rainy River DDC trend identified first in Level 3 with Vessels 94 and 113. The primary characteristic is the rather definitive approach to the application of the CWO decoration. The deep impressions are close together and are applied in a very controlled manner. Vessels 94 and 113 are considered the Coalescent end of this lineage. Vessel 31, although maintaining the decorative approach, no longer has the Blackduck-like neck profile and the rim decoration is a complete departure with thin crescentic stamps applied almost perpendicular to the rim (possibly finger or thumbnail impressions). The neck is also very thick and slightly contracting at the rim. In this way it is similar to Vessel 12, which also shares stamped decoration on the rim. No sherds have been identified from below the horizontal CWOI of this pot. The profile and extent of decoration are not fully understood, but because of the decorative approach it will remain defined as a Rainy River Composite DDC vessel. It appears to have a lamination seam through the neck suggesting a second layer of clay was added to increase the thickness.

Plate 13.4-56: Vessel 31



Vessel 32

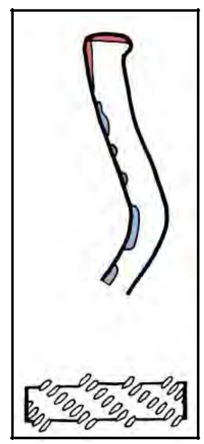
Plate 13.4-57: Vessel 32



Vessel 32 and 46 (from Level 2B) are the only two vessels which have horizontal CWO stamping below the upper oblique CWOI (Vessel 78 has horizontal stamps, but it is decorated with dentate stamps not with CWOI). These two vessels were segregated based on the lower row of stamps and a few other minute differences (see description for Vessel 46, Level 2B). On Vessel 46, these stamps are impressed with the tool held at a certain angle from the vessel surface, whereas on Vessel 32, they are impressed directly at roughly perpendicular to the surface. It should be acknowledged that it is possible they could be the same vessel. Perhaps reconstruction efforts could give us the definitive answer. Vessels 32 and 46 are examples of the variety born out of the diffusion of the Coalescent types which first adopted the pseudo-chevron motif. With the absence of combing and punctates, this vessel falls into the Rainy River Composite and remains undefined despite their distinctiveness.

Vessel 33

Plate 13.4-58: Vessel 33



This vessel is a representative of the Little Owl type isolated in the assemblage. Along with Vessel 10 from this level and Vessel 37 from Level 2A, they are the only pots of this type in the Level 2 Complex. This type carries over from Level 3 and appears also in Level 1. On Vessel 33, the chevron on the upper neck above the horizontals is not quite symmetrical. The lower impression is a linear stamp unlike the pseudo-chevron variety where the lower impression is usually an ovoid or a CWO stamp. The precise and even approach covers the entire neck. On this vessel, there is a second row of vertically oriented stamps below the neck juncture. Vessel 33, like the others of this type, has even thickness through the comparatively thin neck. The profile would be described as in-curved and angled out. A shoulder sherd shows that Vessel 33 had a rounded shoulder. Since this type appears contemporary with Rainy River Coalescent and Composite, it is troublesome for the contention that all Rainy River ceramics were in flux during the transition. It appears that perhaps some were less affected.

Vessel 34

This vessel is identified as the Aspen type (like Vessel 2, from Level 1) of the Rainy River Composite. Lenius and Olinyk (1990:100) isolate the paired (or sets of) stamps in the punctate position of the neck as one of the traits on their list of suspected additional, but undefined, Rainy River Composite Complexes. This vessel has this motif.

The form of this pot would likely be placed in the realm of the Bird Lake Complex, for the liberal use of stamping if nothing else. This pot and Vessel 2 offer these suggestions, but specific traits exclude them from our current definition of Bird Lake. On Vessel 34 there are two rows of stamps (a Bird Lake trait). The upper row is made of small crescentic stamps impressed at an angle, the lower row is vertically oriented linear stamps impressed roughly perpendicular to the surface. This approach does not create a pseudo-chevron which places it with a small and very diverse group of vessels from the Level 2 Complex.

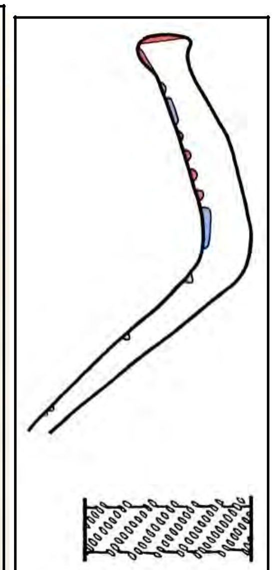


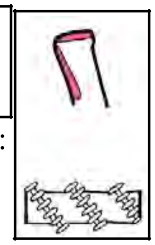
Plate 13.4-59: Vessel 34

One very distinct attribute for Vessel 34 is the trailed design which extends from the base of the neck, over the shoulder, and onto the body portion of the pot. This motif has not been completely revealed by the refitting sherds, but enough of the design is present that we can see the general structure of the design. It appears to be made up of an expanding triangular or delta form emanating from the base of the neck, defined by multiple asymmetrically placed 'radiating' lines. The other aspect of the design is a series of horizontal lines presumably infilling between repeated delta forms. It is assumed that these two design components repeat to create a pattern. The complete design is not decipherable with any confidence, but it is inferred from the estimated dimensions of the vessel that the overall design was based on four or five evenly spaced radials. Similar delta forms have been interpreted as Thunderbird tail motifs, but these kinds of images have cultural connotations even today. Declaring an interpretation based on a small reconstructed portion is unwise. Decoration below the neck is considered to be a Rainy River Composite trait when executed using stamps. Trailed rectilinear motifs are not. Duck Bay variation is considered to include a radial approach to stamped shoulder decoration (Lenius and Olinyk 1990) and there is a certain relationship known to have been present with Devils Lake/Sourisford ceramics which are distinctive for the trailed and incised designs (Dawson and Peach 2002). Perhaps we are seeing a similar arrangement exemplified in this vessel. Affiliations implied by comparing decorative motifs from elsewhere must be accepted as suggestions at this point. Expanding linear forms are seen on Laurel ceramics and on traditions of the northern Plains. Obviously, further work is required to establish a better understanding of what this vessel means to the social/political world from which it comes.

Vessel 36

All that can be said for this vessel is that it is Rainy River. It has oblique CWOI on the rim and below the exterior lip. There may have been a row of oblique elements below these CWOI but not enough remains to be certain. The thickness is of interest as it appears that the rim width was not much more than the thickness of the neck. This might suggest an association with the Little Owl type, but this can not be said for sure.

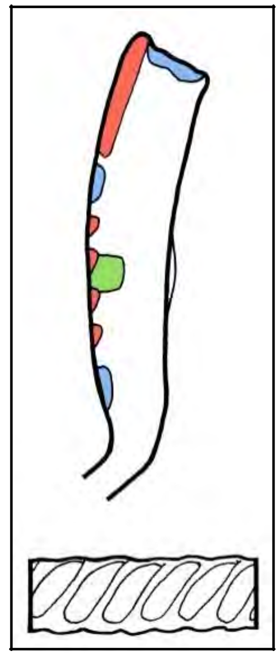
Plate 13.4-60: Vessel 36



Vessel 38

Vessels 12, 31, and 38 have similar rim treatment, where the distance lip to lip is less than the upper neck thickness. These three vessels as well as Vessel 57 (Level 2B) and Vessel 58 share that unusual form trait. When viewed in profile, the line of the exterior neck is convex, or appears to bow outward and, except for Vessel 58, the interior does not, tending to be straight from the neck juncture up to the rim. Vessels 12, 31, and 38 also share thinning toward the neck juncture and unusual stamped rim decoration. This thickening of the mid-neck would have no appreciable structural value, and is thus being considered a trait intended to create a distinctive appearance alone. Whether these vessels are all somehow connected by more than these traits, is impossible to know at this point. Vessels 31 and 38 have the same dense, deep and controlled approach to the application of the decorative elements. Thus, they are both identified as Rainy River Composite DDC. This is despite the fact that the profile of these vessels is quite different from the others of this type. In this case, since the DDC approach was identified in Level 3 and the peculiar profile exhibited by Vessel 38 and others was not, it was decided that the DDC approach was a traceable line of continuity and the profile was not, and thus these vessels were placed in that type by default. This is admittedly imperfect. The profile, as distinct as it is, likely represents a tradition of its own though it is not reflected here convincingly, mostly because of the possible influence from the incipient-S neck form that may be imitated to some degree. Some added significance might be given to the DDC approach for the very fact that it appears on more than one vessel profile. On Vessel 38, the oblique ovoid stamps and the oblique CWOI are angled in the same direction, which defies the pseudo-chevron norm for the Level 2 Complex. This is an uncommon trait, shared only with vessels identified as Rainy River Plain. On those vessels, the stamps are typically vertical or angle neutral, contrary to that on Vessel 38. The punctates on Vessel 38 are on the small side and, despite being impressed quite deeply, bossing is subtle. It is suggested that vessels with this unusual profile should be watched for. It may prove to be the basis for defining another discrete tradition within the Rainy River ceramic repertoire. The slope of the shoulder appears to be fairly steep, suggesting a subtle shoulder to body transition.

Plate 13.4-61: Vessel 38



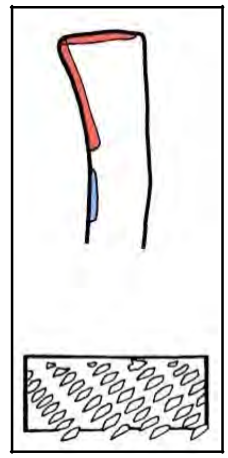
Vessel 44

Plate 13.4-62: Vessel 44, Exterior and Interior

We have minimal representation with this vessel. Only the rim and upper neck have been identified. The distinctive features of this vessel are the wide, flat CWOI on the rim. This element is seen on several other vessels in the assemblage. It appears not to be restricted to a single type, but is more prevalent in the upper levels. The same tool appears to have been used for the oblique elements below the exterior lip. The consolidation is quite poor, contributing to its lack of preservation. The colour of the paste is yellowy-brown which is not typical. These last two observations may be suggestive of extreme re-heating after a poor initial firing.

Vessel 52

Plate 13.4-63: Vessel 52

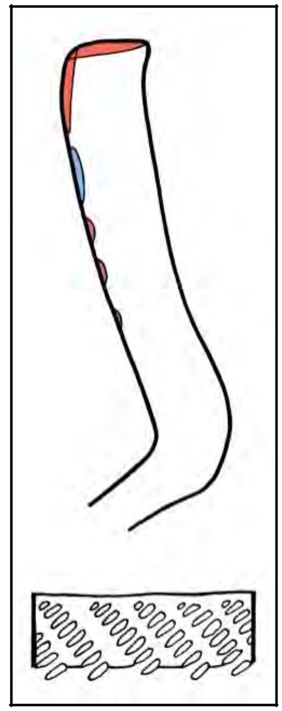


This vessel is part of a unique group of four pots that are being interpreted as being made by the same person. If it weren't for the oblique stamps on this single sherd, it would have been lumped with one of the other vessels. They all share sprang impression up to the exterior lip with right oblique CWOI on the exterior upper neck and left oblique CWOI on the rim. The angles and lengths of the CWOI are the same, and the profiles appear to be also, but for Vessel 60 (a smaller vessel). The stamps on this vessel are left oblique and linear to slightly crescentic (perhaps semi-lunate). The two elements do not create a convincing pseudo-chevron as there is a gap between the stamps and the CWOI above, which detracts from the motif. The spacing of the stamps is too wide. Typically, the two elements of the pseudo-chevron motif are touching and the spacing roughly coincides to create the illusion of the repeating pseudo-chevron. With the addition of the stamps, a feature that Vessels 43, 60, and 62 do not have, this vessel is placed in the Rainy River Composite without hesitation. By their obvious relation to Vessel 52, the others are also considered Rainy River Composite. They are grouped as the Rainy River Composite, Willow type.

Vessel 58

A Rainy River Pseudo-chevron vessel with a tall incipient-S profile, Vessel 58 is quite similar to Vessel 29 in overall form. This vessel is heavy on grit-temper, the paste consolidation is very good, quite dense. In general terms, the thicker walled vessels are usually less well consolidated than the thinner vessels. Vessel 58 is an exception. This pot has no punctates nor does it have a lower row of stamps which makes this pot somewhat distinctive.

Plate 13.4-64: Vessel 58



Vessel 64

This variety of vessel may be the most focussed expression of the Rainy River Pseudo-chevron type which comes into fruition in the Level 2 Complex. Although the profile is incomplete and we can not tell if there might have been another row of stamping at or near the neck juncture or not, the pseudo-chevron is the primary motif. There is some vertical and horizontal brushing on the exterior though the vertical is not very visible and was likely not intended to be decorative as combing was formerly. The interior shows horizontal scraping at and above the neck juncture. The oblique CWOI on the rim are large and deeply impressed, with relatively wide spacing creating a nearly crinolated appearance. The cord wrapping on these impressions is obliterated by accumulated clay on the tool. The rim was roughened prior to decoration. With the possibility that there is no further decoration beyond the visible, this vessel might be compared to the Rainy River Pseudo-chevron vessels of Level 1 which are considered tail-end expressions of a formerly significant decorative motif. But on Vessel 64, unlike those of Level 1, the execution of the pseudo-chevron shows commitment to the motif.

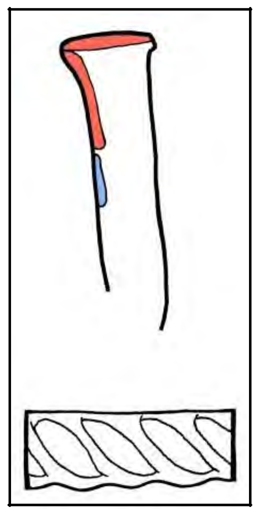


Plate 13.4-65: Vessel 64

Vessel 70

This is the only pot with a three stage alternating oblique motif, referred to as a herringbone motif. This motif is included in the range of decorative variability for the Duck Bay Complex. The neck is straight with a significant outward lean and thins toward the upper neck before widening again at the rim, which is angled inward. This is being considered a Duck Bay-like vessel, because the bottom two rows of the herringbone are CWO stamps and the profile is not incipient-S.

The K-line at the north edge of the originally proposed impact area exhibits vessels of a different character than the rest of the excavated area. The possibility remains that this locus might be an occupation area separate from the levels of the occupation area defined in the primary excavation block, and as such might be culturally distinct to an undetermined degree.

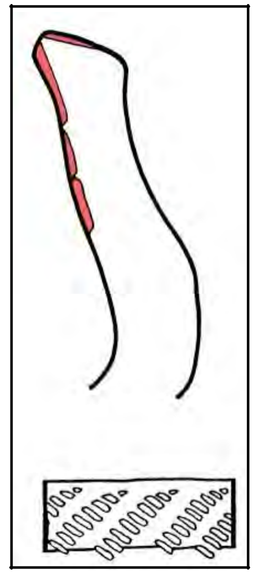


Plate 13.4-66: Vessel 70

Vessel 74

This is a Bird Lake vessel in form at least, but some of the decorative elements are considered by Lenius and Olinyk (2009:pers. comm.) to be non-Bird Lake. Those include the Blackduck traits of punctate/boss and combing, both of which this vessel has. Other unique elements on this vessel, also not considered typical for Bird Lake, are the wide oblique CWOI on the rim and large oblique linear stamps used on the upper neck like CWOI. All in all, this vessel appears to have the fundamental Bird Lake vessel neck flare, with stamps and horizontal CWOI, with the addition of punctates and bosses and combing, Blackduck traits. All these things have connotations for the origins of Bird Lake. Unfortunately, the dates that we have from the Level 2 Complex are not reliable, and the K-line from which this vessel comes had not been stratigraphically tied to the main excavation area. Two proposed adjustments that attempt to account for our problem dates are illustrated in the Stratigraphy section (Chapter 2). In the first corrected scenario, Level 2 would fall somewhere around A.D. 1220. In the second correction scenario, Level 2 would come in around A.D. 1110. Lenius and Olinyk suggest a date range of A.D. 1100 to around A.D. 1350 for the cultural peak of the Rainy River Composite Complexes, including Bird Lake and Duck Bay. That is only a 250 year window, so a difference of 110 years between our dates for Level 2 is significant. This vessel's attributes suggest that an earlier

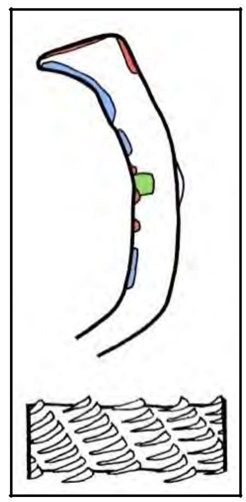


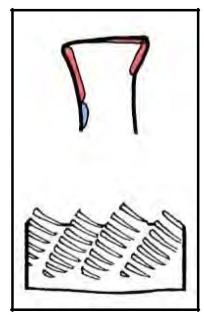
Plate 13.4-67: Exterior and Interior of Vessel 74

date might be likely, because of the lingering Blackduck influence. If the true date for Level 2 is A.D. 1220, then these Blackduck traits were retained well into the cultural peak of the Rainy River Composite and, as we have seen in Level 1, this is not out of the question. If the Level 2 date is A.D. 1110, then the Blackduck traits become more acceptable, but still surprising on a vessel which appears to be Bird Lake in every other way, a Complex considered quite distinct from Blackduck. Another interesting twist is the perceived general trend for Rainy River Composite materials to exhibit an increase in neck flare over time (Lenius and Olinyk 2009:pers. comm.). Vessel 74 has a very pronounced neck flare, akin to what would be expected for later material, and has interior stamping also considered a later trait (bringing decoration back to a more visible area as the necks began to flare more and more concealing much of the exterior decoration in shadow) (Lenius and Olinyk 2009:pers. comm.). This suggests then that the pronounced neck flare was there from early on. As were all the other traits exhibited by this pot. This vessel brings up a lot of questions, unfortunately learning more about the context of the K-line in relation to the rest of the site is now impossible as it has been destroyed.

Vessel 76

This vessel is identified by a single small sherd. What makes it unique is the fairly wide and quite shallow CWOI, only slightly off perpendicular to the rim and the very short oblique CWOI in the interior. The exterior CWOI are nearly vertical. Unfortunately, no other fragments from the rim or neck have been identified from the ceramic recoveries of this excavation.

Plate 13.4-68: Exterior and Interior of Vessel 76



Vessel 77

This vessel has short linear stamps. At the neck juncture, they are vertically oriented. There appears to be a second row below that which is right oblique. From there, descending rows of horizontally oriented stamps extend onto the shoulder. It appears in Level 3 and Level 1 as well as the Level 2 Complex. It seems to have been a major Rainy River trait, which, interestingly, was not used commonly.

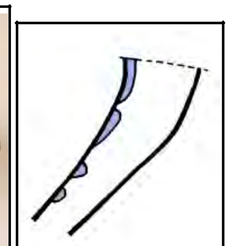


Plate 13.4-69: Vessel 77

Vessel 96

This vessel fragment is described here to highlight the presence of double rows of small stamps on the lower neck (see also Vessel 51 in Level 2A). The stamps on this sherd are very similar to those on Vessel 117. At some point, reconstruction efforts may determine whether they are the same vessel or not. Knowing the rest of the decorative make up for vessels with this motif would be of interest. The small size of the stamps suggests a tradition closer to that of Bird Lake than any other currently defined ceramic type.

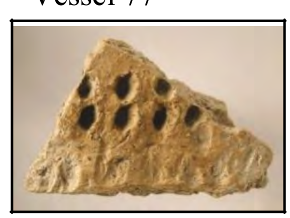
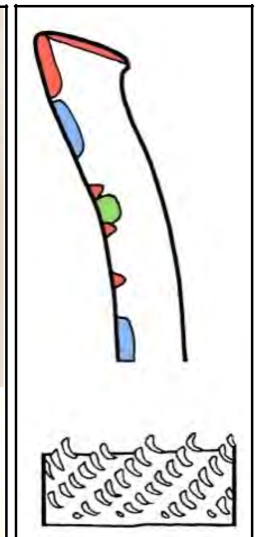


Plate 13.4-70: Vessel 96

Vessel 116

Vessel 116 has an interesting set of traits which set it apart. The clay used for this pot is grainy, it appears to have very fine sand as part of the body giving it a gritty feel and appearance. The temper is crushed and/or crumbled granite. There also appears to be some pyrite affixed to at least one of the observable granules of temper. This would have to be confirmed through higher resolution magnification than was available during this analysis. The profile is straight to slightly flaring and angled outward. The combination of decorative motifs and their positioning would place this vessel with the Little Owl type. It shares the symmetrical chevron above a limited number of horizontal CWOI (two to four) and a row of stamps below that. It also has asymmetrical stamps high on the horizontal set in punctate position. The profile is inconsistent with the other vessels identified as this type in this assemblage. Vessel 116 may represent another example of the transferring of traits and motifs between traditions in this assemblage. It seems that this may have been very common within the context of this assemblage.

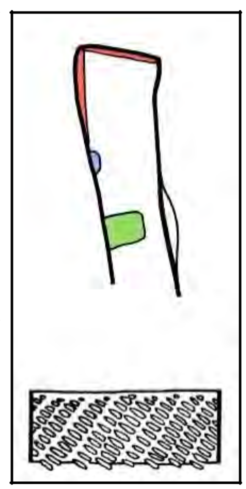
Plate 13.4-71: Exterior and Interior of Vessel 116



Vessel 117

This pot and Vessel 7 are distinct from the rest, but they are not identical. Vessel 117 has punctates, Vessel 7 does not. These two vessels continue the mid-neck emphasis of the Kroker Mid-neck type to a certain degree, but are considered here to be expressions of the Rainy River Plain type. The stamps on Vessel 117 are curiously similar to Vessel 96. If these two could be linked physically by reconstruction efforts, it would change the identification on this vessel. Kroker Mid-neck would be more appropriate because the definition of Rainy River Plain does not include a lower row of stamps. In this case, the presence of punctates is considered part of an earlier expression of the type. It is considered part of the Kroker Mid-neck decorative suite of Coalescent possibilities, which could be envisioned as ancestral, at least in trait transfer.

Plate 13.4-72: Vessel 117



Vessel 119

This is the third Duck Bay-like vessel identified from this assemblage (Vessels 8 and 70 are the others). This and Vessel 70 were recovered from the K-line on the northern edge of the originally proposed impact area. Vessel 119 is identified by only one shoulder sherd which fits the Duck Bay Stamped type, but with the lack of a neck it will have to remain as Duck Bay-like. The stamps are

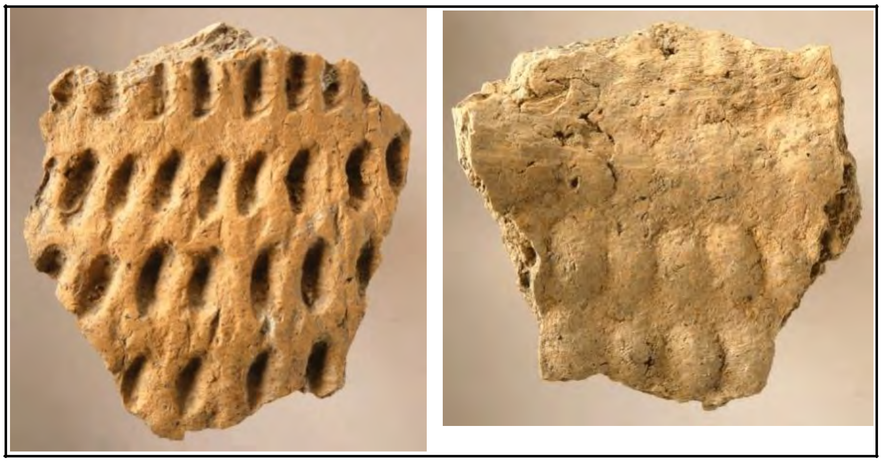
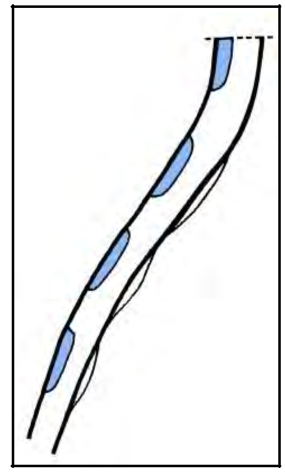


Plate 13.4-73: Exterior and Interior of Vessel 119



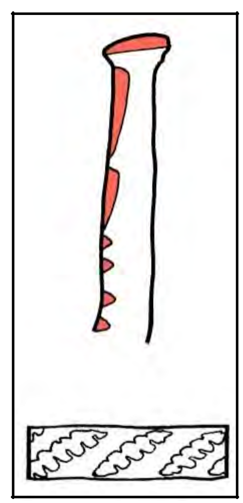
comparatively large for this assemblage, and create bossing on the interior. Interesting comparisons can be made to two vessels from Level 2A, Vessel 47 and Vessel 45. In particular, Vessel 45 is suggestive. No refits have been identified obviously but the paste quality and the character of the lower row of stamps (some of which create bosses) are somewhat similar. The stamps on Vessel 45 are smaller, but on both vessels, the stamp shape varies (more so on Vessel 119). This is an entirely speculative relationship, but of note to future researchers.

13.4.2.3 Level 2A Vessels

Vessel 37

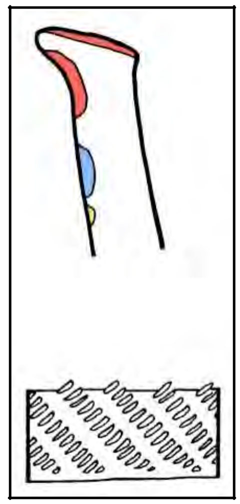
The light tan colour and confident decoration of this vessel fragment make it stand out amongst the others. The body is very well consolidated and dense with fine to coarse grit temper (up to 3.5 mm). This vessel has a chevron motif which points to the right, one of only two vessels, chevron and pseudo-chevron types included, in the entire assemblage. The other being Vessel 113 from Level 3. The chevron is very prominent, appearing to take up a full half of the available neck space, and the horizontal motif appears to go all the way down to the neck juncture. The impressions are confident and deep. Of note is the fact that the first row of oblique CWOI, below the exterior lip, was impressed with the vessel body beneath the decorating hand. This was

Plate 13.4-74: Vessel 37



not observed on any other vessels. The common approach is for the vessel to be in front of the decorating hand. This unusual angle of attack places the deepest part of the impression just below the exterior lip, emphasizing the lip with contour and a shadow line. It also illustrates that the cord was wrapped right from the very end of the decorating tool. The neck is straight and vertical, if not angled inward slightly. The minute amount of outward curvature seen at the bottom of the sherd and the above mentioned decorating tool attitude suggest that this vessel probably had a steep shoulder angle below the neck. In other words, the shoulder was not prominent in the complete vessel contour. This is considered a latent Laurel or Blackduck influence on form. The chevron, overall decorative structure, the even and proportionately thin neck, and the profile place this pot with the Little Owl type. Little Owl vessels appear in Level 3 alongside Coalescent vessels, but also appear in Level 1 where Rainy River Composite vessels are dominant.

Vessel 47



An incomplete profile prevents us from evaluating this vessel with any detail. It has a unique appearance and does shed light on the variation present in the chevron motif. The horizontal motif is present to some extent, but it is unclear

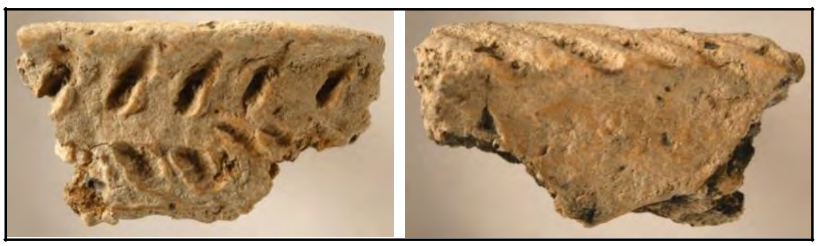


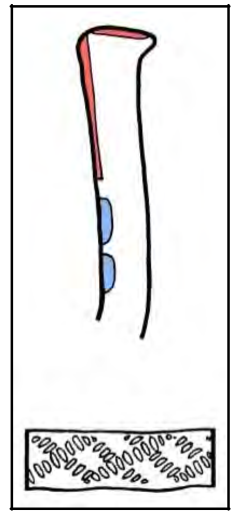
Plate 13.4-75: Exterior and Interior of Vessel 47

if the impression is a trailed line or poorly defined CWOI. The paste is poorly consolidated, fracturing in a platy manner. The temper is comparatively coarse and the neck thickness is of note. The profile appears to be straight, but angled outward. This vessel is Rainy River Composite and shows a general similarity to Vessel 116. It is identified as Little Owl-like due to that similarity and the chevron motif. The association of these two vessels with the Little Owl type is somewhat tenuous as they both are disproportionately large, compared to other Little Owl vessels.

Vessel 48

This pot has an essentially vertical neck of moderate height and even thickness. It is somewhat atypical for the Level 2 Complex in that the pseudo-chevron is not fully committed. Usually the two separate elements which produce the motif are touching, or nearly so. The space left between the two elements is interpreted as a modification. The proportioning of this modified motif is also different than most Rainy River Pseudo-chevron vessels in this assemblage. This single motif, if it can still be called that, easily takes up three quarters of the available neck space. These two tendencies are seen expressed in Level 1 to a greater degree. They are all currently placed in the Rainy River Pseudo-chevron type, but these tendencies are interpreted here as an expression of a disinclination to produce the pseudo-chevron as it is seen in earlier expressions (i.e., the lower levels of the Level 2 Complex and Level 3). The proportional relationship between the neck height and the decoration is a somewhat intangible characteristic at this point. With a larger sample, statistical frequencies might be calculated to establish the significance of proportioning. The pseudo-chevron is of importance, although this vessel also exhibits criss-cross CWOI on the rim which is not common, and it first appears here on Level 2A, with Vessels 48 and 66. The significance of this motif has not yet been established, nor has it been reconciled against currently defined types such as Bird Lake and Duck Bay, not to mention the ceramic traditions of the northeastern Plains/Parkland boundary. This motif also appears on Vessel 8 in Level 2 and on three vessels in Level 1. An apparent second row of widely spaced and more oblique stamps is positioned at the neck juncture. This is defined from partial impressions at the neck juncture. This is not considered to be a paired stamp row arrangement, as seen on Vessel 51, from Level 2A, and Vessel 96 from Level 2. Instead, it is most similar to Vessel 83 of Level 1, where the two rows simply come closer together by proportioning.

Plate 13.4-76: Vessel 48



Vessel 51

Despite being represented by a single sherd and an incomplete profile, this is a distinctive vessel. With a double row of small asymmetrical stamps above the neck juncture, it and Vessel 96 of Level 2 are the only pots with this motif. The stamps fall into the Bird River stamp size parameters. Unfortunately, not much more can be said, except that this vessel would be categorized as a Rainy River Composite pot.

Plate 13.4-77: Vessel 51

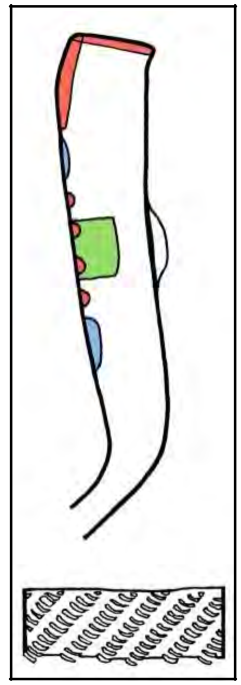
Vessel 57

This is an example of a Rainy River Composite vessel with a persistent punctate element carrying over from the Coalescent period. The punctate appears to be the last Blackduck element to be abandoned (except, of course, for the CWOI). This vessel is considered part of the Rainy River Pseudo-chevron type, but with a strong influence from the DDC tradition, like Vessel 69 (see below) and Vessels 31 and 38 of Level 2.

Interestingly, those using this decorative approach appear to retain the punctate into Level 1 as well (Vessels 23, 39, 54). These two factors could be used to argue that Blackduck continued into the Rainy River Composite period, not disappearing until later. But the fact that stamps and vessel form changes have been adopted seems to signal the direction of evolution. Whether this is the final expressions of Blackduck, as we define it, adopting Rainy River Composite stamping and profile traits, or Rainy River Composite holding onto Blackduck traits is a semantic discussion that should continue.

But, when taken in the context with the rest of the material in this assemblage, it is clear that Vessel 57 and others like it are part of a progression where Blackduck traits are less and less common as time goes on. This vessel shares the unusual tall neck profile with a slight in-curve combination, with Vessels 58 and 38, which also carry the DDC decorative approach. Another question is whether this particular profile is a signal of particular distinction on its own.

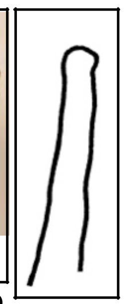
Plate 13.4-78: Vessel 57



Vessel 59

One of two finger moulded pots identified, the other being Vessel 26 from Level 1 which is much smaller. Vessel 59 appears to have fine temper, though this grit may be incidental as it is quite sparse. It is estimated at approximately 10 cm in diameter and around 5 cm in height. There is no decoration on this pot. Pots like this are often referred to as pinch pots. The function of these little vessels is not known to fulfill a particular utilitarian need. They are assumed to be examples of active learning, mimic vessels produced by children.

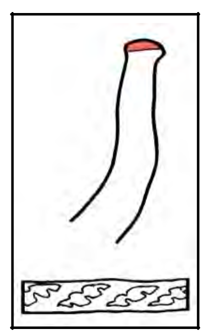
Plate 13.4-79: Exterior and Interior of Vessel 59



Vessel 63

This vessel has a short, straight, vertical neck with oblique CWOI on the smoothed rim. Sprang weave impression is left unmodified up to the exterior lip. A quite small pot with an estimated aperture of only 7 cm, it shares clay and surface characteristics with Vessels 60 and 62, which are in every other way quite different. If it were decorated more extravagantly in a typical Rainy River manner, it would be very similar to the miniature vessels identified from burial mound contexts (Kenyon 1986). Those small pots typically appear to mimic and elaborate on the decorative traits of the larger utilitarian vessels. However, as mentioned, it shares characteristics with Vessels 60 and 62 (Rainy River Willow type) and perhaps it is related to those sparsely decorated and understated

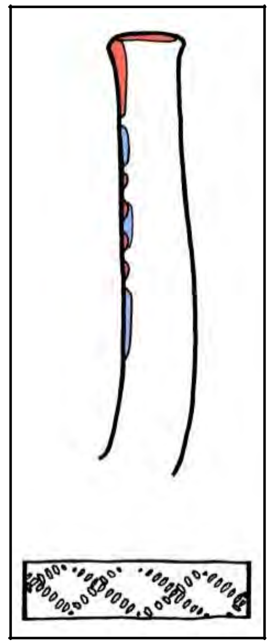
Plate 13.4-80: Vessel 63



vessels. Without reconstruction and the absence of decoration it will remain difficult to typologically define. There are vessel types similar in appearance emanating from North Dakota and Minnesota. Psinomani or Sandy Lake would be one, but Sandy Lake wares are stamped on the interior lip/neck. This vessel has only the widely spaced CWOI on the smoothed rim. The apparent size of this pot is also problematic for comparison with Sandy Lake. More work is required to establish how this vessel fits into the context of Northeastern Plains and Rainy River ceramics. It is not proposed that this is a miniature vessel at this point as no reconstruction efforts have been undertaken to establish its true dimensions.

Vessel 66

Plate 13.4-81: Vessel 66

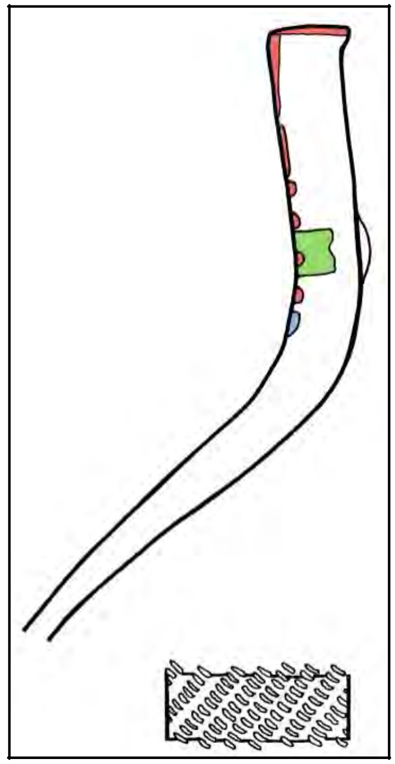


This pot has high temper content, but is dense and apparently well fired. The tall, vertical, straight neck with a slight outward flare towards the rim is reminiscent of Blackduck. This vessel also has vertical combing, a distinct Blackduck trait, but stamping figures prominently in the motifs. Also the rim is impressed with criss-crossing CWOI, generally associated with Rainy River Composite materials. This combination of traits pushes this pot into the realm of the Rainy River Coalescent, but perhaps a late expression. It brings into question issues of when and how traits transfer from one tradition to another. It also suggests that some groups may have been more involved in the mixing of traits than others. Whether this was a geographic phenomenon or a social/cultural one is difficult to know at this point. Level 2A dates hover around A.D. 1200 and late Blackduck dates are usually earlier than A.D. 1000. This would mean Blackduck traits continued well into the era of the Rainy River Composite, at least with some groups, suggesting that perhaps some Blackduck lineages may have progressed into Rainy River Composite directly and not that the Rainy River Composite developed after the diffusion. This would not be entirely unexpected but this vessel shows the transition lingered in some cases and further illustrates the complications, and perhaps futility, in defining terminal Blackduck and early Rainy River Composite Complexes at this point. The oblique CWOI within the horizontal CWOI band is seen on a vessel retrieved from the Christensen Mound in central Minnesota (Wilford, Johnson, and Vicinus 1969:Plate 13f).

Vessel 69

This is one of the Level 2 Complex Rainy River Pseudo-chevron vessels that also maintains the punctate—one of two features on this vessel that are unusual. It was perforated prior to firing on the lower neck, in line with the punctates, by pushing through from the outside using a different diameter tool than the punctate tool. This pot was also patched to reinforce a crack that formed through the neck. Interior scraping below the neck indicates some interior modelling was necessary at this location during manufacture. This might be due to a specific construction approach where the neck is thickened with the addition of a second layer, in this case to the interior. The bottom edge of this second ply, as it were, would then have to be scraped and moulded to laminate the new clay and ensure it is fully adhered. This scraping process also would help final contouring of the neck juncture, and help with evening the circumference and levelling the neck juncture, enabling an even height for the neck and therefore a more level rim. An alternative to this is the entire neck section was added to the prepared base and the seam then moulded and scraped to create the finished contour and secure the join. This pot is very similar to Vessel 57, but for the profile which is slightly flaring . This seems to suggest that the decorative suite was transferable between vessels with different profiles. Form is generally considered to be a more fundamental component of vessel manufacture and, as such, is accepted as likely less variable within a given tradition. If this is true, then circumstances for the traditions interacting during this period in this region might have been such that there was increased acceptance of variability.

Plate 13.4-82: Vessel 69



Vessel 71

This vessel shares characteristics with Rainy River Coalescent vessels from Level 3, specifically those with the Kroker Mid-neck pattern. The neck is not as tall as some, and the shoulder transition from neck to shoulder appears to be subtle suggesting some influence from vessel forms like those seen on the Soft Shoulder pattern, also a Coalescent trait.

The pseudo-chevron is not particularly well formed using a comparatively large CWOI. It is unclear if stamps were present near the base of the neck. It appears not. This vessel also has small CWOI impressions on the interior lip. The significance of the presence of this motif is not understood at this time. It is seen in Level 1, but on vessels that are quite different.

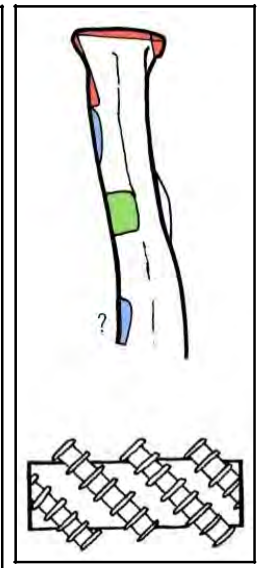


Plate 13.4-83: Vessel 71, Both Sides

Vessel 82

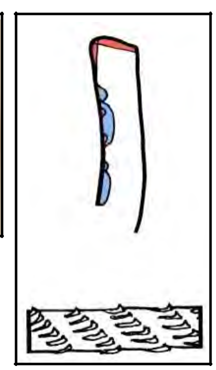
This small fragment of upper neck and rim has CWOI angles and spacing much like that on Vessel 43 of Level 2B. Vessel 82 has a much thinner neck and pronounced widening of the rim. Unless physical refits not already explored establish a connection between these two, this specimen will have to remain separated, though intuitively, it may be considered the same pot. The rim width versus neck thickness is disproportionate when compared with the rest of this collection. The most similar vessels in that regard are Bird Lake-like.

Plate 13.4-84: Vessel 82

Vessel 115

This is a Little Owl pot. The chevron, one of the diagnostic motifs for the type, is actually more accurately described as a pseudo-chevron in this case. Variation of this motif is recognized on a few of the other Little Owl vessels so this alone does not disqualify it from consideration. The diminutive size, compact application of decorative impressions, and the proportioning on the neck are also considerations. It has a vertically oriented linear stamp on the top two rows of the three horizontal CWOI, and there are oblique CWO stamps below the horizontals at the neck juncture. The pseudo-chevron is a pervasive motif in the Level 2 Complex, and it is interpreted here on this vessel as an adoption of the pervasive motif. The aperture seems relatively large for the neck height, at approximately 19 cm.

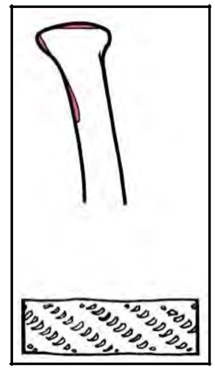
Plate 13.4-85: Vessel 115



13.4.2.4 Level 2B Vessels

Vessel 43

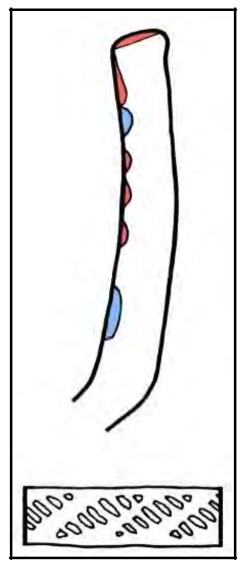
Plate 13.4-86: Vessel 43



This vessel is similar in several respects to Vessel 60 and 62 but there are some important distinctions to be made. It is sprang weave impressed up to the exterior lip like the others, but is partially obliterated. The external lip flare is more pronounced, to the point that the cord wrapped tool applied obliquely to the upper neck bridges between the lip and the neck creating a gap in some cases (this is similar to Vessel 82 from Level 2A). The CWOI are also very shallow, unlike those seen on Vessels 60 and 62. This vessel has far better paste consolidation than the other similar vessels as well. Vessels 43 and 60 share similar proportions of thickness and neck height, Vessel 62 has a taller neck, as probably did Vessel 52. Vessel 43 along with Vessels 52, 60, and 62 are here identified and isolated as the Rainy River Willow type. The extremely limited decorative range on these pots call into question how they might relate to the more elaborately decorated and more typical Rainy River ceramics. At this point, due to the commonalities of neck profile, vessel form, and construction, they are being considered part of the range of Rainy River ceramic expression.

Vessel 46

Plate 13.4-87: Vessel 46

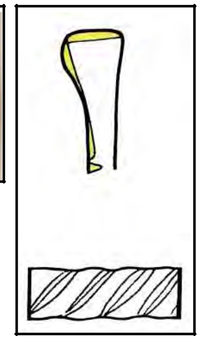


At first glance, Vessel 32 and this pot are possibly one and the same. The size and angle of the stamps, the length and angle of the oblique CWOI below the exterior lip and on the rim, and the height of the horizontal motif on the neck were deemed enough to split them. These are not entirely conclusive. Only focussed efforts at reconstruction could say for sure as no refits were identified between the two. Vessel 46 also appears to have a single elongated horizontal stamp on the middle row of the three horizontal CWOI. The horizontal stamps are seen on only a few vessels in this assemblage (including Vessels 32, 46, and 78). These three vessels share a straight to slightly flaring profile. This vessel and Vessel 32 are both classified as Rainy River Composite vessels and are somewhat reluctantly left as Undefined. If this pattern with the horizontal CWO stamps below the obliques is identified external to this assemblage, it might be considered as a distinct type.

Vessel 72

This vessel has typical Woodland decoration executed with a Plains approach (incising). Where one would expect to see CWOI, this vessel is incised, at times very deeply. This vessel has a thin neck expanding on exterior toward the somewhat flattened rim. The interior and exterior lips are more rounded than is typical in the rest of the assemblage. This pot could represent a Plains maker in a Woodland environment, or vice versa. Without the complete profile, not much more can be said.

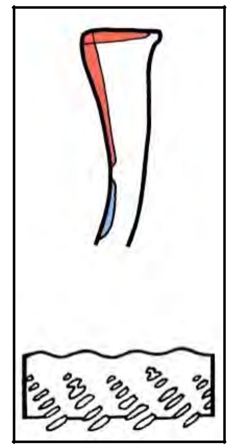
Plate 13.4-88: Vessel 72



Vessel 75

Another incomplete profile, this vessel has near vertical CWOI below the exterior lip (widely spaced) with left oblique elongated ovoid stamps below that, and near vertical left oblique CWOI on the flattened rim, which has been cord roughened after decoration. The CWOI are fairly large and the cord wrapping is open spaced. This vessel has a very similar profile contour to Vessel 78, a very thin neck expanding toward the rim, on the exterior, but here it is shorter. Horizontal scraping is evident up the neck to the interior lip. This is unique. The paste is very well consolidated. With the stamping and CWOI, this pot will be considered Rainy River Composite, but is atypical in that the CWOI on the upper neck are not markedly oblique. The question is should this be considered a pseudo-chevron? Because the angles of the CWOI and stamps are counter oblique, it will be placed in the Rainy River Pseudo-chevron type. Minor reservations will remain however as this motif takes up the entirety of the neck. This is unique in the Level 2 Complex but is seen to some degree in Level 1 materials. This decorative approach may prove to warrant distinction as a new type if external comparisons find consistency.

Plate 13.4-89: Vessel 75



Vessel 78

Unique in this assemblage, Vessel 78 was decorated with a serrated tool, mimicking CWOI. This method is a definite Laurel trait, combined with the Blackduck-like decorative composition, which also happens to include stamps. This combination creates a Rainy River Coalescent vessel. The stamps were made using the end of the serrated tool and are essentially horizontal on the upper row and appear to be slightly left oblique. The punctates are deep and the bosses produced are prominent. The profile is tall and straight to slightly flaring. The flare comes from additional thickness expressed toward the exterior on the upper portion of the neck. The line of the interior, in profile, is closer to vertical. Evidence of horizontal scraping is present near the neck juncture. Consolidation is very good. The wide spacing of the oblique elements is very similar to Vessel 75. This vessel may have had the widest aperture of any pot recovered at 32 cm.

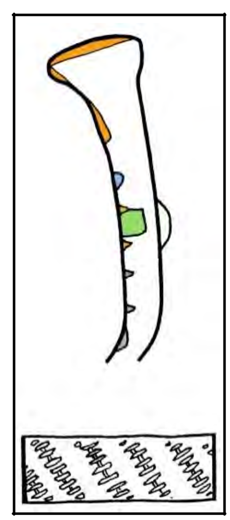


Plate 13.4-90: Exterior and Interior of Vessel 78

This pot shows us that Blackduck influence is still strong in the context of this level and the assemblage as a whole, but the stamps are definitive components of the expression. The pseudo-chevron is not ascribed to by this maker, perhaps an indication of temporal/developmental sequence for Rainy River ceramics.

13.4.2.5 Level 2C Vessels

Vessel 79

This is one of the Soft Shoulder pattern vessels with a tall neck and subtle shoulder projection expressed by a steep slope toward the body of the vessel. The neck is straight and vertical if not leaning inward somewhat. This form points toward a Laurel-like vessel form and away from Blackduck. The CWOI impressions are unusual, they are very short (approximately 6 mm). The CWOI

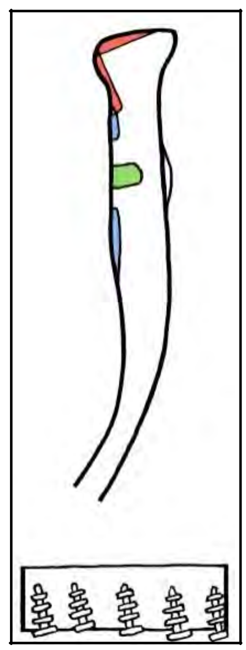


Plate 13.4-91: Exterior and Interior of Vessel 79

on the rim are slightly left of perpendicular of the rim and deeply impressed, notching the exterior lip and not touching the interior lip. The neck impressions are CWO stamps. They create a pseudo-chevron below the exterior lip (though not well formed) and the lower row brackets the smoothed mid-neck with punctates, suggesting an affinity with the Kroker Mid-neck pattern as well. The lower row is uneven, rising and falling from the lower neck to the mid-neck and back again.

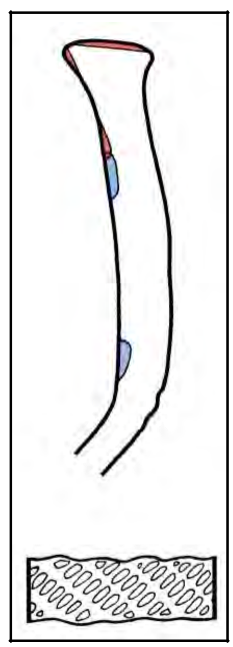
The sprang weave impression from the body portion is obliterated and smoothed above the neck juncture, leaving some texture up to the mid-neck. The lower row of stamps appears to follow the edge of this transition. The punctates are 13.5 mm apart (close) and there are subtle corresponding bosses on the interior. The clay body or paste is very well consolidated and very dense. Based on the single sherd, the mouth opening is estimated at 25 cm. The lower CWOI are short enough to all be considered as CWO stamps, however, the intent appears to be to utilize the side of the tool more so than the end which counters consideration as stamps. The oblique CWOI below the exterior lip are a particular departure, creating a very distinctive looking vessel. Whether or not short CWOI at the exterior lip is borrowed from a similar tradition like that of the Otterhead type, defined from Level 3, or if this pot is an aberration or a representative of an entirely different tradition can only be speculated at this point. But it is distinct in many respects. Vessel 79 further emphasizes the potential range to be considered when evaluating Rainy River vessels. With that in mind, it would be helpful to have good context for its temporal position. As a single sherd, this vessel's provenience might be called into question, but it was excavated from Unit G5, a location above the topographical incline which divides the excavation area. The taphonomic actions had less of an impact on the relatively level ground above the slope. This perhaps adds some credence to its spatial origins. However, as noted in the Stratigraphy section, surface compaction contemporary to the occupation is likely in this area and, because of this, discerning the different occupational horizons of the Level 2 Complex was not always readily feasible.

13.4.3 Level 3

Vessel 73

This pot has been lumped with the Kroker Mid-neck type. With a tall, angled out and slightly flaring neck profile, it is somewhat Blackduck-like. The decoration illustrates a combination of traits which position it as a Rainy River Coalescent vessel. The mid-neck emphasis is identified in this assemblage as one of the threads of continuum that appear to progress into the Level 2 Complex and diffuse into Level 1, although modified. This particular vessel has the addition of CWO stamps at the bottom of the oblique CWOI below the exterior lip. This combination does not create a pseudo-chevron, perhaps supporting the Coalescent designation. The pseudo-chevron is seen on some Coalescent vessels, but it

Plate 13.4-92: Vessel 73



comes into focus primarily in the early part of the Composite phase. This vessel has vertical combing, which in the interpretation of this assemblage became a marker for this transitional phase. Combing is not seen above Level 2A in the main excavation block. Vessel 73 does not have punctates. This is interpreted as another step away from Blackduck, like the addition of CWO stamps, particularly those in contact with the oblique CWOI. In this case, the mid-neck is emphasized by negative space as this vessel also does not have the horizontal CWOI band. A sample from this vessel was submitted for residue analysis.

Vessel 85

An example of one of the perceived influential vessel patterns, the Soft Shoulder pattern, Vessel 85 has a very steeply sloped shoulder with minor constriction at the junction of the neck and shoulder. The shoulder transition is thus interpreted as being very gradual. Vessel 91 from Level 3A is this type as well. As these are the earliest examples in the assemblage, they were isolated for reference in the discussion of later vessels which show similar tendencies. The upper neck on Vessel 85 has not been identified during this analysis, but it is presumed that the neck form was likely straight to slightly flaring like that of Vessel 91. The neck was entirely smoothed prior to decoration, which includes at least three rows of horizontal CWOI with a single row of oblique CWO stamps. The first wrapping of cord shows at the edge of the stamps. The decorative impressions were not applied in a consistent and controlled manner.

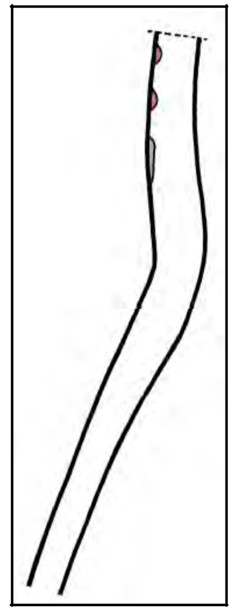
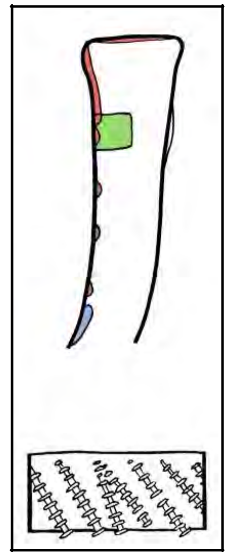


Plate 13.4-93: Vessel 85

Vessel 88

This vessel is similar to the Otterhead type common to this level, but Vessel 88 has atypically large stamps and is thick. These two features are not seen on the Otterhead type as defined here. The short oblique CWOI and high punctate on high horizontal CWOI are shared though. Very oblique ovoid stamps below the horizontals are not out of the question for Otterhead but they are comparatively large on this vessel. This pot also has vertical combing. Only one of the Otterhead vessels with the usual neck thickness was identified with this attribute. Vessel 88 is left as an Undefined Coalescent pot at this point because these differences were deemed to be sufficient that caution should be exercised so as not to confuse potential range of variations for the Otterhead type at this early stage. Also the sherds representing this vessel do not give a complete unbroken profile.

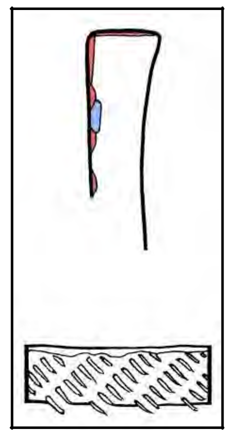
Plate 13.4-94: Vessel 88



Vessel 89

This pot and Vessels 98 and 105 show that round stamps sometimes are used instead of punctates. This is considered a minor alteration, though it does create a different look from the exterior and does not produce bossing. The position is between the top two rows of horizontals. Thickness of this vessel's neck is considered near the upper limits for the Otterhead type, but it is still placed in that group.

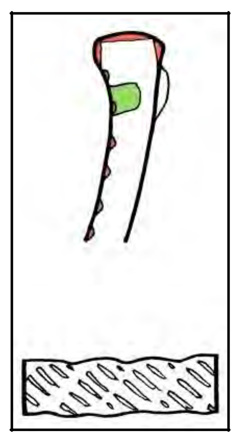
Plate 13.4-95: Vessel 89



Vessel 92

Vessel 92 is subjectively looking closer to Laurel than some of the others in the Otterhead type. The horizontal CWOI are extremely high as is the punctate, leaving the boss only 3 mm from the interior lip. The oblique CWOI on the exterior are restricted to the lip and are only 5 to 6 mm in length. Vessel 92 also has similar impressions on the interior lip. This is unique in the Otterhead group. This rim treatment is only seen on the vessels of the Dogwood type in Level 1 but they are not assumed to be related. Six rows of horizontal CWOI are visible. Due to the similarity to the other pots grouped under this type, it is placed there as well. It is assumed that it too was sprang weave impressed on the exterior though the sherds

Plate 13.4-96: Exterior and Interior of Vessel 92



themselves do not display this. As only two sherds from Levels 3 and 3A combined were identified as smooth, and neither of these show any other Laurel traits, such as coil fractures, it is safely assumed that Laurel ceramics were not present. This suggests that, despite this vessel appearing Laurel-like, it was likely sprang impressed like the rest and that is not a Laurel trait.

Vessel 94

Vessel 94 is one of two pots from Level 3 which helped define the DDC decorative approach. These two vessels (the other is Vessel 113) are the earliest examples of this pattern in the temporal

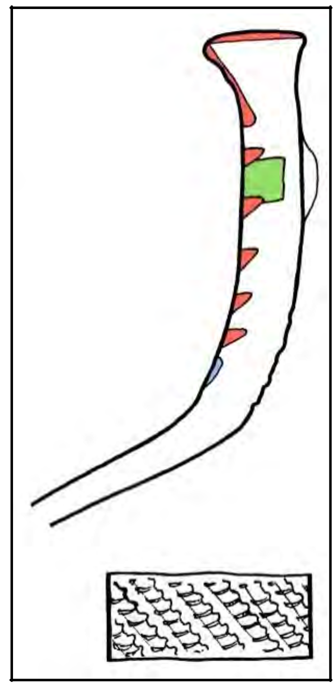


Plate 13.4-97: Exterior and Interior of Vessel 94

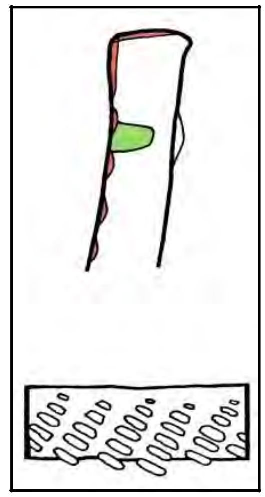
sequence of this assemblage, both Coalescent vessels. They are informally considered to be formative expressions of this pattern. The DDC decorative approach (deep, dense, controlled) appears to be maintained as neck profile tendencies change. It is essentially identified as a tradition which appears to disperse into the range of vessel expressions of the Rainy River Composite. The distinctive and graphic appearance, with strong patterning and shadow-lines, is its hallmark. The impressions on Vessel 94 are particularly deep, the cord-wrapped tool was sharp-edged and bevelled. It has crescentic stamps below the horizontal CWOI and combing. The well defined punctates create strong and large bosses. The form of the vessel was a large globular body, constricting at the neck. The neck is moderately flaring with a vertical stance, the interior shows coarse horizontal brushing at the neck juncture and above. Unlike Vessel 113, Vessel 94 shows a range of paste quality, from well compacted and dense to flakey and delaminating. This may be due largely to the fact that Vessel 94 is represented in far greater numbers. The two pots are quite similar in many respects.

This vessel was recovered from peculiar circumstances. The root system and buried stump of a dead tree decayed away sometime after the vessel was deposited and, subsequently, as the wood was eroded away over time, the ceramics were repositioned. A sink hole effect pulled the ceramics downward creating a natural feature involving the ceramics. This was not understood until after the excavation of this feature was completed. We were initially concerned that this pit may have had human origins and spiritual significance during its discovery and excavation. Precautions were undertaken to involve Aboriginal community elders in the early evaluation and possible identification of this feature.

Vessel 95

Another Otterhead vessel, this pot has small punctates positioned at uneven heights on the neck. The two that are visible are still positioned high on the top two rows of the already high horizontal CWOI. The interior is not smoothed to the same extent as some. The oblique CWOI on the rim and the upper neck are applied in the same direction. This is uncommon.

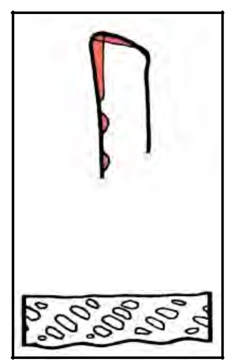
Plate 13.4-98: Vessel 95



Vessel 97

Although this vessel is defined only by a sherd of the rim and upper neck, it does provide some interesting subtleties to mull over. The oblique CWOI on the inwardly bevelled rim and those below the exterior lip are angled in the same direction. They are carefully connected to appear as one continuous impression. Because of the incomplete nature of the vessel, it will remain undetermined as to type, but it is similar to the Otterhead vessels in that it has very short oblique CWOI and high horizontals.

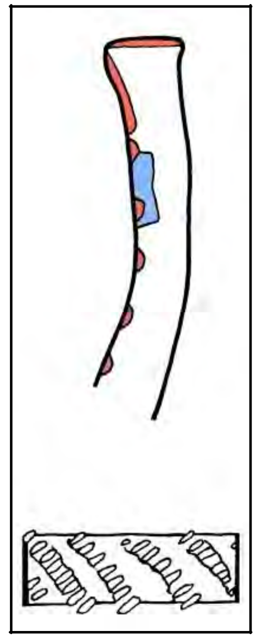
Plate 13.4-99: Vessel 97



Vessel 98

This pot is a subtle variation of the Otterhead type, like Vessels 89 and 105. It has round stamps, not punctates. The stamps on Vessel 98 are large however, and do deform the surface of the interior to a certain degree. Due to the surface area of the stamps, they do not penetrate and create bosses. The CWOI are also somewhat heavy handed. This vessel is the right proportions of thickness and form for Otterhead. Combing is evident. This is the only Otterhead vessel with the more typical moderate thickness that has combing. The interior of this vessel is not well smoothed.

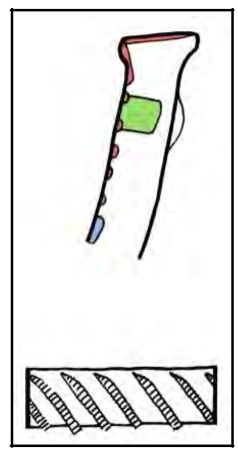
Plate 13.4-100: Vessel 98



Vessel 99

Vessel 99 is a refined and well finished vessel. The CWOI are very small diameter as is the ‘cord’ wrapping which is likely sinew as opposed to fibre cordage. The density and consolidation of the clay paste is very good, much better that the rest of the Otterhead pots. Below five rows of horizontal CWOI are a row of small oblique ovoid stamps. The curvatures of the neck profile suggest that this vessel had an inward lean which turned outward at the neck juncture. This is hinting that this pot may have had a more globular body and a more defined neck to shoulder transition than what can be extrapolated for the others of this type. This appears to be a somewhat smaller vessel as well. One sherd of this vessel was recovered from Level 2 and is considered rodent displacement.

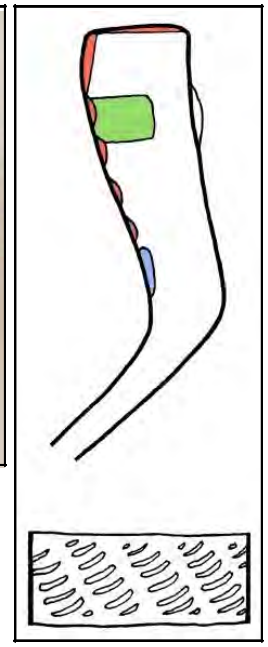
Plate 13.4-101: Exterior and Interior of Vessel 99



Vessel 100

Vessel 100 is considered to be a hybrid between the Otterhead type and the contemporary version of the DDC pattern. This pot is not placed with either type as it is seen as a departure for both. It will remain as an undefined Coalescent expression. The thickness, neck angle, and dimensions of the impressions are unique in Level 3. Remove the punctates and place it in Level 1 and it might be considered with the Holly Oblique type. The

Plate 13.4-102: Vessel 100

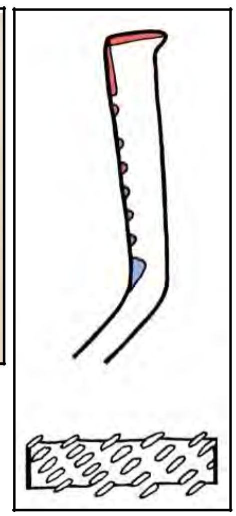


as well, they appear to be stamps with a little flick added. They have a slice action which adds unequal length to these impressions.

Vessel 101

This vessel is distinct with the neck height being disproportionate for its thickness. The profile is straight with a slight outward lean. Short oblique CWOI on the upper neck and six rows of horizontal CWOI with stamps below are typical for the Otterhead type, but this pot has no punctates or round stamps. The thickness from the shoulder to rim is pretty much the same (3.5 to 5.5 mm). Another

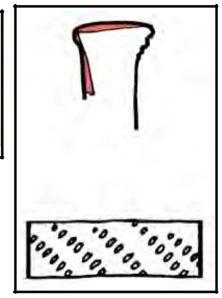
Plate 13.4-103: Vessel 101



have been decorated left handed as the apparent angle of attack for the stamp row is reversed from the typical. These stamps on the lower neck are applied at a very low angle more typical of a stab and drag technique, but there is no dragging evident. Stab and drag impressions are considered a Laurel trait. The rim was not smoothed prior to decoration. This pot also displays oblique CWOI applied at the same angle on the rim and below the exterior lip, they do not align. They also are suggestive of left hand application. Despite being surrounded by Coalescent vessels, it is unclear how it might relate. There are very few derivative Blackduck or Laurel tendencies to evaluate. Like Vessel 90, this pot might represent a distinctly other influence in the formation of Rainy River traditions. It is identified in the database as a Coalescent Rainy River Undefined.

Vessel 102

Plate 13.4-104: Exterior and Interior of Vessel 102



There is very little to work with but this small sherd has enough distinctive features to distinguish it from the rest. It has left oblique CWOI on the rim and below the exterior lip and there appears to be a trace of a portion of the topmost row of horizontal CWOI, but this little is inconclusive. The rim was squared and then smoothed with a flat edged tool after the decoration was applied. This is unique in Level 3 and generally uncommon, as is the unusual horizontal striations on the interior lip. It is unclear what they are or how they were formed. Two scenarios were considered: they may be modified impressions created by wide, flat CWOI which were then compressed and deformed when the rim was flattened and squared or, they are marks left by horizontally trailing a cord-wrapped tool along the interior lip. Both of these would be quite unique. A third scenario, though this seems less likely, is that these marks are small folds or wrinkles produced as the rim was compressed for shaping. The surface of the clay would have had to have dried slightly for this to occur. This is most likely a Rainy River vessel, though there is nothing tangible that says whether it is Coalescent or Composite. It is undeterminable.

Vessel 103

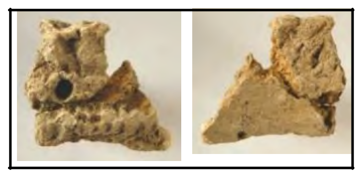
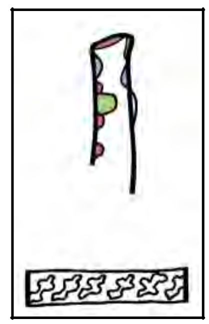


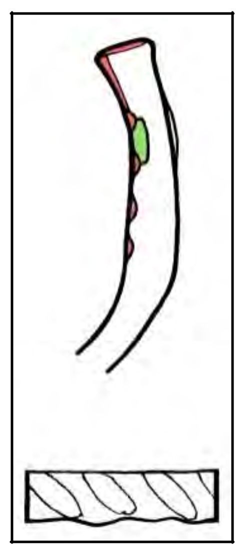
Plate 13.4-105: Exterior and Interior of Vessel 103



This type, Little Owl, is seen in Level 3, the Level 2 Complex, and in Level 1. This vessel is represented by only a small sherd, but it seems to have been a small vessel. Despite this, it is highly decorated. Densely applied impressions are one of the characteristics of this type, but this little pot has more than others. This pot's size is so small as to create conflict with the dimensions of the decorating tools themselves. There seems not to be enough space to fit the attempted motifs. As a result, some truncation has produced incomplete motifs, specifically the chevron which is restricted to a single oblique component. As if to compensate, there are two rows of tiny oblique stamps on the interior. Interior decoration is seen only on one other vessel, Vessel 81 of Level 1. The other Little Owl vessels do not have this. Unfortunately, the representative sample for this vessel is also tiny and the complete profile is unknown. The estimated vessel diameter must be viewed as highly speculative, but based on proportional extrapolation, the diameter was likely smaller than 13 cm.

Vessel 105

Plate 13.4-106: Vessel 105



Vessel 105 is an Otterhead vessel which shows a fairly pronounced neck to shoulder transition on the interior, the exterior transition is less angular. This pot has round stamps in place of punctates, but some bossing is evident regardless. The bottom row of the horizontal CWOI set is incomplete or interrupted. The angle of the oblique CWOI below the exterior neck is executed at a steep angle. The fact that some Otterhead vessels display this and others are applied at a very low angle is of interest. There seems to be a correlation between this trait and the round stamp. The Otterhead vessels that exhibit punctates also have the more oblique angled CWOI, which tend to be up more on the exterior lip than on the neck. More research is required to verify these distinctions which are beyond the scope of this assemblage.

Vessel 106

Another Little Owl vessel, this one was also defined from an incomplete profile. Vessel 106 shows a straight to slightly incipient-S neck. The rim portion is missing, but a balanced chevron is decipherable with two rows of horizontal CWOI below that. It appears as though there is a row of oblique CWOI below that, at the neck juncture. The neck does not appear to have been smoothed prior to decoration, sprang weave patterning can still be seen. Vessels 106 and 103 are the earliest examples of the Little Owl type in the assemblage and, interestingly, it appears that they are the smallest as well. In a general sense, this type appears to get larger over time, within this collection. Whether this is a characteristic of this type that would be validated or even recognizable from materials outside this assemblage remains to be seen.

Plate 13.4-107: Vessel 106

Vessel 107

These two sherdlets from the neck juncture portion of Vessel 107 show a bottom row of what is presumed to be a set of horizontal CWOI, and just below that a single row of small oblique stamps. These stamps do not match any seen on the other vessels. The diminutive scale is of interest as well, but without a physical refit or shared trait, this vessel stays isolated.

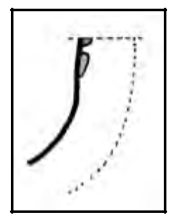


Plate 13.4-108: Vessel 107

Vessel 108

Vessel 108 is unlike any other vessel in the assemblage. The neck profile and the decorative approach are only seen on this one vessel. The profile has a two stage angular transition, changing direction at the neck juncture with the shoulder and then again angling outward starting at the upper neck. This kind of profile was described by Lugenbeal (cited in Anfinson 1979) as a "Complex Straight Rim", a variant in the Blackduck range of profiles. Whether this kind of vessel should still be considered as Blackduck after the definition of Rainy River is not understood. Its presence here in Level 3 suggests that it was involved with the coalescence of Rainy River ceramics to some degree. The decoration, as mentioned, is a departure from the rest of the assemblage but it does have some decorative motifs in common with other types found in Levels 3/3A, and the later levels as well. First off, the oblique CWOI below the exterior lip, a marker shared by nearly all vessels here, are proportionally short for the neck height. This is seen on the Otterhead type. Only two horizontal CWOI were used, this might be compared with the Little Owl type. Vertical combing is present, a Blackduck trait, but also seen here on Rainy River Coalescent vessels. The columnar arrangement of horizontally oriented linear stamps, was also identified in Level 1. Sets of vertically oriented linear stamps on the horizontals is seen on Vessel 12 of Level 2. Short oblique CWOI on the interior appears with increasing frequency in the later levels. Also, this vessel was perforated by drilling on the neck, which was identified in the Level 2 Complex and in Level 1.

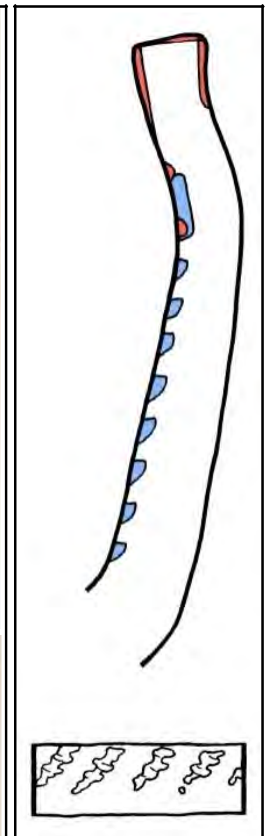


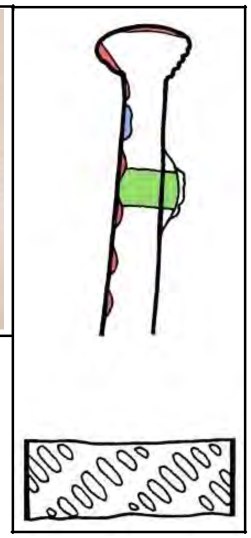
Plate 13.4-109: Exterior and Interior of Vessel 108

All of these traits separately are seen on other vessels, but none has them all except Vessel 108. The radial arrangement of columns of linear stamps has been identified from Hungry Hall Mound 1 on the Rainy River (Kenyon 1986) on an otherwise very different vessel. The fact that this motif and design are repeated on distinct vessel forms could be viewed as support for common linkage. The ramifications of this vessel have yet to be fully teased out. There is an obvious connection to the materials of Minnesota in this assemblage. This vessel is most likely part of that and may prove to be a pivotal piece of the puzzle in establishing regional linkages for Rainy River ceramic development in the Red River drainage region.

This vessel also has a distinctive paste quality and colour. There appears to be a grainy quality to the clay, possibly indicative of a certain silt content, and the temper, although largely grit (degraded granite minerals), contains some sand. The impure clay and the sand may be partly why some surface spalling has taken place. The spalling seems to have taken place after the vessel was fragmented and most likely is related to severe re-heating.

Vessel 112

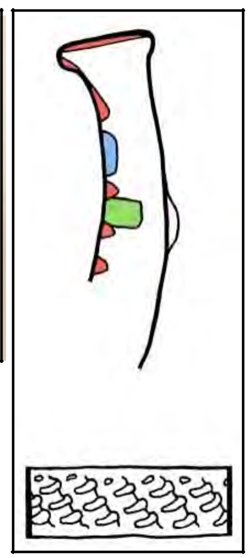
Plate 13.4-110: Exterior and Interior of Vessel 112



This Otterhead vessel is somewhat unusual with the finish of the rim. The interior and exterior lips expand and are rolled over and rounded. The protrusion of these edges is extensive enough that the short oblique CWOI on the exterior span between the lip and the upper neck, occasionally producing a gap. On the interior lip, the extension was such that after being fired the ridge was physically scraped down, obviously the magnitude of overhang was unacceptable for some reason. The CWOI on this vessel are large dimension and their application produced shallow impressions, only the cordage shows in most cases. The punctates are well pronounced as are the bosses, one in particular appears to have had the boss punched out to fulfill perforation. This pot also shows evidence that it was cracked from the rim down to at least mid-neck for much of its functional life, as charred residue build-up is visible inside this vertical crack. The latter three features are all seen on a single sherd (DlLg-33:08A/19415 from Unit C9).

Vessel 113

Plate 13.4-111: Vessel 113



Along with Vessel 94, these are the only examples of the DDC decorative approach. This vessel is distinguished from Vessel 94 primarily by the upper row of oblique stamps which complete a pseudo-chevron, one of the earliest in the assemblage. The DDC and pseudo-chevron traditions are perceived to be highly influential and both were present during the Coalescent phase of Rainy River development. What this excavation can't address is how long these 'traditions' were around prior to the occupation of Levels 3/3A. Resolving this would be very helpful for the proper interpretation of this assemblage. The oblique CWOI on the rim of Vessel 113 appear to be made by a very similar shape of cord-wrapped tool to that which is evident on Vessel 94. The other CWOI are not particularly echoes of those on Vessel 94, however. They are generally shallower, not revealing the distinctive bevelled edge so apparent on Vessel 94. These two pots also share similar paste quality, temper content, and colouration.

Vessel 114

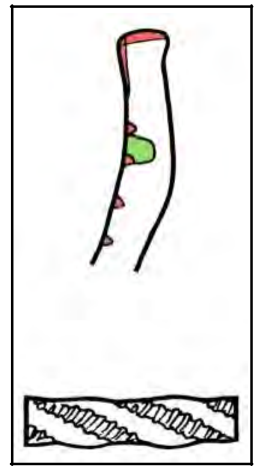
For all that can be seen on this small sherdlet, it appears that it could be another Otterhead vessel. The neck is interpreted as straight, the rim having a slight inward angle or slightly flared, and the rim being flattened at an angle perpendicular to the central vertical axis.

Plate 13.4-112: Vessel 114

Vessel 118

The same combination of short oblique CWOI, high horizontal CWOI, and high punctates as seen on other Otterhead vessels are seen here. The neck and rim were smoothed prior to decoration, this isn't always apparent. The cordage, if that term can be used, on the decorating tool is fine and of a very small diameter. The angle of the oblique CWOI on the exterior changes fairly dramatically on one sherd, evidence of how much variability there can be on a single vessel. The oblique CWOI on the rim are particularly deeply impressed. The single punctate that is observed is small diameter, it does not produce a boss. The slight flare seen on some of the Otterhead type is usually expressed safely above the mid-neck. On this pot, it is uncertain how the curvature of the neck should be interpreted. The change of angle apparent from the interior surface of the neck appears to suggest that the flaring may start lower than on other vessels of this type. If this interpretation is correct, then the rim angle is angled outward (although still squared to the centre line of the neck). This is somewhat different than the others. Alternatively, if the rim is interpreted as perpendicular to the central vertical axis, then the mid-neck would be on an outward angled portion. This too is different than the others. In fact, these problematic interpretations of neck angle are the same as those encountered when evaluating Vessel 108. Unfortunately, without more of this vessel's profile being identified, its original stance could remain unresolved. Research into the 'Complex Straight Rim' defined by Lugenbeal (cited in Anfinson 1979) may shed some light at some point.

Plate 13.4-113: Vessel 118



13.4.4 Levels 3/3A

Vessel 104

Recovered from both Level 3 and Level 3A, with one sherd on each, it is not committed to either. It is a Coalescent vessel with vertical combing and oblique ovoid stamps below horizontal CWOI. The upper neck was not recovered. The lower row of stamps is usually positioned in close proximity to the neck juncture, but on this vessel there is only slight curvature even below the stamp row. This suggests two possibilities, either the stamp row is higher than most or the transition from neck to shoulder is gradual presenting us with a steep shoulder and vertical neck profile. This pot was thick walled as well.

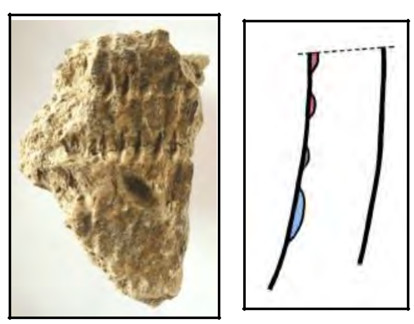


Plate 13.4-114: Vessel 104

13.4.5 Level 3A

Vessel 86

This pot, though likely an Otterhead vessel, is not complete enough to be entirely certain, as the upper neck and rim were not recovered. Five, maybe six, rows of horizontal CWOI are apparent. Below this is a row of small oblique CWO stamps. The small scale of these impressions is comparable to some of the other Otterhead vessels. The wrapping on the cord-wrapped tool is very fine. The estimated diameter of this vessel is only 10 cm.

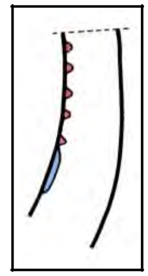
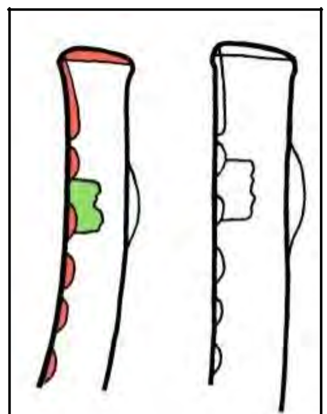
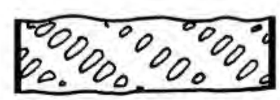



Plate 13.4-115: Vessel 86

Vessel 87

This pot has a straight neck with perhaps a slight outward lean, but all in all it is very like the other Otterhead vessels. Vessel 87 has large shallow CWOI and well defined punctates and bosses, which are closer together than on most of the others. There are two decorative approaches with the CWOI on these vessels, roughly half are large and shallow, the other are small diameter and more deeply impressed. No added significance has been suggested for this at this point but it is interesting. The Otterhead type looks very similar to what has been identified as Blackduck Bossed type vessels, but that variety has been identified as an early Blackduck variation (Lugenbeal, cited in Anfinson 1979).

Plate 13.4-116: Vessel 87

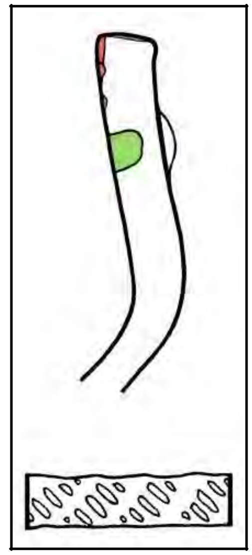



Early Blackduck dates might be acceptable, and thus Blackduck is a typological consideration, if the dates for Level 3 and Level 3A agree. But at this point the dates for these levels are inconclusive, and with Coalescent vessels in the same occupational layers as the Otterhead type vessels it is assumed that a later date is more likely. This would have ramifications for the reconsideration of these Blackduck-like vessels and also the appearance and influence of Rainy River-like expressions within the Blackduck realm. Most of the Otterhead pots have some moderate outward flare at the upper neck, Vessel 87 does not. The paste consolidation is good, equivalent to the other Otterhead vessels.

Vessel 90

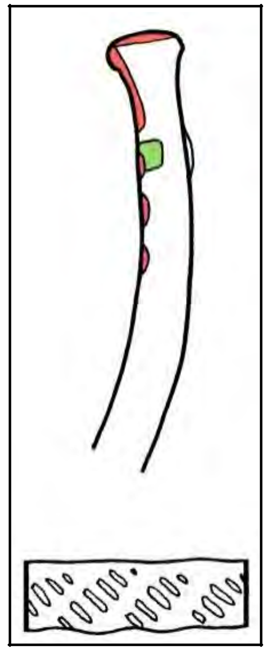
This vessel's presence in the same occupational horizon as Rainy River Coalescent and Blackduck-like vessels place it early in the Rainy River development pattern, but it is not typically what would be expected to be seen alongside the previously mentioned materials. The straight neck and definite outward angled stance is seen on vessel types from later in the typological sequence, specifically Duck Bay and some Bird Lake-like expressions. But it is also seen in Plains Village ceramics, generally also later than the expected dates for the Level 3 and Level 3A occupations. But it has decorative links with the material it was recovered with. It has short and very oblique CWOI below the exterior lip, the uppermost (and only) horizontal CWOI is high on the upper neck, much like the Otterhead vessels. But, with only one horizontal CWOI (appears to split into two at some point), Vessel 90 is unique in the collection. (A note about this horizontal impression, it is obscured by charred residue and therefore the identification is not absolute, in some places it appears almost like a trailed line as no clear wrapping impressions are visible, whereas in other places the impression appears more like CWOI.) The neck was smoothed as if in preparation for more to be added, but the only other decorative element is circular punctates and their corresponding bosses. The pot is fairly small with a rim aperture estimated at around 15 cm, and considering the neck is angled outward. the aperture at its smallest, near the bottom of the neck, would be closer to 10 or 12 cm. This pot is unfortunately left undefined at this point, but if its traits are true links with later vessel types, then this vessel could be significant in establishing a new development pattern for Rainy River ceramics west of the Lake of the Woods. This vessel occurs with Vessel 91 in the same units, two very different vessels.

Plate 13.4-117: Vessel 90



Vessel 91

Plate 13.4-118: Vessel 91

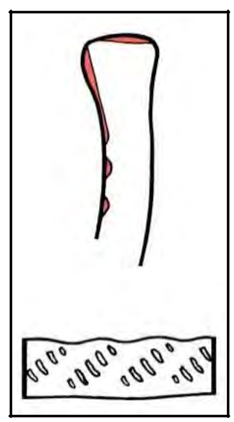


Other than the lack of definition on the bosses and the unthickened rim, there is no physical reason for this vessel to not be considered Blackduck. But in the context of the rest of the materials in Levels 3 and 3A, this identification, and its connotations, might be reconsidered. We currently decide whether a vessel is Rainy River Coalescent or Composite by the presence of non-Blackduck traits in conjunction with a sliding scale of diminishing Blackduck traits over time. Theoretically, when pushing the temporal scale backward, at some point, the range of Coalescent expression becomes convergent with Blackduck and would make distinguishing between the two impossible. One might argue we have an unresolvable problem and this may be the case. Especially when our working definition of what Blackduck should be is also non-specific, there is a wide range of profiles and decorative elements and motifs espoused in the literature. The only concrete marker, it seems, is the presence of stamping (and there are issues regarding the definition of stamping; CWO stamps, shallow punctates, etc.), a defining character of Rainy River ceramics (although not all Rainy River ceramics will have stamping). For this analysis, the line was drawn in the sand specifically with vessels that were otherwise very Blackduck-like. If Vessel 91 had stamping, it would not be Blackduck. It does not. Its neck profile and probable shoulder angle appear to be within the range of acceptability. But the non-expanding (or unthickened) rim raises questions. This vessel hovers in the region between, but with the undefined bosses and essentially squared rim, and the context of the contemporaries in this level, the decision was made to place it in the Rainy River Coalescent. This vessel occurs with Vessel 90 in the same units, two significantly different vessels. Vessel 91 is part of the Soft Shoulder pattern.

Vessel 109

Although this vessel is represented by only one sherd which does not provide a full profile, it was deemed sufficiently distinct to warrant isolation. It does have the same decorative traits in common with Vessel 91, including the gap between the oblique CWOI and the horizontal CWOI. But this sherd exhibits greater thickness, a wider rim, and a distinctly flaring neck profile. To be cautious, it was not lumped with Vessel 91.

Plate 13.4-119: Vessel 109



13.5 Specific Observations in the Assemblage

13.5.1 Tendencies by Level

13.5.1.1 Level 3

Decoratively, the major difference between the Level 3/3A materials and those of the later levels is an absence of stamping above the horizontal elements found on the neck (Vessels 73 and 114 are the sole exceptions). On these vessels, the horizontal CWOI are higher on the neck, as is the punctate. The punctate is also located higher within the set of horizontal CWOI than in the material from the Level 2 Complex and Level 1. The oblique CWOI below the exterior lip are shorter and occasionally very oblique, specifically in reference to the Otterhead type. Stamping is not absent below the horizontal CWOI however, and they are either vertically oriented linear, slightly crescentic stamps, or oblique CWO stamps. The horizontal CWOI element on the vessels of Level 3 and Level 3A is not only higher but there is also a greater range in the number of rows, two to six rows. The high figure is seen on the Otterhead type and the low end is seen on the Little Owl type as well as Vessels 108 and 90, three very distinct vessel types.

Neck height ranges but, in general, on those vessels that have well defined shoulders, the neck height is taller than those found in Level 1. Neck height in the Level 2 Complex is comparable to that of Level 3/3A (Figure 13.5-9). Profile characteristics other than height alone are quite different from that of the Level 2 Complex and Level 1. The standardized characterization of profiles for each level show that the range of profile forms for Level 3/3A (Table 13.5-1) are narrower than in the Level 2 Complex (Table 13.5-2) and Level 1 (Table 13.5-3). Curvature is incurving to slightly flaring, and the stance of the neck ranges from angling outward, to straight, to angling inward. The angle inward stance is the most obvious difference when compared against the material of the other levels, 32.0% of the determinable profiles record this stance, whereas there are none in the other levels. The majority of the vessels, 40%, have a vertical stance, with slightly flaring and straight predominating. Angled out vessels are present, but not dominant as they are in the later levels. This generalized tendency perhaps points to the Laurel influence suggested in the Otterhead type but also the more vertical expressions of Blackduck.

13.5.1.2 The Level 2 Complex

This grouping of occupational horizons with its complex stratigraphy and taphonomic influences remains awkward for interpretation. Largely, the nuances of temporal sequence that were anticipated before interpretation began have had to be ignored. With so many vessels recorded being recovered from more than one level, detailed sequencing was not possible. Yet, despite this, there are perceivable differences between the lower and upper levels. These differences were interpreted as reflecting developmental progression. Unfortunately, again, radiocarbon dates were unable to give clarity. The appearance of Coalescent vessels in the lower levels and much fewer in Level 2 or 2A, despite the increasing number of vessels recovered, is the primary indicator of that progression.

The Level 2 Complex has the best context for seeing continuities, beginnings and endings, and isolating the atypical, because it is sandwiched between materials which come before and after. The general tendency to drop Blackduck-isms, and the increase in stamp use, the variation thereof, and variation in neck profile shows us that Rainy River expression was diverse during this period of occupation. This diversity has by no means been resolved or reconciled fully. The significance of the differences and similarities with Duck Bay and Bird Lake need to be viewed in the light of a correct date sequence.

Level 3/3A		STANCE						
	25*	Angled Out	%	Vertical	%	Angled In	%	Total %
CURVATURE	Flaring							
	Slight Flare	73 / 91, 109	12.0	98, 105, 113 / 86	16.0	92, 94, 108, 118	16.0	44.0
	Straight	101, 114 / 90	12.0	89, 97, 103 / 87	16.0	88, 96, 99, 112	16.0	44.0
	In-curved	100	4.0	85, 106	8.0			12.0
	Incipient-S							
	Total %		28.0		40.0		32.0	100.0

* Number of measurable vessels

Table 13.5-1: Profile Characteristics for Vessels from Level 3/3A

As alluded to earlier, the inward angled neck stance is not strongly representative as only one vessel from Level 2 has this stance. With only one vessel, it is difficult to assess the significance of its presence in the uppermost level of the Level 2 Complex. The dominant profile in the Level 2 Complex is the angled outward, straight neck. The angled out, slightly flared neck is a close second. Of interest is the number of in-curved necks with angled out and vertical stances, 19% of the measurable vessels. In-curved necks are identified in Level 3/3A and in Level 1, three in each occupational period. As pointed out in the discussion of profiles below, these vessels represent a poorly understood tradition with Rainy River ceramics. It was decided to leave this hanging until more research is undertaken. One vessel was categorized with a significant outward curvature and outward lean.

13.5.1.3 Level 1

Some decorative elements appear with increased frequency in Level 1. The use of a CWO impression produced by a wide and flat tool is seen most commonly in this level. These elements are evident on the rim only. However, impressions are produced by the edge of this type of tool occasionally, usually on the same vessel. The vertically oriented linear stamp at or just above the neck juncture appears with increased frequency also. It has been eluded to earlier, but the Level 1 material indicates a general shift to a more limited range of decoration on vessels with shorter neck height. There are a few exceptions, however, which raise the possibility that these generalities may not reflect the full range of potential for Rainy River ceramics. In fact, this can probably be safely assumed for all levels. This is of course why comparative analysis will be necessary to place the observations seen here into a wider picture. Sprang impressed exteriors are significantly less common in Level 1. This trend is quite significant also. With reliable and accurate dates from this excavation, one could imagine surface treatment alone as a defining temporal marker, at least in this region.

Level 2 Complex 43*		STANCE						
		Angled Out	%	Vertical	%	Angled In	%	Total %
CURVATURE	Flaring	74	2.3					2.3
	Slight Flare	28, 32, 34, 36, 116 / 82 / 43, 78 / 35	20.9	9, 52 / 115 / 46, 75	11.6			32.5
	Straight	8, 29, 44, 64, 117 / 47, 48, 69 / 60, 61, 62	25.6	7, 10 / 37, 63, 66 / 72 / 79	16.3	6	2.3	44.2
	In-curved	33, 58 / 57, 71 / 45	11.6	12, 31, 38	7.0			18.6
	Incipient-S	70	2.3					2.3
	Total %		62.7		34.9		2.3	99.9

* Number of measurable vessels

Table 13.5-2: Profile Characteristics for Vessels from Level 2 Complex

Level 1 and the Level 2 Complex illustrate similar tendencies as far as neck form. As in the Level 2 Complex, the straight neck with an outward lean is predominant, but more so. Also, the vertical stance is less prevalent, but only slightly. The incipient-S profile is best represented in Level 1, but still by only three vessels (9.7%).

Level 1	31*	STANCE						
		Angled Out	%	Vertical	%	Angled In	%	Total %
CURVATURE	Flaring							
	Slight Flare	15, 30, 42, 55, 83	16.1	1, 2, 19, 20	12.9			29.0
	Straight	3, 14, 18, 23, 24, 25, 39, 41, 50, 54, 84, 93	38.7	13, 21, 81, 110	12.9			51.6
	In-curved	17, 49, 67	9.7					9.7
	Incipient-S	16, 56	6.4	80	3.2			9.7
	Total %		71.0		29.0			100.0

* Number of measurable vessels-

Table 13.5-3: Profile Characteristics for Vessels from Level 1

13.5.2 Comments on Decoration

13.5.2.1 Decorative Structure and Proportioning

At the core of what appears to make types distinct from one another is proportional structure of the decorative area of the neck. The elements and motifs are placed on the neck in defined horizontal bands, the widths of these bands appear to dictate the dimensions, angles, and locations of the desired elements and motifs on the neck, placing some constraints on the decorator. On some vessel types, this proportioning is very precise and measured, while other types follow the ratios with less discipline. This suggests some maker/decorators paid particular attention to this aspect of expression and others were less concerned. This may be related to personality alone, but it may also be driven by social expectations. The discussion of such motivators could be construed as speculative and not defensible, but the observations are taken from the material. It is perceived by this analyst that decorative structuring and proportion may very likely have played a significant role in directing decorative approach for the individual potter.

13.5.2.2 Punctate and Boss

In this assemblage, the presence of this decorative element in Composite material is contradictory to the definition of Rainy River used and defined by Lenius and Olinyk (1990). In their observations of some 3500 vessels, they were comfortable in saying that the punctate and boss would be excluded from Rainy River Composite ceramics, and went as a far as to state that the presence of this trait would exclude a vessel from being defined as Rainy River. However, this does not seem to bear out here, as vessels that would be considered Rainy River in every other way also have punctates and bosses. In the interpretation of this assemblage, the Composite vessels which have these are generally most similar to the identified Coalescent threads (the DDC decorative approach, the Mid-neck emphasis, and the Soft-shoulder form). Conversely, the vessels which exhibit different form and decorative approach generally tend to not use the punctate and boss. Overall, the punctate and boss does appear less frequently in the upper levels of the Level 2 Complex and also in Level 1. Among the few vessels that carry the punctate and boss in the later levels are vessels which have a strong affinity to the DDC decorative approach. One of these exhibits the pseudo-chevron motif, otherwise all three may have been isolated by the presence of the punctate alone and because of this, these vessels are more broadly defined as Rainy River Composite DDC.

The meaning of the presence of punctates on Composite vessels cannot be resolved here. But perhaps the Rainy River Composite DDC type (with and without punctates, but especially with) is an example of the diffusion of Blackduck into Rainy River, one that holds closer to Blackduck roots than most. The presence of punctates on other Composite vessels does not have a tidy explanation.

This assemblage reignites the semantic debate of punctate versus stamp definition. The action creating these two impressions is quite often identical. The punctate has been rightfully isolated from consideration as any other stamped impression, because of the spatially isolated nature of its use, the fact that often it is produced with a different tool than other stampings on the same vessel, and because the depth of the impression is usually deeper than stamps, but also punctates often produce an accompanying boss which, when prominent, can become a decorative element unto itself. Other than the isolated nature of the punctate impression and the fact that the punctate impressions are typically a different form than other stamps on a given vessel, the other factors (depth and boss production) are dependant on a relationship between the dimension of the tool and the thickness/pliability of the clay at the time of the impression. The latter also affects the definition of the boss as well. In this assemblage, it appears that the boss is an intended decorative motif more convincingly in the earlier materials. This trait appears to decline and correlate to the decline of Coalescent vessels. In general, bosses on vessels in the later levels are less well defined. The 'punctate' however continues to appear as a distinctive impression, typically different from other impressions on a vessel, and usually round. The use of the term 'punctate' unfortunately necessitated qualification in the discussions herein. The intent of the decorator is key but is not always clear to the interpreter. It was chosen to use the term 'punctate' when the impression was distinct from the other stamps, regardless of the other factors like depth to width ratio, or a resulting boss. Distinct form is a definitive sign of intent to emphasize this element. In many cases, it is a motif unto itself and thus deserves to be distinguished.

13.5.2.3 Cord Wrapped Object Stamping

CWO stamping is a somewhat controversial decorative element in the definition of Rainy River ceramics for two reasons: one is the presence of similar impressions on Blackduck pottery (lower row only), and second is the difficulties in defining cord-wrapped object stamps reliably. On many Rainy River vessels, stamped decoration is produced by the same tool that creates the oblique and horizontal cord wrapped object impressions seen on most and typically these stamps are also applied at an oblique angle.

These impressions will show a portion of the cord wrapping creating a distinctive impression that falls somewhere in between a typical stamp and a typical CWOI, depending on the length. It is not used as a defining decorative trait on its own. They usually appear as an upper row below the oblique CWOI below the exterior lip (often fulfilling the pseudo-chevron motif or something close to it), or as a lower row below the horizontal CWOI set at mid-neck, near the base of the neck, and sometimes both. Standard non-CWO stamps also appear in these same locations on Rainy River pots. In certain cases, it appears that these impressions are deliberately produced with the intent to show some of the cordage and sometimes not. Obviously, these tend to be longer than the typical stamp impression made by the end of the tool. With this kind of variation, the problem comes down to a deciphering of intent and there are a range of attributes to evaluate before an assertion can be made in that regard.

This decorative element in the lower position is considered acceptable in the definition of Blackduck (Lenius and Olinyk 2009:pers. comm.) as long as there are other elements or motifs which are consistent for Blackduck. If these impressions are short and are approaching the dimensions of a typical stamp, then what? Likewise, if these impressions are long on a Rainy River vessel, what are the connotations? We need to know how to distinguish these impressions and if we can use them to tell Rainy River from Blackduck. One way might be length. But how much cord should be impressed, or what length, before the impression is no longer a stamp and should be considered a CWOI like the oblique and horizontals?

The length of these impressions are defined by the angle of the tool during their application. A major influence on tool angle is the contour of the vessel itself, most significant is the projection of the shoulder and the acuity of the angle between the neck and the shoulder. Most commonly, the upper and lower impressions are made with the tool pointing upward toward the rim. If the tool has any length at all, which it appears most do when assessing the horizontal CWO impressions, the tool would have to be held at an increased angle of obliqueness (to the side) if any length of the tool is to make contact near the base of the neck. The ‘distal end’ or ‘heel end’ would contact the shoulder during the application otherwise and force the tip of the tool to make more significant contact. These kinds of impressions are seen commonly, but so are impressions made with the tool held more perpendicular to the surface, where the end of the tool is the primary contact point. This is the more typical stamp making attitude. So the question remains, are the typically shorter CWO impressions seen below the oblique CWOI on the upper neck at the rim to be considered stamps or oblique CWOI? At the start of this analysis, it was assumed that the length was a good characteristic by which to differentiate, because the intent of the decorator could be inferred, to some tenuous degree, by the angle of attack or length of the impression. If the side or a length of the edge of the tool contacts the surface, versus the end of the tool, very different impressions are created, at least visually. But because of a vessel’s contour, it seems likely that this may not always be a reliable indicator of intent.

That being said, the length of these impressions is most typically shorter than the oblique CWOI extending down from the exterior lip and this should be considered purposeful as it is quite consistent among Rainy River vessels. Since many vessels use non-CWO stamps in these same positions, with similar dimensions and results, it is considered safe to presume that the intent is pretty much the same for both as far as patterning and decorative structure. Thus, in the end, length was used to some degree in the identification of these impressions in this report. One of the problems still remains, what to do if the lower row has some length and no other traits assist in deciding whether a vessel is Blackduck or Rainy River? At this point, vessel form characteristics are all we can use. Things are likely to remain this way until Blackduck assemblages can be analyzed and reassessed for the frequency of occurrence of this decorative element in particular.

We should not be calling all oblique CWOI impressions, below the upper neck, stamps. Conversely, just because a stamp is produced with a cord wrapped tool does not mean that it should be described as a CWOI like any other. But is length alone a valid discrimination? It appears not, as in several cases CWO impressions short enough to be considered as stamps are used, with little or no more emphasis toward the tip of the tool, as with other typical CWOI. So where does that leave us? It is clear that these shorter CWO impressions are deliberately distinct, and typical stamps appearing in the same placements with similar dimensions corroborates the likelihood of intent to remain inside a certain decorative structure or maintain a particular motif, i.e., the pseudo-chevron. So perhaps the best use of the term ‘CWO stamped’ is for any short impression showing cordage in a typical stamp position. The upper row of stamps, whether they are produced with a cord wrapped tool or not, are the domain of Rainy River ceramics alone.

Impressions considered cord-wrapped object stamps were present in all three occupation periods (Plate 13.5-1), most diversely illustrated in the Level 2 Complex. In Level 1, two vessels are identified with CWO stamps (Vessels 20 and 50) and one (Vessel 24) has a lower row of impressions that are appropriately described as oblique CWOI (the only vessel in the collection with this attribute). In the Level 2 Complex, there are ten vessels which have impressions for which the descriptive moniker of CWO stamp would be considered, three of these are definite (Vessels 6, 32, and 46), six show some length but are still shorter than the upper obliques (Vessels 12, 45, 58, 69, 70, and 79) and one has a row which are borderline (Vessel 37). There seems to be two types of CWO impressions that fall into consideration. One is the direct end impression which shows the last cord winding or two and the other is a short side impression and, despite the angles of impression, length didn’t change particularly. The latter is occasionally created with a slicing motion, where the tip is impressed significantly deeper presumably to allow more of the cordage to be impressed. It appears that this element was created to be distinct from the typical oblique CWOI present below the exterior lip, on the upper neck, as the length is rarely equal. It is clearly a Rainy River decorative trait although the presence of similar impressions on Blackduck gives further evidence of some connection between the two.

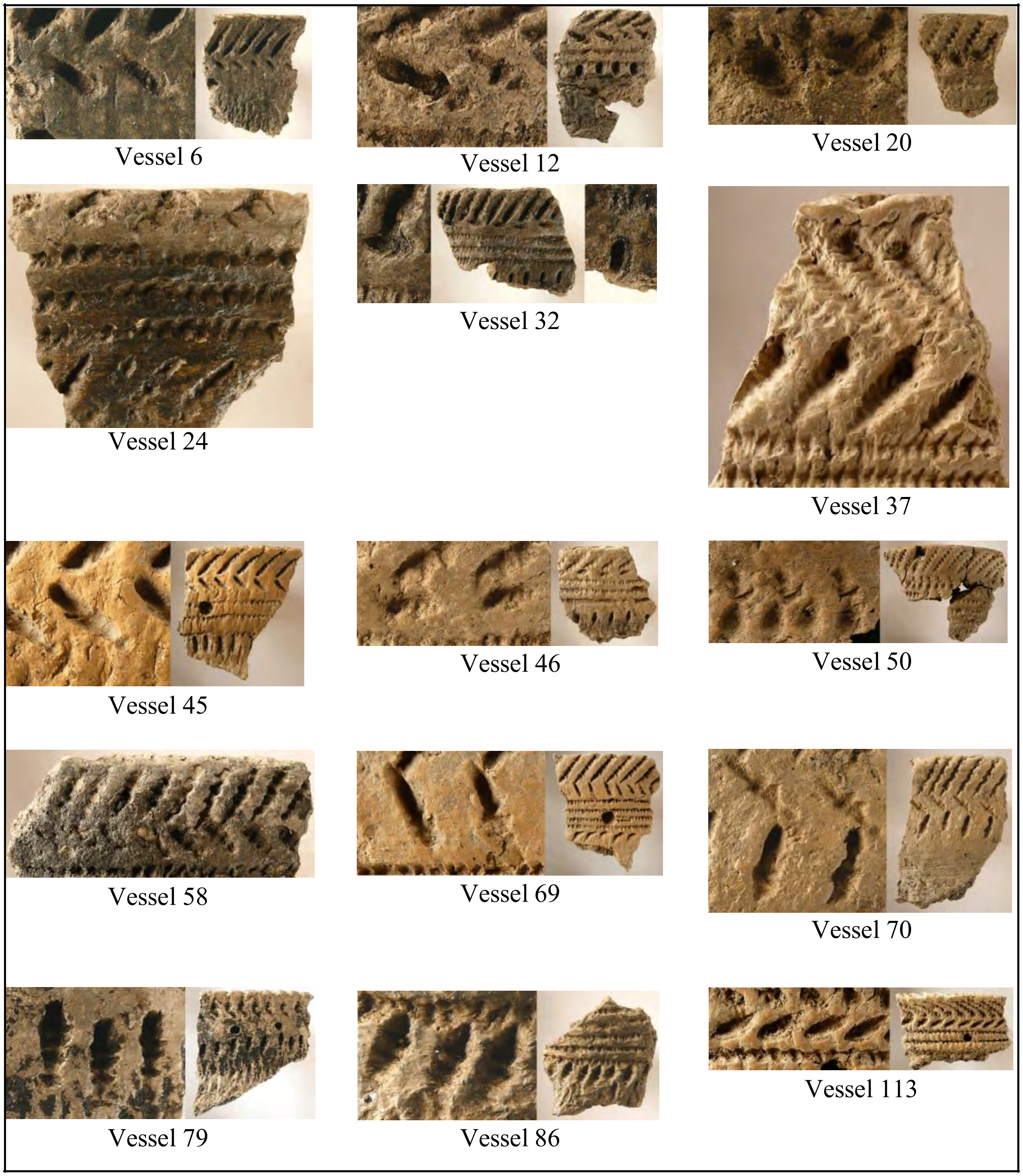


Plate 13.5-1: Examples of CWO Stamps

13.5.2.4 Shoulder Stamping

Stamp designs on the shoulder and body is an approach which is defined as a fundamental marker for Rainy River ceramics, both on miniature vessels and everyday wares. The Bird Lake and Duck Bay Complexes both utilized this decorative feature, so it is understood as a Composite expression.

- Stamping in the form of paired descending rows is recorded here from Level 3 indicating that extending the decoration onto the shoulder was done on utility vessels in the Coalescent phase of development. This motif was noted (Lenius and Olinyk 1990:87) as a Duck Bay and Bird Lake trait, but here the stamps are far too small to be considered as typical Duck Bay. Unfortunately, it is not possible to tell if the rest of the pot represented by these sherds would support a Bird Lake designation, but because they occur in Level 3, it seem unlikely.
- The horizontal swag or necklace pattern made up of two rows of vertically oriented ovoid stamps, is identified in some quantity in the Level 2 Complex and appears to be associated with Bird Lake-like vessels only. A single sherd with this pattern was recorded from Level 3 (rodent displacement is a possibility). In Level 1, some of the Holly Oblique vessels appear to exhibit this pattern also but, on these vessels, the stamp is large and has is a vertically oriented crescentic to asymmetrical form. It appears on some sherds that there may be a third row.
- Another stamping approach is present which appears to be concentric horizontal rows around the shoulder. Due to the limited amount of sherds found to refit, it is difficult to say whether these rows may swag to some degree or not. This type appears in Level 2 on a Duck Bay vessel from the K-line.
- Another variation is a vertical row of horizontally oriented linear/crescentic stamps descending from the neck onto the shoulder, sometimes described as columnar rows. This motif was identified in Level 1 (Plate 13.5-2), Level 2, and Level 3 (Plate 13.5-3).

Patterns or motifs created by the application of repeated stamping is present in all three occupational periods. These patterns are either horizontal/concentric or vertical/linear and stamp size varies for both during the temporal span of this assemblage. These motifs might be considered one of the anchor decorations for Rainy River ceramics. However, it is quite clear that a minority of vessels actually carry this motif and that shoulder decoration occurs on “Undefined” Rainy River vessels as well as on typical stamped Bird Lake and Duck Bay vessels. This leaves us guessing as to the significance of these particular motifs. Are we seeing early expressions that are perhaps formative in the development of Duck Bay and Bird Lake? Or, are these motifs deeply seeded expressions available for all Rainy River ceramic types and are those types of vessels which carry these motifs simply produced by people more closely associated with Bird Lake and Duck Bay traditions than others? Unfortunately, we can’t answer those questions at this point. But, by the appearance of shoulder stamping in Level 3, it is safe to say that these were present near the beginning of the Rainy River Composite phase of development.

The stamp size delineation consideration for Bird Lake and Duck Bay used by Lenius and Olinyk was applied to some of the vessels exhibiting motifs created by stamps alone, the bulk of which fall onto the Bird Lake side of the curve. One vessel had stamps of both sizes (Vessel 111). In general, it appears that larger stamps are later.

Vessel 3 - Level 1

Vessel 42 - Level 1

16007 - Level 1

2034 - Level 1

Plate 13.5-2: Examples of Shoulder Stamps from Level 1 (actual size)

13.5.2.5 Interior Decoration

Interior impressions were observed as both CWOI and stamps. The stamps were either linear or crescentic—no other form was observed in this position. This trait appears in all levels: Level 3 had three (Plate 13.5-4), Level 2 Complex had four (Plate 13.5-5), but it was most common in Level 1 which had eight vessels (Plate 13.5-6). Of the three vessels identified as Duck Bay, none had interior decoration. From the same portion of the excavation area as these Duck Bay vessels, a Bird Lake-like vessel (Vessel 74) was recovered, which does have interior decoration on its flaring rim. One suggestion for the appearance of interior decoration is on vessels where the profile flares or leans outward to such a degree that it obscures the exterior decoration, and the increased visibility of the upper portion of the interior neck affords the opportunity to mark a highly visible surface (Olinyk

2009:pers. comm.). This was observed on some Bird Lake vessels from Tulabi Falls, the Bird Lake type site. But in this collection, interior decoration appears on other vessel forms as well. The fact that it appears in Level 3, which predates the peak cultural period for the Rainy River Composite and certainly Bird Lake, indicates that it does not originate with the later expressions of Rainy River ceramics. Interior decoration is present during all three occupational periods, but is not prevalent.

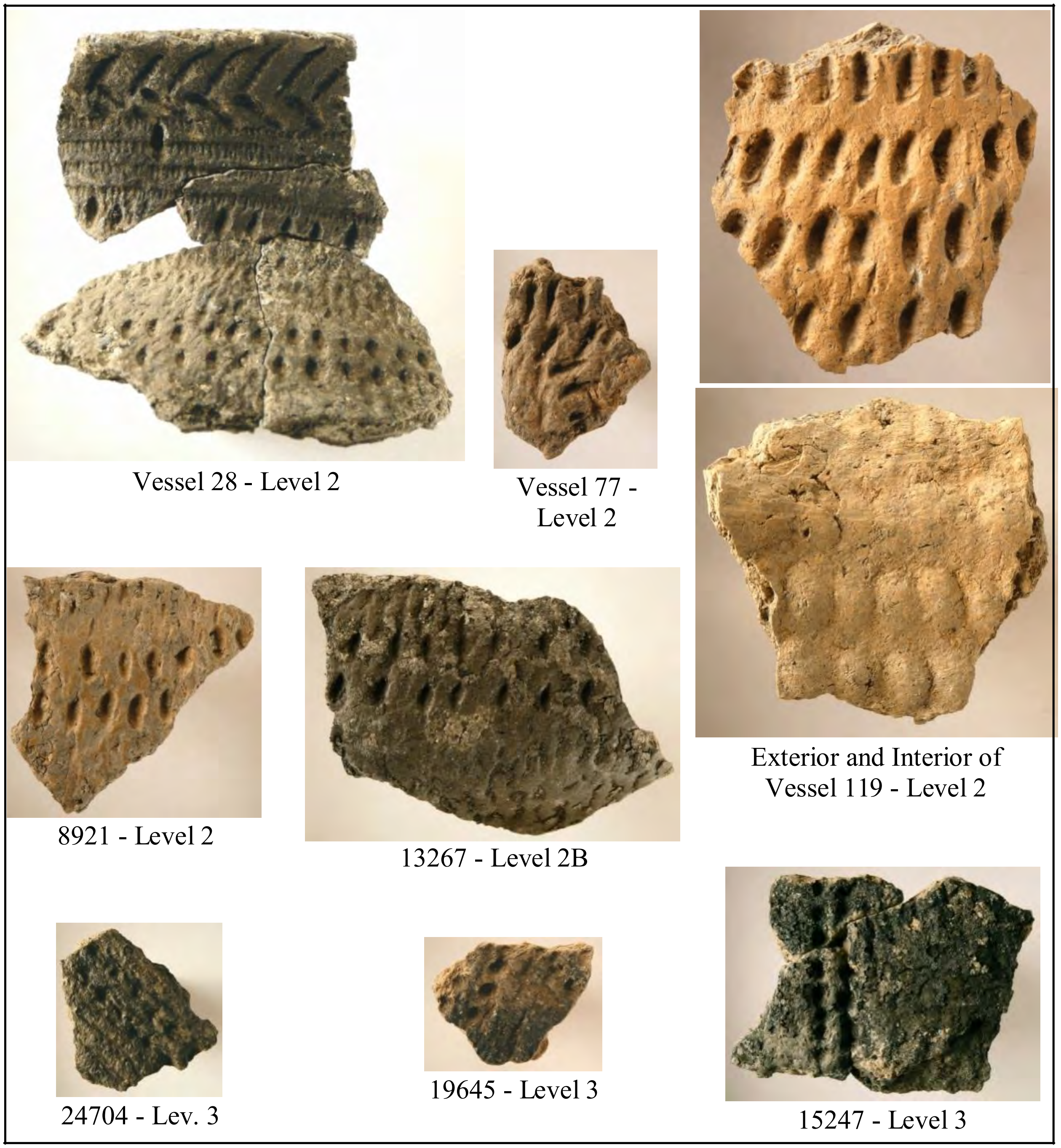


Plate 13.5-3: Examples of Shoulder Stamps from Levels 2, 2B, and 3 (actual size)

Vessel 92

Vessel 103

Vessel 108

Plate 13.5-4: Interior Decoration on Level 3 Vessels

Vessel 44 - Level 2

Vessel 74 - Level 2

Vessel 76 - Level 2

Vessel 71 - Level 2A

Plate 13.5-5: Interior Decoration on Vessels from Level 2 and Level 2A

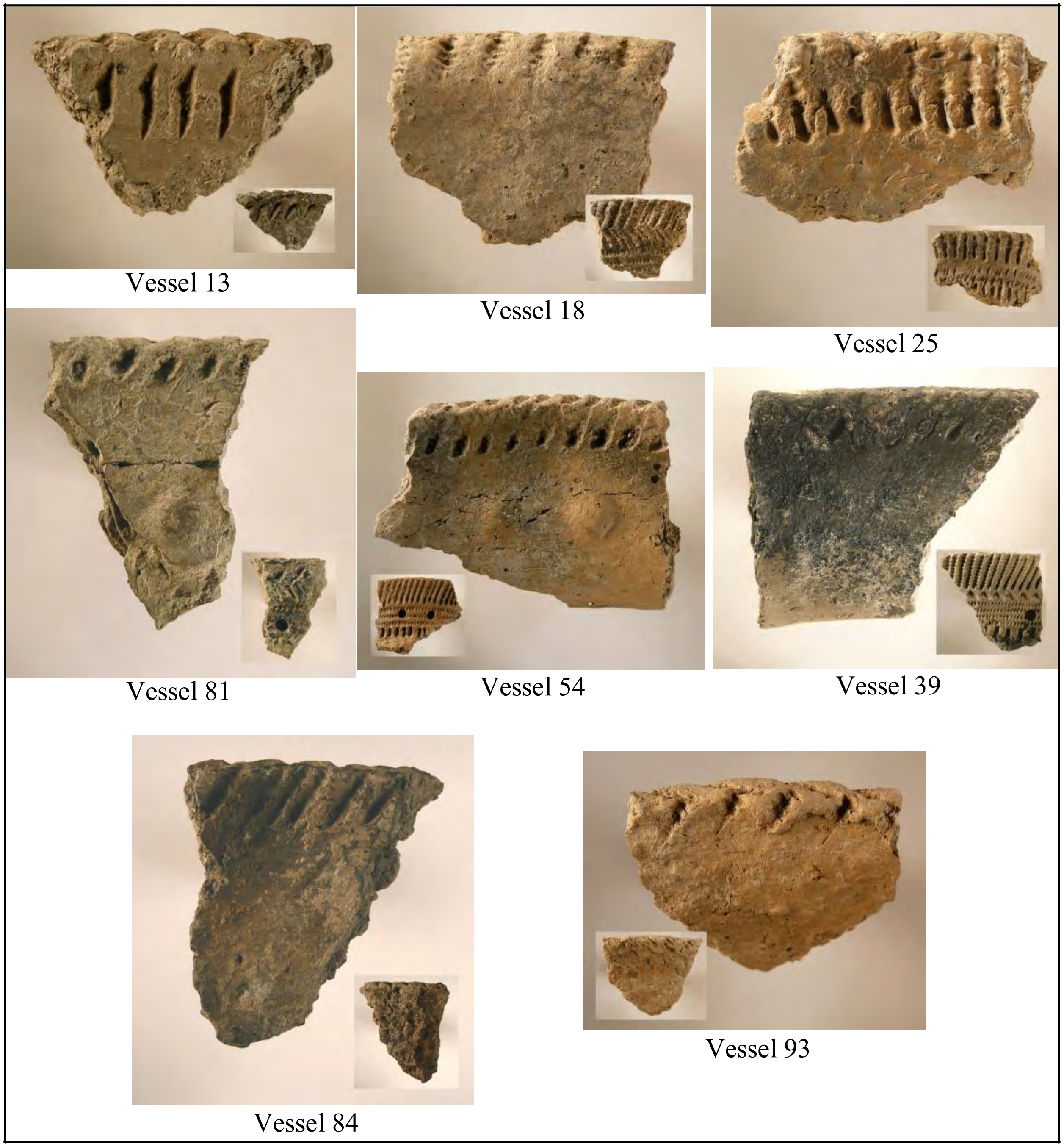


Plate 13.5-6: Interior Decoration on Vessels from Level 1

13.5.2.6 Pseudo-chevron Motif

The pseudo-chevron is defined here as the combination of oblique CWOI and counter oblique stamp creating an asymmetrical chevron, a pseudo-chevron which repeats on the upper neck, above the horizontal CWOI or blank mid-neck. This motif first appears on Coalescent vessels in a limited way and then shows up on vessels exhibiting a range of different forms and decorative approaches of Composite vessels in the Level 2 Complex. By Level 1, the pseudo-chevron is not as prevalent.

Further research will help to elucidate the significance of this motif as it appears to be most common on the early variations of the Rainy River Composite. One postulation might be that during a period of highly fractured and diversified cultural expression after the diffusion of Blackduck, the pseudo-chevron became a regional marker, helping hold some continuity among a diverse but related group of smaller groups. Perhaps dispersing as things began to settle out, the pseudo-chevron motif loses its utility and dissipates into other expressions explaining the poorer execution and minimal presence in Level 1. This is highly speculative.

One Duck Bay decorative approach described by Lenius and Olinyk (1990:88) is a combination of oblique CWOI and stamp, including at least two rows of vertical to oblique elongated stamps (Duck Bay-sized). This appears to encompass the pseudo-chevron motif, but only when in the presence of a second row of stamps, although the pseudo-chevron is not specifically mentioned. In the case of this assemblage, the two rows of stamps are generally separated by the horizontal CWOI. It is suggested that this is a distinction that precludes those vessels from Duck Bay. Two abutting parallel rows of stamps above the horizontal CWOI are seen here to a very limited extent, including on at least one vessel (Vessel 70) identified as Duck Bay-like. These vessels fit that description, but yet again, other traits preclude them from Duck Bay. The prevalence of this motif (the pseudo-chevron) in the Level 2 Complex of this assemblage is of interest if it is deemed to be a Duck Bay only motif, as this would force us to lump or split. Yet again, the dates become an issue in the interpretation, and we may have to consider whether we are seeing predecessor expressions or fringe diffusion. For now, the pseudo-chevron is considered a motif which functions independently of other traits. It appears with and without a second row of stamps, and the dates place the vessels with this motif earlier than the proposed emergent for the Duck Bay Complex.

13.5.2.7 Trailing and Delta Motif

The decorative repertoire seen within the Rainy River Composite is constrained to CWOI, stamps of different sizes and shapes, and occasionally even punctates. Incising and trailing can sometimes be seen also which suggests southern influence in this area. It is difficult to be specific about source, but trailed and incised decoration is a common mode of decoration on traditions peripherally associated with the Mississippian Cultures of the American Midwest. These groups, in turn, would likely have been somewhat peripheral to the makers of the ceramics interpreted here, so the result is combining of the CWOI and stamp decoration and borrowed decorative technique. Vessel 34, an Aspen vessel, is the case in point for this subject. The neck decoration is comprised of CWOI and stamping, an otherwise more or less typical Rainy River Composite pot. The decoration below the neck is the departure. The origins of decoration on the shoulder of some Rainy River vessels could be viewed as an adaptation of the Laurel decorative approach, but some southern traditions also produced similar motifs that could have been adapted to the Rainy River aesthetic. The delta shape, expanding onto the shoulder, is seen on several ceramic traditions along the northern periphery of the Plains, but also on Laurel ceramics in the Boreal forest. Although only partially revealed, it appears that is what is presented on the shoulder of Vessel 34, with the addition of parallel horizontal lines presumably in-filling and alternating between the repeating delta or inverted V-form. But this remains a ‘best guess’ as only a small portion of this vessel appears to have been recovered.

Regardless, the presence of vessels harbouring both typical Rainy River decorative traits and atypical traits such as this suggest a certain affinity, if not a direct relationship, with another decorative approach or tradition.

13.5.2.8 Rim Decoration Observations

13.5.2.8.1 Compound Impressions on the Rim

One of the definitive traits for Bird Lake is the alternating oblique CWOI and the pseudo-chevron on the rim (lip, as it is described by Lenius and Olinyk 1990). The alternating groups of opposing angle oblique CWOI identified as definitive Bird Lake (Lenius and Olinyk 1990) is not seen on any vessels in this assemblage. But there are several vessels with criss-crossing CWOI, a compound impression not particularly unlike the alternating groups, but with overlap. The criss-crossing CWOI motif, however, is not affiliated with Bird Lake ceramics as defined and this motif occurs here on a diverse array of vessels. Again, the significance of such motifs is not understood, but the fact that the criss-crossing CWOI motif recurs is suggestive that these interchangeable motifs may be identifiers. Of what, is not known at this point. One vessel did have a compound impression motif on the rim other than the criss-cross. This is Vessel 28, a Bird Lake-like pot with a symmetrical chevron pattern comprised of two rows of oblique CWOI (Figure 13.5-1) which is not an acceptable motif for positive Bird Lake affiliation because it is specifically stated that with this motif on the rim, it shall be formed by a combination of CWOI and stamp, not CWOI only. This is not the only 'not quite right' aspect of this particular vessel.

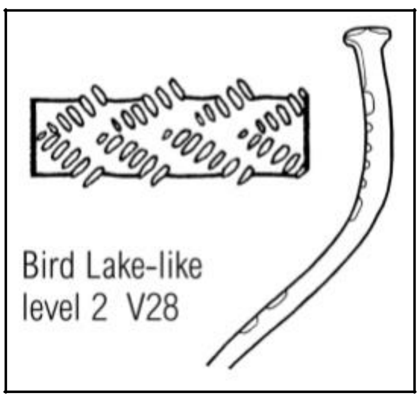


Figure 13.5-1: Chevron Pattern on Rim

Six vessels were identified with criss-crossing CWOI on the rim (Figure 13.5-2), three from Level 1, one from Level 2, and two from Level 2A. As mentioned, there is little commonality between this group other than this decorative treatment. Only two are identified as part of the same type, Rainy River Pseudo-chevron, Vessel 48 from Level 2A and Vessel 56 from Level 1, but they too are quite different from each other.

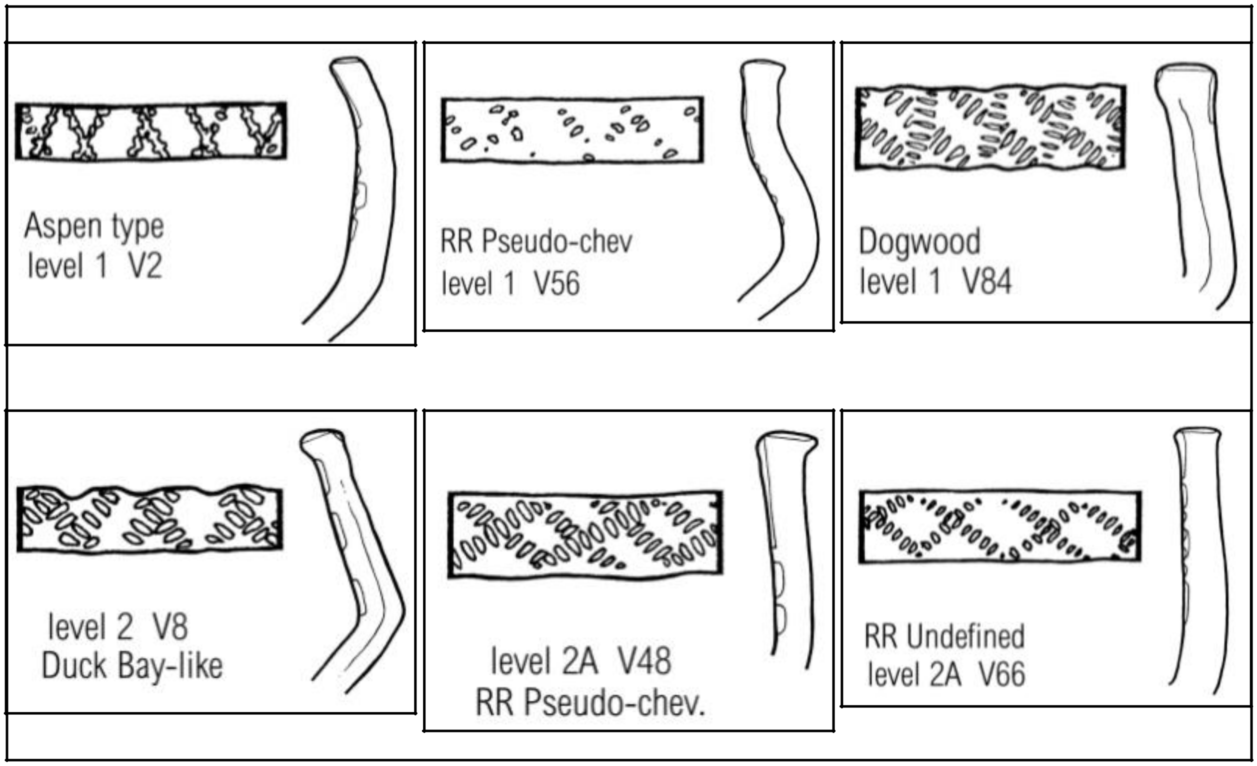


Figure 13.5-2: Criss-cross CWOI Impressions on Rim

13.5.2.8.2 Wide and Flat CWOI

Impressions produced with the face of a wide and flat cord wrapped object are distinctive and are seen on several vessels in this particular assemblage (Figure 13.5-3). This tool shape was deciphered from linear impressions on the exterior (both oblique and horizontal), creating deep V-shaped impressions (in cross section), but most uniquely from the rim impressions. The rim impressions are seen to have been applied perpendicular to the rim, just slightly off perpendicular, oblique, and, in one case, parallel to the rim, creating a unique large ovate impression. In regard to the perpendicular to the rim impressions, they appear to be applied with the decorating tool pointing toward the exterior and the impressions do not extend beyond the apex of the exterior lip.

This approach to rim decoration is similar to that described for Duck Bay vessels with stamping or notching on the rim. The general tendency for these impressions (Lenius and Olinyk 1990:88) is to be perpendicular to the rim, with the application emphasis on the interior lip. If these practices are related, we are again left with the question of which way the influence is flowing, Duck Bay to this material, or the other way around? If our dates are earlier than those for Duck Bay, we may be seeing a formative expression leading toward Duck Bay.

Four vessels recorded this disproportionate decorative element in Level 1, two from the Holly Oblique type. Five were identified from Level 2, two of which were too incomplete to classify. Lastly, one was from Level 3 with significantly wider CWO impressions on the rim than elsewhere. This census appears to suggest that this a more significant element later than earlier.

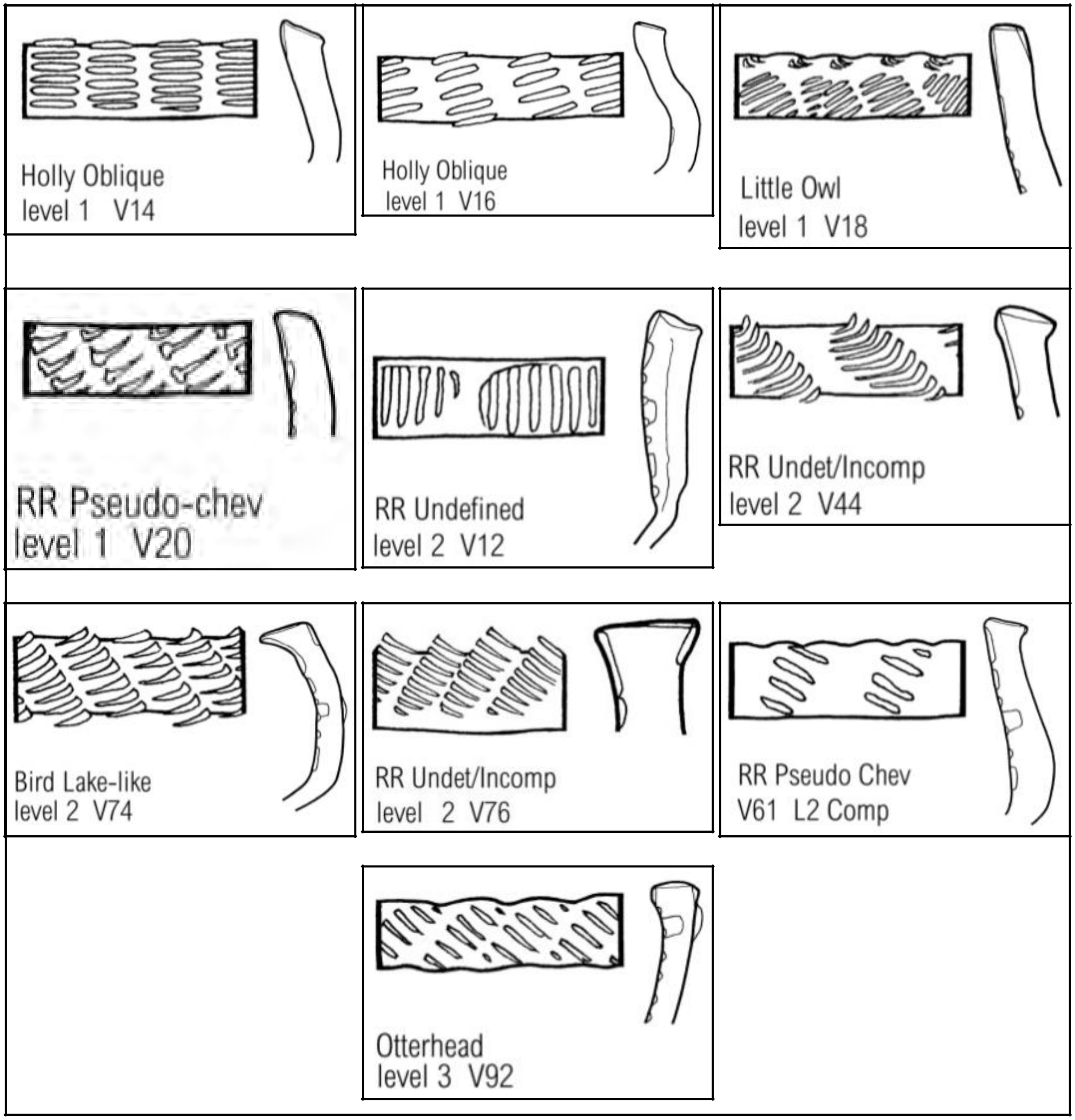


Figure 13.5-3: Wide Flat CWOI on Rims

13.5.2.8.3 Stamped Rim

Two vessels from Level 2 exhibit a stamped rim (Figure 13.5-4). Both of these are identified as Rainy River Composite DDC because of the overall approach to the decoration, except for the rim treatment which is atypical as is the neck profile. These two attributes might be cause for separation at some point. The stamps themselves are deep and more or less crescentic.

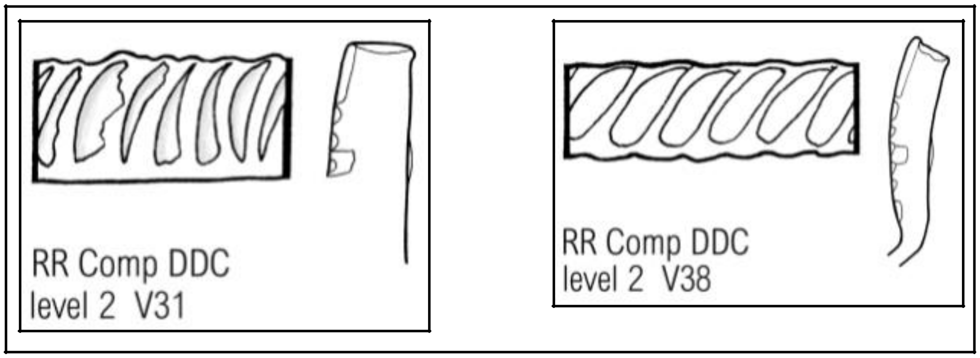


Figure 13.5-4: Stamped Impressions on Rims

13.5.3 Manufacturing Characteristics

13.5.3.1 Surface Treatment

The observed surface textures were identified as being either textile impressed, sprang weave impressed, obliterated textile impressed, vertical cord impressed, or smooth. Some artifacts were catalogued with no recorded surface treatment. The statistics were compiled in Table 13.5-4. This table omits non-vessel ceramics, 21 items in total. The 'No recorded surface treatment' column includes rimsherds where surface treatment is not visible due to decoration, sherds too small for recognition, and sherds catalogued with exfoliated exterior surface. It also includes ceramic materials recovered from the northwest and southwest sump pits, 9 sherds with a total weight of 73.6 grams which were ascribed to Level 2. Percentages were calculated for each category based on the total weight recovered from each level. Textile impressed (Plate 13.5-7) was the predominant surface treatment when looking at the excavation as a whole, at 51.6% of the total recoveries. Sprang weave impression (Plate 13.5-8) was identified on 36.4% of recoveries. Obliterated textile impressed was the third most common at 5.7%. The other surface impressions identified were a minor portion of the totals.

The two remaining surface treatments that appear, vertical cord impressed (Plate 13.5-9) and smooth, are represented in very small quantities. A total of only 8 sherds were identified as being vertical cord impressed, all appearing in either Levels 2 or 2A with one small sherd identified from Level 2C. Four of these sherds were identified as from the rim portion of vessels, with limited area of surface impression, and because of this could be considered as tenuous. They were deemed by this analyst to be lacking the weave features required to be classified as sprang.

Smooth surface sherds are a tiny minority of the total excavation recoveries (0.5%), appearing in Levels 1, 2, 2A, and 3A. The smooth surface sherd statistics represent some interesting vessels however. The small finger molded vessels of Level 1 and Level 2A accounted for a significant portion of the sherds described as smooth. The remaining smooth sherds are from Vessel 50 (Level 1). Two sherdlets from Level 3A were identified with no linkage to a particular vessel.

LEVEL	SPRANG			TEXTILE IMP.			OBLITERATED			VERTICAL CORD			SMOOTH			* NO RECORDED SURFACE TREATMENT			LEVEL TOTALS	
	WT/g	QTY	%	WT/g	QTY	%	WT/g	QTY	%	WT/g	QTY	%	WT/g	QTY	%	WT/g	QTY	%	WT/g	QT
1	969.7	366	8.0	9900.4	3959	81.4	592.1	357	4.9	-	-	-	94.2	55	0.8	600.6	312	4.9	12157.0	5049
2	2196.3	691	33.1	3289.7	1416	49.7	700.7	174	10.6	44.3	5	0.7	10.1	13	0.1	381.5	188	5.8	6624.4	2487
2A	1648.6	452	58.8	882.5	367	31.5	166.4	41	5.9	31.4	2	1.1	36.7	19	1.3	38.7	18	1.4	2804.3	899
2B	1569.9	452	66.9	590.3	290	25.2	106.8	50	4.5	-	-	-	-	-	-	77.8	37	3.3	2344.8	829
2C	389.5	194	75.2	82.9	27	16.0	11.2	7	2.2	1.1	1	0.2	-	-	-	33.4	35	6.4	518.1	264
2D	86.9	27	98.4	0.8	2	0.9	0.3	1	0.3	-	-	-	-	-	-	0.3	1	0.3	88.3	31
2 Complex	5891.2	1815	47.6	4846.2	2102	39.1	985.4	273	8.0	76.8	8	0.6	46.8	32	0.4	531.7	276	4.3	12378.1	4510
3	3166.7	1940	70.6	784.7	661	17.5	98.0	43	2.2	-	-	-	1.5	1	0.03	436.5	260	9.7	4487.4	2905
3A	1061.1	369	75.4	160.8	180	11.4	62.9	23	4.5	-	-	-	0.3	1	0.02	121.1	44	8.5	1406.2	617
3 Complex	4227.8	2309	71.7	945.5	841	16.0	160.9	66	2.7	-	-	-	1.8	2	0.03	557.6	304	9.5	5893.6	3522
TOTALS	11088.7	4491	36.4	15692.1	6902	51.6	1738.4	696	5.7	76.8	8	0.2	142.8	89	0.5	1689.9	895	5.5	30428.7	13081

THIS TABLE OMITS NON-VESSEL CERAMICS (21 ITEMS)

* Includes rimsherds where surface is obliterated by decoration, sherds too small to tell, and sherds with exfoliated exterior

Table 13.5-4: Surface Treatment by Level Showing Weight, Quantity, Percentage, and Totals

DlLg-33:08A/9374 - Level 2B

DlLg-33:08A/9375 - Level 2B

DlLg-33:08A/16397 - Level 2A

DlLg-33:08A/13898 - Level 2B

Plate 13.5-7: Textile Impressed Variation (actual size)

It should be said here that surface treatment identification on sherdlets is often misleading. Despite best efforts to be discriminating, identification can prove to be incorrect. Small sherdlets with smooth surface can easily be misidentified as obliterated textile, and vice versa. Misidentification occurs between sprang and vertical cord impressions as well. If at some point these small sherdlets can be refitted to a particular vessel, their surface identification will be confirmed or changed.

When the individual level totals are reviewed, a significant trend emerges. An inversion occurs in the representation of textile impressed and sprang. In Level 3 and Level 3A combined, sprang weave impression constitutes 71.7% versus 16.0% that is textile impressed. In Level 1, the totals are reversed, 8.0% sprang versus 81.4% textile impressed. The complex of horizons that makes up Level 2-2D illustrates the trend further, though it must be considered that the quantities recovered from the five horizons identified in the Level 2 Complex decreased the deeper we went. However, the proportional percentages did not counter the inversion trend, with sprang weave representing 33.1% in Level 2 to 98.4% in Level 2D. Textile impressed is calculated at 49.7% in Level 2 and 0.9% in Level 2D.

DlLg-33:08A/14347 - Level 2A

DlLg-33:08A/12839 - Level 2A

DlLg-33:08A/17719 - Level 3

DlLg-33:08A/11040 - Level 2B

Plate 13.5-8: Sprang Variation (actual size)

The Level 2 Complex, on its own, is so stratigraphically and taphonomically problematic that this trend might be taken sceptically if it were not bracketed above and below by the concise and well contained Levels 1 and 3/3A. When the figures are totalled for the Level 2 Complex, the figures still fit this inversion sequence. This appears to illustrate quite clearly a change occurring during the period of the occupations excavated.

Based on the numbers, it appears that during this window in time there was a change in preference or technological approach to the utilization of particular textiles as they relate to the manufacture of ceramics. Trends like this are not typically exposed in single excavations. Given the potentially tight date range for Level 3A to Level 1, as little as forty years (perhaps only 2 generations), this inversion is that much more remarkable. Adaptations were obviously adopted quickly in the community represented in this excavation.


Plate 13.5-9: Vertical Cord Impression on DlLg-33:08A/12956 - Level 2A

Variation in the quality of the textiles was observed. The textile impressions were characterized as coarse or fine when possible. This is a subjective observation which is based on the character of the cordage from which the textile is made. If the cordage is fine and smaller diameter, the overall textural quality of the textile impression was considered to be fine. Conversely, if the cordage is coarse and of a larger diameter, the weave ends up appearing coarser and so does the impression left on the vessel. This simply goes to state there was a range of quality present at any given time. This might reflect skill levels or fibre source. A coarser fibre would restrict the manufacture of fine cordage.

The cord strand impressions seen in this assemblage, despite the simplistic and rudimentary classification, appear to exhibit a range of patterning, not all of which is easily understood by a non-weaver nor by experienced finger weavers.

One observation deserves mention here, relating to weave structure. On several sherds with very good impressions, a three cord pattern is repeatedly seen, i.e., three parallel cords appear to emerge from the weave (Plate 13.5-10). Two explanations are postulated here which will require further investigation. The first relates to sprang weave bag construction. Noted finger weaver, Carol James (2009:pers. comm.) suggested that in order to create a bag or three dimensional globular form with sprang weave one would have to add in and drop strands (Plate 13.5-11) from the weave during the process. Criss-crossing parallel strands in this portion of the vessel could be produced by establishing a basic and freeform weave which eventually morphs into sprang once the contoured bottom of the bag is formed. Perhaps these repeated three cord impressions may be related to this process. The other possibility may relate to cord wrapped paddle work or even a cylindrical cord wrapped roller which could aid in formation of the vessel or simply to texturize the surface. Perhaps paddle work was used to form the base of the body before placement into a bag, leaving a patterning of both. The use of these techniques is not out of the question, but remains unproven in Rainy River ceramics to this point. The fact that parallel cord impressions that do not seem to be integrated into an actual weave appear inconsistently on vessels identified as sprang weave impressed needs to be rationalized. But it seems to be that the majority of these kinds of patterns are more prevalent on what appear to be basal or lower body fragments.

Plate 13.5-10: Sprang Weave - 3 Cord Pattern Assumed to be Related to Weave Transition

Plate 13.5-11: Sprang Weave Variation - Broken Pattern (DlLg-33:08A/19646 - Level 3)

13.5.3.2 Thickness

Some generalities were observed between the different surface treatments, one was body sherd thickness. There is overlap in the ranges but sprang impressed sherds tended to be thinnest (2-6 mm) and the thickest sherds were textile impressed (4-9 mm). The thinnest sprang sherds measured a mere 2 mm or slightly less and most, if not all, were from the upper body to shoulder transition area. Shaping the vessel from the interior within an expanding bag is what causes this portion to be thinnest. The apex of the shoulder being the maximum extent of expansion. The thickest sherds overall are often from the neck and neck to shoulder transition zone of a vessel, but the base of a vessel can also be thick. As vessel identification was not applied to the body sherds, there was no proportional comparison of thickness from the upper section of vessels to the lower.

13.5.3.3 Profiles

The characterisation of the typical profiles in this assemblage is derived from observation only. No metric analysis was undertaken to establish or define patterns of form.

The neck profiles associated with the Rainy River Composite: straight, flaring, or incipient-S, appear early in this assemblage in limited numbers but should be considered when evaluating borderline Coalescent/Composite vessels, though definition of Composite vessels cannot hinge on this alone. Coalescent profiles are typically more similar to Blackduck or Laurel influenced forms, but it appears from this excavation that straight and incipient-S are also in use to a limited degree (Figure 13.5-5). These neck profile forms are suspected to be part of a southern influence that may or may not have filtered through Blackduck. This is presumed, at this point, to have been brought on by the derivative ripple effect from the collapse of the dominating Chiefdom societies of the United States Midwest.

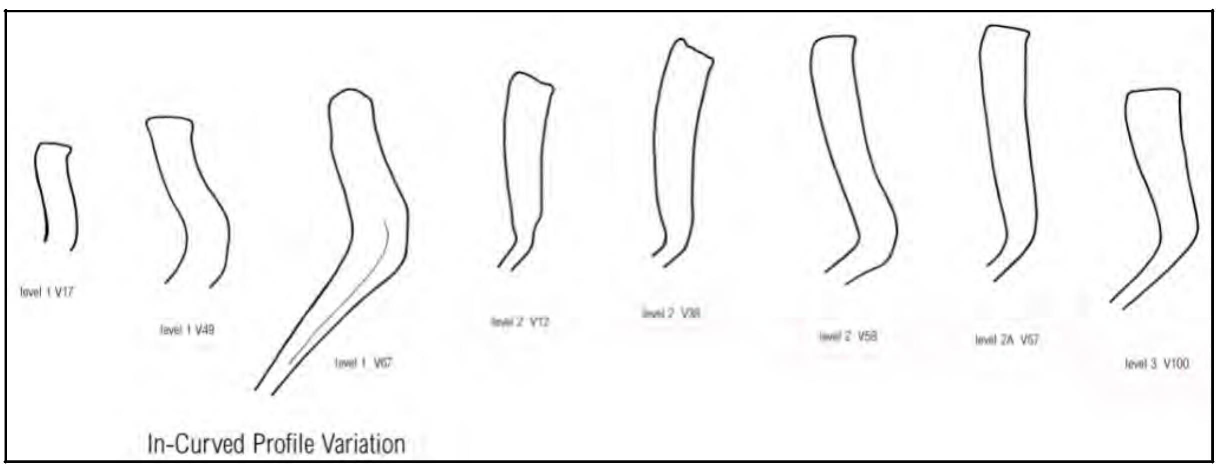


Figure 13.5-5: Profiles Present in the Ceramic Assemblage

There appears to be a general trend in this assemblage for the neck height to diminish, or at least the prevalence of a shorter neck increases. This appears to have happened with all of the typical profiles: straight, flaring, and incipient-S, and is most evident in Level 1. This observation has not been reconciled typologically in this report, but this tendency may be indicative of a particular tradition that manifests during the middle to late Rainy River expansion. Lenius and Olinyk (2009:pers. comm.) postulated that this, along with a gradual increase in neck flare, were progressive tendencies in the development of Rainy River ceramics. The latter does not bear out in an obvious way here, although it does appear that the Composite range includes more vessels with moderate to pronounced neck flare. What these tendencies represent, if anything, is unclear.

13.5.3.3.1 Incipient-S

The term incipient-S, a typical Duck Bay profile, was coined to differentiate between true S-rim profiles, not found in this site or in Duck Bay ceramics for that matter, and a significantly less pronounced version where the neck profile curves outward slightly near the base of the neck and then inward at the rim. For this report, the incipient-S term is applied to a specific form, as seen with Vessels 56 and 80 (of Level 1) and Vessel 45 (of the Level 2 Complex). It is essentially a simple modification to the usual approach for a straight or a flaring neck, but creates a very different finished appearance. The neck stance is either vertical or, more typically, angled slightly outward. The thickness is usually moderate to thin and is consistent from the base of the neck to the upper neck. The rim is usually wider, due to some lip protrusion or emphasis, typically more on the interior. In this collection, there is apparently a short neck version which also maintains even thickness through the neck.

Some general observations regarding neck flare were noted:

1) Neck flare and neck stance must be considered together, an outward stance can greatly emphasize the appearance of flare. The degree of flaring is the amount of outward curvature built into the vessel from the neck juncture to the rim, where on the neck this curvature begins greatly effects the degree of flaring that is perceptible.
2) Another effect which creates a flared look is an increased thickness on the outer, upper neck, beginning above the mid-neck. On vessels which have this, the interior plane of the neck does not follow the exterior flare, but progresses commonly to a near vertical right-angle juncture at the rim (the interior lip). The overall stance of the neck is vertical or nearly so. This is of particular note on Coalescent phase vessels. This tendency is considered here as a trait typical of Blackduck. This form appears to dissipate in later expressions where neck height is reduced and the incidence of outward lean also seems to increase.
3) The extent of neck flare does not appear to influence the extent of decoration in any way, although neck height does.
4) Neck flare does not appear to correlate to any particular vessel type or decorative approach consistently in this assemblage.

13.5.3.3.2 Other Observations

One particular profile is of interest. It is typically described in this analysis as incipient-S but there are some features which suggest that this form may be distinctive enough to be categorized separately. This profile does not show much outward curve from the neck juncture, instead the tendency is for the neck to progress as an outward leaning straight neck, but finishing toward the rim with an inward curve above the mid-neck. The neck of these vessels is thicker than most as well as proportionately taller. The decoration on these pots exhibits the DDC approach in most cases. The pseudo-chevron does not seem to be favoured and two vessels which have this profile have atypical decoration on the rim. There is no representation of this profile variation in Level 1 and it is restricted to the mid to upper levels of the Level 2 Complex. It is advised that vessels like these should be noted in future, as it is suspected that they represent yet another distinct type in the Rainy River family.

13.5.3.4 Vessel Size and Proportioning

Neck height and diameter measurements and calculations were compiled to assess and give a sense of the range in vessel dimensions in this assemblage. Only pots which had complete neck height measurements and enough rim curvature preserved were used in the calculations. Thus, not all vessels are represented in the following graphs and discussions. The neck heights are accurate and the distance measured runs from the exterior lip to the centre of the apex curve at the neck juncture with the shoulder (Figure 3.2-3). To measure the diameter of the vessels, the rim sherds were evaluated using a radius scale to measure the curvature potential for the rim aperture at the interior lip. An average was calculated based on the perceived maximum and minimum potentials. This ends up being a ballpark estimate for rim aperture/diameter with a greater margin of error for some vessels than others, but it does give some idea of the relative dimensions when considered in conjunction with the profile and neck stance. In the calculation of the mean values, the minimum and maximum values were discarded. This is not desirable when evaluating individual types, but was done to create values covering variation in the occupational periods and the total assemblage.

13.5.3.4.1 Neck Height

Neck height varied quite significantly in this assemblage, but the tallest and the shortest neck heights correlated to the atypical vessels in the group (Figure 13.5-6). Of the five shortest neck heights, those under 20 mm, all were either not Rainy River or are identified as Rainy River Undefined but for one which is a Holly Oblique vessel, a previously undefined type. Except for Vessel 63, all are from Level 1. The tallest neck heights were observed on vessels of the DDC and Kroker Mid-neck patterns, which include the Composite types, Composite DDC and Rainy River Pseudo-chevron, as well as some pots which remain as Rainy River Undefined (some Composite and some Coalescent). This tall neck tradition is more graphically illustrated in the Level 2 Complex and Level 3 and is perceived as a derivative Blackduck trait. The tallest neck height was measured on Vessel 108, an atypical Rainy River pot. The mean neck height for Level 1 was 29.45 mm, and the Level 2 Complex was nearly identical to that of Level 3, 34.53 mm and 34.35 mm respectively. This tends to corroborate the idea of decreasing neck height over time for Rainy River ceramics suggested by Lenius and Olinyk (1990, 2009:pers. comm.). A greater deviance is observed in the proportioning ratio of neck height to rim diameter. The mean neck height for the assemblage is 32.77 mm.

13.5.3.4.2 Rim Diameter

The mean diameter for the assemblage (Figure 13.5-7) is 186.53 mm, with Level 1 vessels again separated, averaging 200.95 mm and Level 2 Complex vessels and Level 3/3A vessels again comparable at 177.66 mm and 181.0 mm respectively. Vessel 63, with an estimated rim aperture of 70 mm is approaching that seen for the miniature vessels from mound burial contexts. There are no burial mounds within this campsite context. Whether Vessel 63 or any other small pot recovered from this excavation would have been intended for ceremonial use is quite speculative. Miniature vessels are not only found in burial contexts. Lenius and Olinyk (1990) noted that at Tulabi Falls, the Bird Lake type site, miniature vessels were recovered without the presence of burials at that site as well. So it seems that the presence of small vessels in campsite contexts is not particularly unusual. It is not obvious what function Vessel 63 served in this campsite context, nor is it clear if this vessel is even properly affiliated with Rainy River. It could be a trade vessel.

Figure 13.5-6: Neck Height by Level

13.5.3.4.3 Neck Height to Diameter Proportions

Other manipulations were undertaken to further illustrate the overall range in vessel size and proportion. One was a scatterplot graph using neck height and diameter on the axes, allowing the ability to visualize clustering. (Figure 13.5-8). The second approach was to create neck height to diameter ratios for each vessel which had both measurements and place them on a bar graph. This illustrates the variation among the different types and within those types, as well as aids comparison between the three occupational periods and the assemblage as a whole (Figure 13.5-9).

What comes forth from this analysis are general tendencies for this assemblage. We see that Level 1 vessels on the whole are shorter necked and proportionately wider in relation to the neck height, less projection of the neck (7:1 neck height to diameter), suggesting a stockier overall vessel appearance. Reconstruction efforts will confirm or deny these statistics at some point. Also seen in the Level 1 vessels is a wider range in the neck proportioning ratio, part of this appearance of breadth is the presence of two short necked vessels in particular (Vessels 25 and 93), both with uncertain affiliation to Rainy River ceramic traditions. Of interest too is the range illustrated in the Holly Oblique type, largely attributed to a single maker. This variation is contrary to the observations for the Willow type, another group of vessels ascribed to a single maker, found in the Level 2 Complex.

The range is far more constrained in the Level 2 Complex and Level 3/3A materials. The Level 3/3A vessels are represented by a ratio suggesting a taller neck and narrower diameter vessel proportioning in relation to the neck height. Again, confirmation of the actual vessel forms will not be available until reconstructions can be attempted.

All in all, this statistical review suggests a marked distinction between the vessels of Level 1 and those of the more closely similar vessel proportional tendencies from Level 3/3A and the Level 2 Complex. This seems to show a closer affinity between Level 3/3A and Level 2 Complex materials than that of Level 1 and the Level 2 Complex materials. On the face of it, this seems somewhat counter intuitive to a perceived progression where, stratigraphically and temporally speaking, Level 1 and the Level 2 Complex should be more closely related. But like many things about Rainy River ceramics, we don’t really know what the rate nor manner of change was at any given point in time or geographically. If we assume that this assemblage is representative of what was happening in the larger picture, which it of course does (but to what extent?), then it may be that the period of time between A.D. 1000 and A.D. 1250 saw an acceleration in change after A.D. 1200. The other possibility remains as well, that the perceived progression, a kind of evolution of ceramic expression, is only part of what we should be considering when trying to anticipate how and where a particular vessel might reside typologically and temporally. It also is likely that within the Rainy River ceramic tradition as a whole, there are several Complexes undergoing their own transitions. This is a highly dynamic mix of linear and non-linear influences which has become a little clearer with this assemblage. The pot has been stirred.

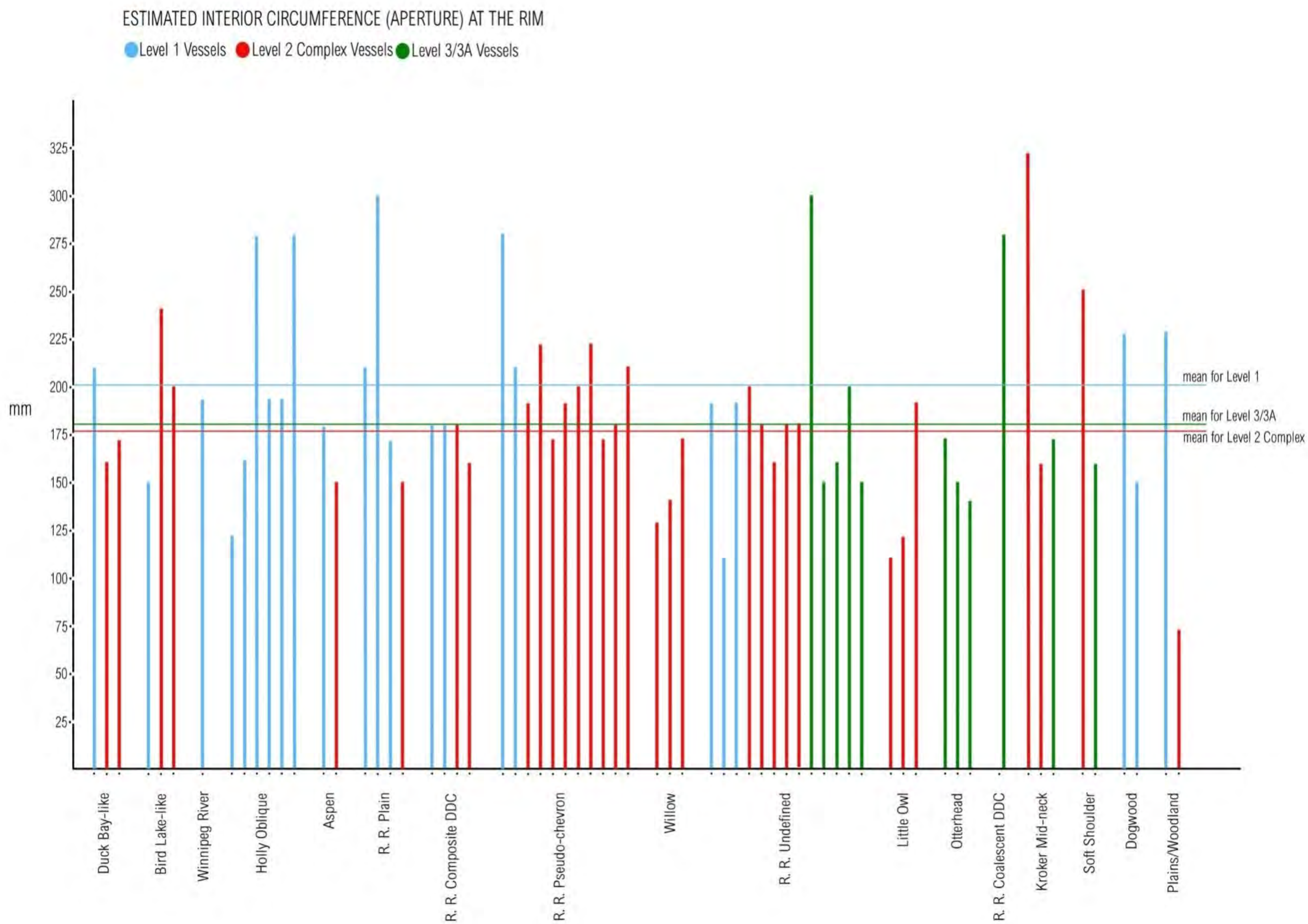


Figure 13.5-7: Interior Diameter at Rim by Vessel

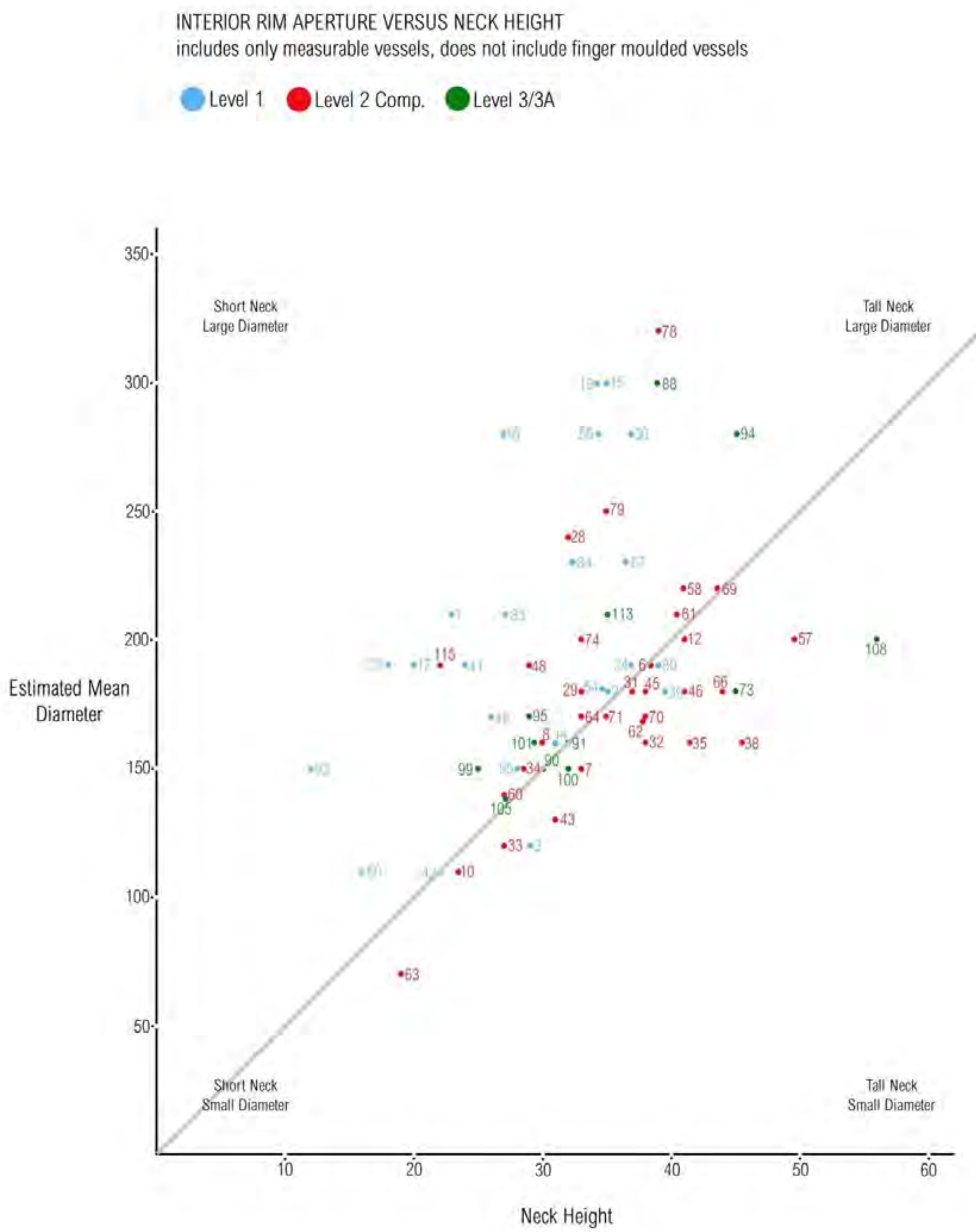


Figure 13.5-8: Scattergraph of Neck Height Versus Interior Diameter at the Rim

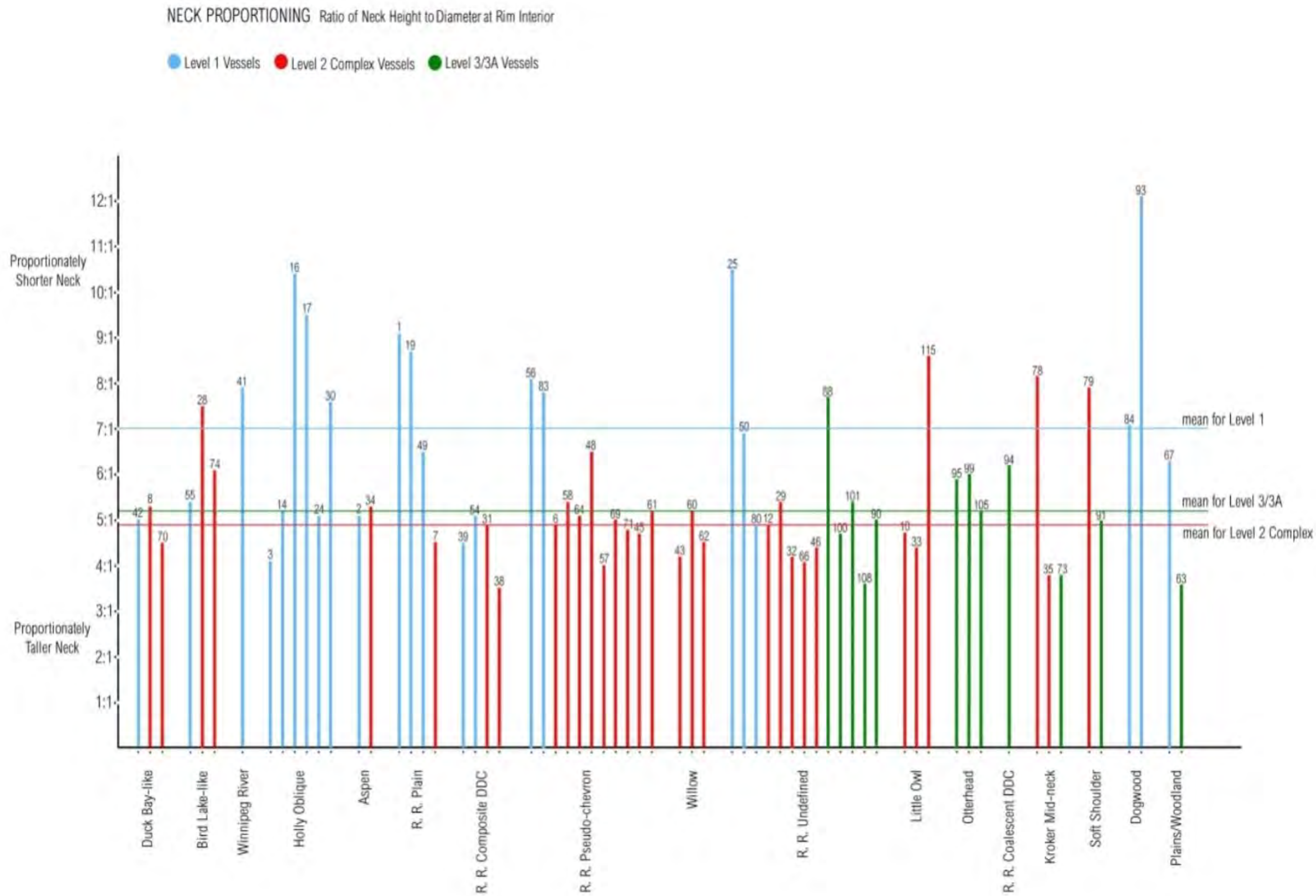


Figure 13.5-9: Ratio of Neck Height to Diameter at Rim Interior

13.5.3.5 Neck Lamination

Neck lamination presents in several vessels in the assemblage (Figure 13.5-10), by an apparent seam which runs down the centre of the neck, visible in cross-section (i.e.,vertical fractures). Most are only visible through the neck, above the neck juncture and terminating within a few millimetres of the rim. But occasionally the seam runs through the neck juncture as well. In most vessels where the lamination seam is visible, horizontal scraping is observed at the neck juncture on the interior, suggesting that the lamination was applied to the interior. The scraping action is indicative of shaping and feathering out the join. There are a couple of vessels (in particular Vessel 12) where the neck form is suggestive of the possibility that lamination may have been applied to the exterior.

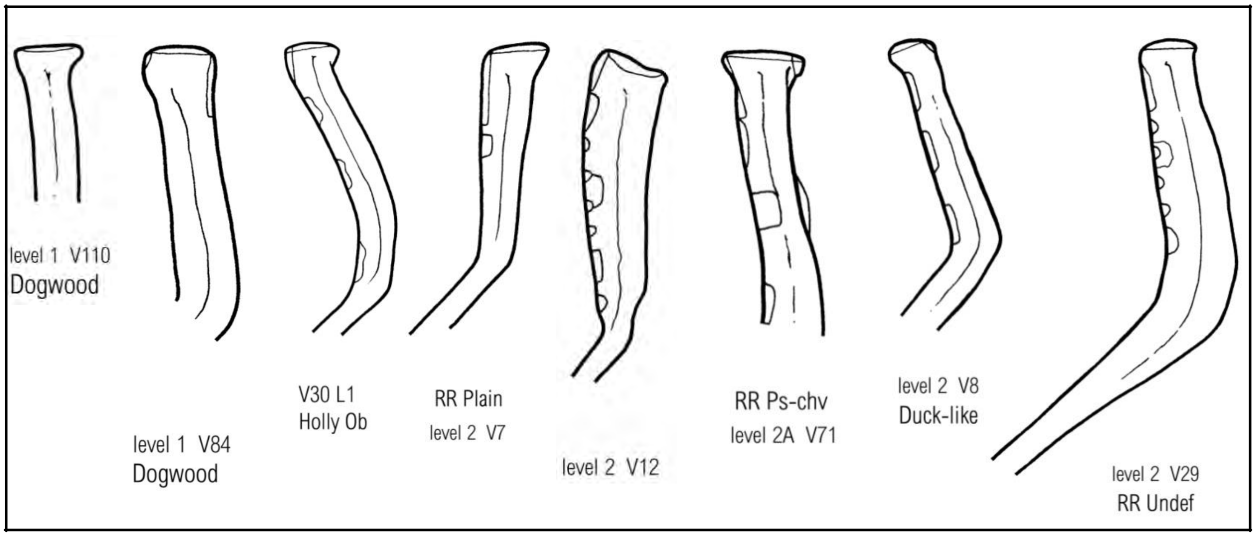


Figure 13.5-10: Vessels with Laminated Necks

13.5.3.6 Single Makers

There are two sets of vessels which have given insight into how individual makers fit into the perceived diversity of ceramic expression. The balance of social/cultural pressures and personal expression in the production of daily wares is an aspect of ceramic analysis which is rarely addressed. In the Level 2 Complex, we have evidence of what appears to be a single maker producing vessels with very little expressive variation (Vessels 43, 52, 60, and 62, Willow type). The proportion of neck height to diameter at the rim is similar for the three vessels of this group which have complete and measurable neck profiles. These vessels are interpreted as originating on different levels, suggesting that this maker returned to the exact same campsite during sequential occupations. In Level 1, we see a single maker responsible for several vessels with very different decoration (Vessels 3, 16, 24, 30, and possibly 17 and 111, Holly Oblique type). The vessels identified as Holly Oblique, with complete and measurable profiles, show an unexpectedly wide range of neck proportion in relation to the diameter at the rim, any where from 4:1 to over 10:1. With these vessels, we see an openness of expression and range of proportion which contrasts with that of the maker in the Level 2 Complex. The meaning and significance of this is unknown at this point, but there would appear to be different rules guiding decorative licence. The motives for such rules and the mechanisms that govern them are not understood. In one hypothesis, we might assume that decoration functions as an identifier, then a very limited range of expression might suggest tightly held ‘tradition’, a protective outlook. On the other hand, diversity of expression from a single individual suggests a permissive state of expression. Unfortunately, these conditions can function at a personal level but can also be external, as social or cultural environment pressures. This dilemma can only be resolved by incorporating a broader context of observations where the same vessel types are identified from other locations and, as these examples here are interpreted as the work of individuals, the chance of finding further examples of their work is remote. Fortunately, the two examples here are quite distinct.

13.5.4 Finger Molded Vessels

The finger molded vessels are comparatively poorly made. The exterior is smoothed though not in a controlled or refined manner. The interior is rough and uneven. Thickness is highly variable. The simplistic approach to the forming of these vessels, the small scale, lack of temper, and inconsistent form are suggestive of inexperience. These vessels were not functional in the sense that they would not have been able to fulfill everyday demands beyond holding a limited amount of dry material for short term. There is no charring or residues from cooking. Indentations on the interior surface are suggestive of small fingers. These vessels are likely the work of children. Proving this would probably entail focussed analysis of similar materials from many sites, beyond the scope of this report.

One question could be posed. If these finger molded vessels are the work of children, then it might not seem unreasonable to suggest that adults were likely constructing vessels at or near this location. Unfortunately, the only evidence that might suggest this was happening is a very limited quantity of cast-off clay and hand molded clay pieces without temper. No direct evidence of pottery manufacture was found.

13.5.5 Non-Vessel Ceramics

As suggested earlier in this report, there is little to suggest that the manufacture of ceramic vessels was happening within the parameters of the excavation area. There are several items which illustrate that clay was manipulated and utilized in a limited way. The artifacts tend to suggest an informal relationship to ceramic production. It is not surprising to anyone who has spent any time in the soils of the Red River Valley to understand that when it is wet you cannot avoid becoming intimate with the clay. As it would have been ever present, some of these objects are purposeful manipulations and others are incidental. Interestingly, even the incidental artifacts carry a depth of character that is surprising.

DlLg-33:08A/7587, from Level 2B, is a glob of clay which appears to have been trod upon and squashed, only to stick to the side of the moccasin, and later, flicked indifferently into the fire where it solidified well enough to survive the ages. It seems to carry a kind of melancholy resignation and acceptance of the futility of fighting against the conditions. The clay was dense and well consolidated, it fired well, perhaps indicating that it had been worked, molded, or played with before being abandoned to stick to someone’s foot.

From Level 1, DlLg-33:08A/11713 tells a similar story. This one is an expression of frustration. This glob shows little evidence that it was a useful piece of clay. It is not dense and appears to have been lobbed with some velocity. It impacted a piece of split wood, whether that wood was outside or inside the fire at the time is hard to know. Personally, I like the connotations of the 'in the fire' scenario.

As mentioned, there is a very limited number of items from this excavation that suggest that vessel manufacture was happening within the excavated area. Clay was being manipulated in various ways, and the intentionally fired items are suggestive that molding and firing objects in order to add permanence was certainly an accessible manner of expression.

13.5.6 Clay Sample Firing Test

In several locations during the excavation, small isolated deposits of 'non-local' clay were observed. It was described as dark grey or black clay and only found in cultural context. Tests in the field indicated exceptional characteristics in comparison to the clays found in natural deposits.

A plasticity test indicated a high degree of pliability. A small portion of the clay was worked, then rolled, then bent. Breakage occurred at near 180 degrees. The piece was then rolled into a ball and allowed to dry. The result was very hard and resistant to crumbling. It also was observed to take a high polish when burnished and it retained its dark colour.

One recovered sample was large enough to do a controlled firing test (DlLg-33:08A/13024 from K9 in Level 2A). A request was made of Robert Archambeau, Professor Emeritus of the Ceramics Department from the Faculty of Art, University of Manitoba to offer an opinion of the clays viability and perform a controlled firing test at a targeted temperature range. The original sample was divided into six approximately equal portions, four of which were turned over for testing and the remaining two were retained for future analysis and returned to the collection.

Evaluation objectives were to assess workability before firing and to determine final fired characteristics and colour at target temperature ranges between cone 0/8 (922/C - 956/C) and cone 0/6 (981/C and 1013/C). Natural earthenware clays are known to reach their potential below 1093/C. The clay was worked and rolled out to an even thickness (approximately 6 mm thick). It was then sectioned into approximately 2.5 cm squares. A strip was retained for a shrinkage test, two marks 10 cm apart were incised into the strip before drying and firing. Four samples were fired to cone 0/8, and three (including the shrinkage test) were fired to cone 0/6 in an electric kiln. Absorption tests were also conducted on samples from the two temperature firings.

High iron content in the clay and the oxygen rich environment of the electric kiln produced a terracotta colour on the 0/6 samples, and a yellow/brown on the 0/8 samples. The shrinkage test indicated 13% shrinkage when fired to 0/6. And the absorption test results were 13.9% in the 0/8 samples and 9.1% in the 0/6 samples. According to Archambeau, these were within expected ranges for earthenware and that the fired samples were brittle.

Despite the field test observations, the results here proved to be unremarkable. But, none the less, the clay would have been quite viable for production. While there were a few sherds which approached the colour of the 0/8 samples, they were generally spatially isolated from each other. Vessel 108 was the only vessel which showed similarity in colour, though not a match by any means. These non-local clay deposits were definitely transported to the site, but there is no direct evidence of how the material was utilized. No analysis was undertaken of the microscopic content of this clay.

13.6 Conclusions

The significance of the confluence of the Red and Assiniboine Rivers to the Pre-Contact people of the modern geographic region including southern Manitoba, North Dakota, Minnesota, and northwestern Ontario is emphasized by this assemblage. This site (DlLg-33), The Forks, was pivotal in the seasonal existence of the people of this region for thousands of years. But this a generality. Public interpretations and press releases repeat these types of phrases implying that since this much is known, the specialists obviously know more. The truth is that we know very little, each excavation emphasizes that, and adds more to be considered. Because this site is as significant as it is, the materials removed from this site (DlLg-33) can afford utterly unique insight into the entire geographic region, not just The Forks or a single part of this large settlement area we call "The Forks". This puts this site into a class with few others. There are very few localities in this part of the world that appear to have been so important to so many people. It was a shared site, the distinct ceramic traditions identified from DlLg-33 support this.

In this light, the sequence of occupations salvaged in the 2008 mitigative project is compelling. This assemblage shows tremendous variation but from within a limited cultural context. The perceived typological transitions that are illustrated here were unexpected but are hoped to afford an insight into how the Rainy River Composite may have manifested itself during its development, specifically in the Red River Valley. The vessels here are collectively suggestive of a further influence from the southern margins of this cultural catchment area, specifically the straight and incipient-S neck profiles. These are neither Blackduck nor Laurel in origin and are apparently present at the Coalescent period and carry forth through the later materials where they predominate. These forms are seen in the contemporary materials to the south and to the west, albeit with some quite different decorative approaches (Figure 13.5-11).

The definitions of Blackduck and Rainy River hinged largely on the presence or absence of the perceived adopted Laurel trait of stamping and dentate stamping and, to a lesser degree, more nuanced features of vessel form. Pivotal Blackduck traits became the presence or absence of punctates with bosses and vertical combing. The former is now shown to be present into the Composite phase of development on some types. The final word on vertical combing remains to be determined. Although it is used here as a feature assisting in delimiting Coalescent from Composite, it is uncertain where, when, and how this trait should be used in other regions. Questions arise. Is it a true Blackduck marker or is it relevant more to a transitional progression, an indicator of Blackduck departure? One thing is certain, combing appears with decreasing frequency as Composite ceramics come into focus.

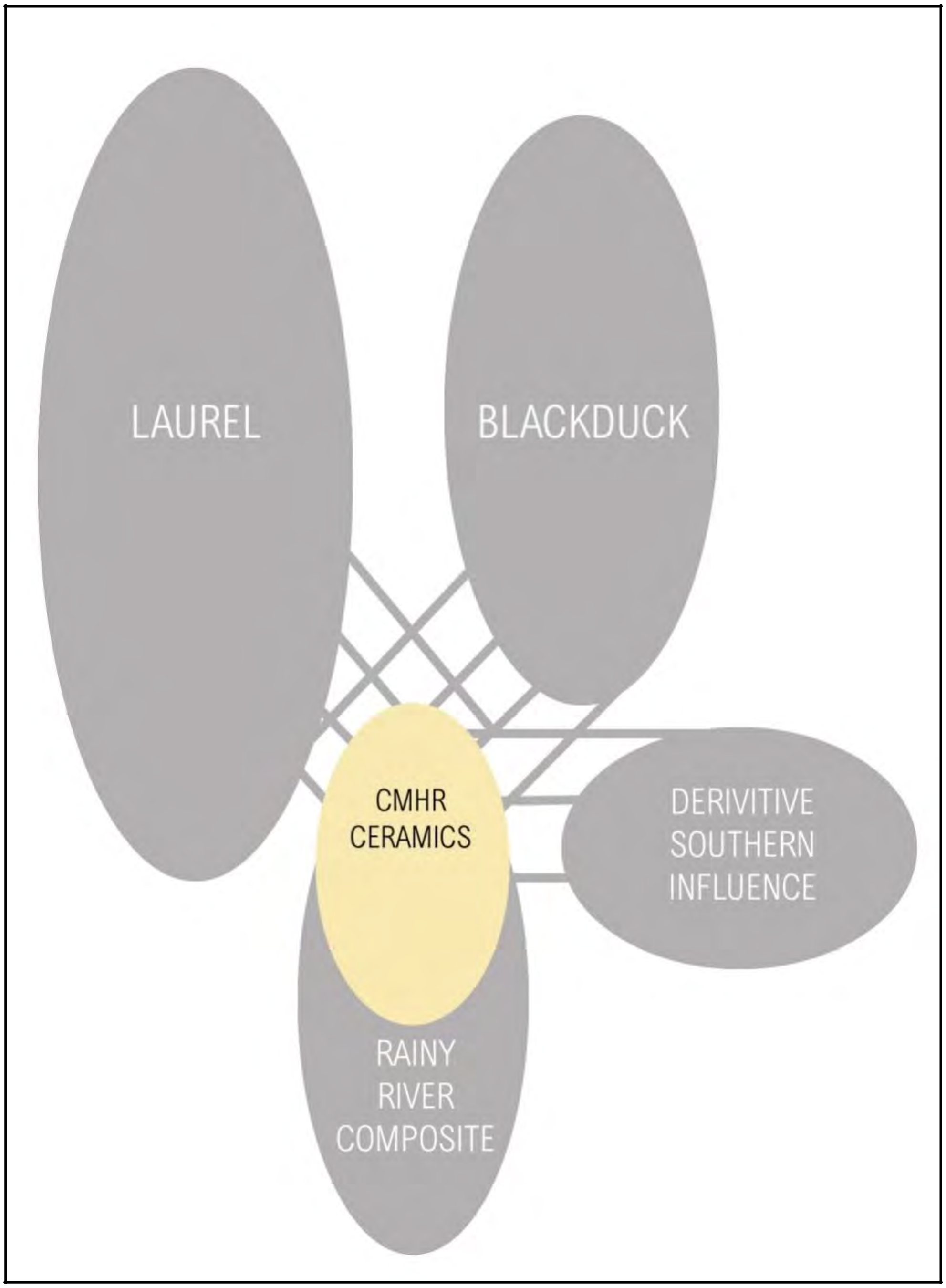


Figure 13.5-11: Perceived Realms of Influence Predicated upon the CMHR Ceramic Assemblage

Blackduck type site assemblages need revisiting in the light of these observations. A new definition of the Blackduck/Rainy River interface is necessary. As splitting of Rainy River ceramics continues, Blackduck is being pared down. We need to establish how we are to define the departure from the variations within Blackduck and those of Rainy River. This is an ongoing problem and the approach taken here may help in working backward toward Blackduck. If we can establish a rudimentary lineage, perhaps this departure can be visualized. The transition is likely to be variable across the region, but as this material may be an example of the first step removed from the geographic and typological definition of Blackduck, it is hoped that it may provide a footing for understanding the progression of ceramic Blackduck-isms through the Parkland region.

Many questions remain about what and who the Rainy River Composite actually represents archaeologically speaking. It has strong roots in Blackduck—this is for certain—but there are other influences showing themselves here at the junction of the Assiniboine and Red Rivers. This period in particular, between A.D. 900 and 1250, is very dynamic. From the review of this material, it is being proposed that there is a greater influence from the south than from the Boreal Forest in the expansion and development of the Rainy River Composite of the Red River Valley. The results of the residue analysis support this assertion with the presence of beans and the lack of Boreal Forest mammals. It is interpreted here that the Laurel influence is significant in the occupations on Levels 3A/3, but is evident in succeeding levels only by a very limited number of derivative traits.

An added consideration must be placed here. The residue analysis shows little maize in the results. According to other evidence, the minimal representation of corn and the preponderance of beans, sunflower, and squash is pointing to an affiliation with Plains Village horticultural traditions emanating from the Missouri River areas to the south west (Flynn and Syms 1996), more than from the Midwest where maize was the dominant cultigen. This is very interesting in the light of recent findings in southwestern Manitoba (Syms, Skalesky and Fleury 2009; Skalesky, Syms, and Fleury 2009) where Bird Lake ceramics have been identified. There is a connection between the Plains Village traditions and Rainy River traditions, at least in the Red River Basin. This relationship is not well understood at this point.

A Mississippian/Middle Missouri connection has been identified by others as a significant influence in the Souris River Valley of southwestern Manitoba (Nicholson 1996). Nicholson suggests two periods of influx for that region, the first occurring between A.D. 1000 and 1300, following the James River (central Minnesota) and Sheyenne River (central-northern North Dakota) valleys into the Souris Valley. What the 2008 assemblage suggests is that this first influx was strongly manifested northward up the Red River valley as well, and likely spreading through and along the Parkland boundary north and westward. And the Middle Missouri component was present in this first influx, at least as far northeast as the Red River valley.

Decoration descending onto the shoulder and body of the vessel and proportionally shorter neck and neck profiles, including straight and incipient-S, are present in the early stages of Rainy River formation sen here. Other non-Laurel and non-Blackduck signals noted are incised patterns mimicking Blackduck/Rainy River CWOI patterns, and zigzag or alternating inverted triangles on the shoulder with horizontal infill impressions (made of CWOI). The presence of a wedge rim (incised) and a sharp shouldered cord impressed sherd are also suggestive of interaction with groups other than Laurel or Blackduck.

Is this a reflection of the southern boundary realm of interaction throughout Rainy River Composite development and is this consistent throughout its range? Or, are these attributes a local dynamic of the Red River Basin? Is Rainy River less about a coalescence of Laurel and Blackduck than a dispersal of Blackduck traits (or Blackduck itself) west through the Parkland corridor, between the Plains and the Boreal Forest and its interface with incoming pressures from the south (i.e., Mississippian/Middle Missouri)? This assemblage is suggesting that this is the case and that there may be regional diversity across the Parklands. Regional diversity appears to have been typical for this period, the extent and nuance we are now beginning to grasp. Typologically, it is clear that for this period we cannot interpret fully any sample of this diversity without first understanding what the preceding cultural sources might have been.

In one corner of this realm, the Rainy River Coalescent gives rise to the Rainy River Composite (Figure 13.5-12). Within a few generations, the Rainy River influence can be seen in western Manitoba and into Saskatchewan (Duck Bay Complex). Another (Bird Lake), seemingly, pushes into the Boreal forest, away from the influx. Interestingly, Bird Lake is now identified from sites in the Souris River region in southwest Manitoba (Syms, Skalesky and Fleury 2009; Skalesky, Syms, and Fleury 2009). This seems to be corroborating an extended Parkland interface for Rainy River traditions and a continued relationship to mound burial traditions and indirectly with horticultural expansion.

Bird Lake and Duck Bay decorative traits are readily identified on the miniature vessels from burial mounds along the Rainy River (northwestern Ontario). Upon reviewing a selection of those miniature vessels (Kenyon 1986) in the light of this assemblage, we see some continuity as well as with some of the mortuary vessels removed from mounds in central and even southern Minnesota along the headwaters and tributaries of the Red River (Wilford 1970; Wilford, Johnson and Vicinus 1969) during the 1950s to early 1970s. But the reflection is not as clear. Perhaps because the traits of similarity are not as obvious as the distinctive patterns recognisable as Bird Lake and Duck Bay.

There are some traits from the undefined types seen on the mortuary vessels from the Rainy River region, such as the pseudo-chevron, enough to say they are definitely related, but they are far subtler. Why this would be is not a simple question to answer. At a glance, the mounds along the rivers of central and southern Minnesota show shared identity with the Rainy River mounds but there also appears to be other decorative traditions present that aren't in the Rainy River mounds. In the 'natural flow of development', it seems logical to infer that the decoration on ceremonial vessels would hold closer to cultural roots and utility pots would more readily reflect the interactive nature of everyday life. This could give some context to explain the variation seen in this assemblage. In that sense, it would not be surprising to contemplate in a rapidly changing cultural landscape that everyday wares may quickly outmode the ceremonial. This is a problem for using them for comparison. But no relationship has been defined to indicate how the variability in ceramic expression between ceremonial and utilitarian might interact in daily life or over time, specifically with this region and this period. So, the extent to which we can rely on comparison between them is not understood. All of this is highly presumptuous despite the visually identifiable similarities. But for now, it appears that there is a connection between this material and the decorative approaches seen in burial mound vessels from central and southern Minnesota and those of the mounds along the Rainy River.

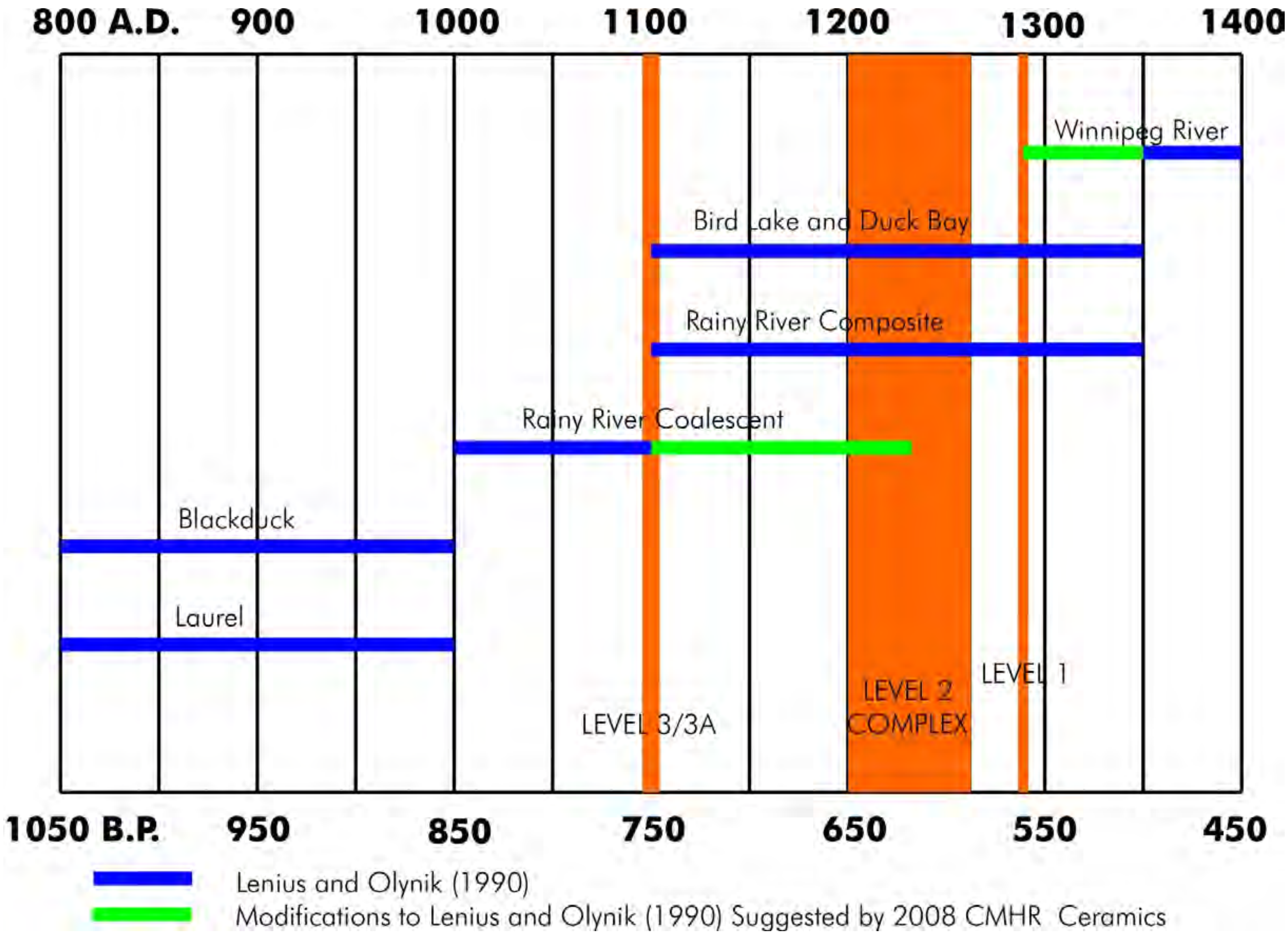


Figure 13.5-12: Occupation Horizon Dates and Rainy River Configuration Timeline

With the southern influence interpreted from the neck profiles and atypical motifs (for Laurel and Blackduck) present at the very beginning of the Rainy River Coalescent/Composite transition, the simple bridging of decorative and form traits between Blackduck and Laurel becomes something far more complex and dynamic. One might wonder if the southern influx may have pressured Blackduck to the point of dissolution, creating the Rainy River Composite scenario, and Laurel remained largely separated from the influx. Interestingly, the late Laurel occupations like those at the Ballynacree site, near Kenora, Ontario (Reid and Rajnovich 1991), suggest how unshakable this tradition with such ancient roots may have been in the face of the change that apparently surrounded them on their southwestern boundary. The dates from that site indicate that Laurel traditions and ceramic approach continued after the emergence of Rainy River Composite traditions had taken hold. This suggests that the two were isolated from each other.

This assemblage needs now to be reconciled against collections from points west, north, south, and east. And old stand-bys like Blackduck need to be re-evaluated in order to test the observations found here, and perhaps even be redefined. At the time of writing this report, the area around the excavation site had and was being severely impacted, with very little chance for recovery of materials in context. Any questions raised from this analysis will likely not receive further contextual data from this particular portion of this occupation site.

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APPENDIX A

HERITAGE PERMITS

The Heritage Resources Act (Subsection 14(2) and Sections 52 and 53)

Manitoba
Culture, Heritage, Tourism and Sport

Heritage Permit No. A26-08

Pursuant to Section/~~Subsection~~ 53 of *The Heritage Resources Act*:

Name: Sid Kroker
Quaternary Consultants Ltd.
Address: 130 Fort Street
Winnipeg, MB R3C 1C7

Attention: **Sid Kroker**

(hereinafter referred to as "the Permittee"),

is hereby granted permission to:
Controlled mitigative excavation (approximately 60% Basement Area) related to the development of the Canadian Museum for Human Rights at Site DlLg-33. Excavation area and methods as per attached letter entitled: **Re: Archaeological Requirements: Lands to be affected by the Construction of the Canadian Museum for Human Rights, Winnipeg (Site DlLg-33)**
dated May 12, 2008 to
Ms Susanne Robertson
Chief Financial Officer/Project Manager
Friends of the Canadian Museum for Human Rights Inc.
Suite 1560, 201 Portage Avenue
Winnipeg MB R3B 3K6

during the period:

June 1st, 2008 to March 31st, 2009

This permit is issued subject to the following conditions:

(1) That the information provided in the application for this permit dated the 29th day of April, 2008, is true in substance and in fact;

(2) That the permittee shall comply with all the provisions of *The Heritage Resources Act* and any regulations or orders thereunder; PLEASE NOTE ATTACHMENT RE CUSTODY AND OWNERSHIP OF HERITAGE OBJECTS;

(3) That the Permittee shall provide to the Minister a written report or reports with respect to the Permittee's activities pursuant to this permit, the form and content of which shall be satisfactory to the Minister and which shall be provided on the following dates:

March 31, 2009

(4) That this permit is not transferable;

(5) This permit may be revoked by the Minister where, in the opinion of the Minister, there has been a breach of any of the terms or conditions herein or of any provision of *The Heritage Resources Act* or any regulations thereunder;

(6) Special Conditions:

a. The permittee must obtain permission from any landowner, lessee or regulatory authority as applicable, concerning access to any property to be examined;

b. Neither the Government of Manitoba nor the party issuing this permit shall be liable for any damages resulting from any activities carried out pursuant to this permit, and the Permittee specifically agrees, in consideration for receiving this permit, to indemnify and hold harmless the Minister and the Government of Manitoba, the Minister and any employees and officials of the Government, against any and all actions, liens, demands, loss, liability, cost, damage and expense including, without limitations, reasonable legal fees, which the Government, Minister or any employee or official of the Government may suffer or incur by reasons of any of the activities pursuant to or related to this permit..

c. The permittee has, along with this permit, received enclosure: *Provisions Regarding Found Human Remains Under THE HERITAGE RESOURCES ACT, And* Manitoba's *Policy Respecting the Reporting, Exhumation and Reburial of Found Human Remains* (1987).

d. As per Manitoba letter dated May 12, 2008 attached and on file with Historic Resources Branch.

Dated at the City of Winnipeg, in Manitoba, this 30th day May, 2008

for Neil Gaudry [signature]

Minister of Culture, Heritage, Tourism and Sport

Manitoba Culture, Heritage, Tourism and Sport

Manitoba
Culture, Heritage, Tourism and Sport
Historic Resources Branch
Main Floor, 213 Notre Dame Avenue
Winnipeg MB R3B 1N3
CANADA

May 12, 2008

Ms Susanne Robertson
Chief Financial Officer/Project Manager
Friends of the Canadian Museum for Human Rights Inc.
Suite 1560, 201 Portage Avenue
Winnipeg MB R3B 3K6

Dear Susanne:

Re: Archaeological Requirements: Lands to be affected by the Construction of the Canadian Museum for Human Rights, Winnipeg (Site DlLg-33)

Further to discussions held on March 26, 2008 among the Friends of the Canadian Museum for Human Rights, Historic Resources Branch, Parks Canada, Canadian Heritage, Quaternary Consultants Ltd., and PCL Constructors Canada Inc., this letter sets out the scope, terms and conditions of Manitoba's archaeological mitigation requirements deemed necessary for the protection of the heritage resources within site DlLg-33 in respect to the proposed development of the Canadian Museum for Human Rights. It should be noted that if conditions change in development plans or design, or if there occurs at anytime throughout the project unanticipated events affecting the archaeological resources, these requirements may be revised as needed to ensure proper and adequate protection of the heritage resource.

The Historic Resources Branch has reviewed the report *Archaeological Impact Assessment for the Canadian Museum for Human Rights at the Forks* (May 2004) submitted by Quaternary Consultants Limited on behalf of Friends of the Canadian Museum for Human Rights Inc. under terms of Heritage Permit A46-03.

The Historic Resources Branch is satisfied with the scope of the field investigation and reporting undertaken by Quaternary Consultants Ltd. under Heritage Permit A46-03. Based on the findings of the above mentioned report, the Historic Resources Branch has reason to believe that heritage resources within site DlLg-33 are likely to be damaged or destroyed by construction of the proposed Canadian Museum for Human Rights.

The Historic Resources Branch is in agreement with Quaternary Consultants Ltd. that an archaeological mitigation program is required prior to and during specific construction phases of the Canadian Museum for Human Rights (page 157 of the above mentioned report) and that such a mitigation program needs to be devised based on the submission of a development plan by the development proponent.

Therefore, the Historic Resources Branch is requiring under *The Heritage Resources Act* that the Friends of the Canadian Museum for Human Rights Inc. carry out this mitigation work.

Based on design drawings dated March 4, 2008 (Building Section A: Sheet Number AE303), the installation of below surface elevator shaft, mechanical room and chiller plant complex (subsurface complex), will impact known archaeological resources of site DlLg-33. Total surface area required for subsurface complex is calculated to be approximately 4,000 square feet.

Required:

Excavation Area A: 60% complete mitigation of archaeological cultural components
Total area to be excavated is 220 square meters of surface area in a contiguous block excavation. This is expected to extend to depths of 3.0 to 3.5 meters below present ground surface. Excavation will be undertaken according to, but not limited to the following terms and conditions:

- All overlying disturbed deposits may be removed mechanically to expose undisturbed soils;
- Minimum collection unit 1m square;
- Excavation following natural stratigraphy;
- Mechanical means may be used to remove intervening sterile flood deposits between cultural deposits;
- Excavation of cultural layers by hand tools;
- All matrix from cultural deposits screened through ¼" (6mm) mesh screens;
- Soil samples (unscreened) collected from each cultural deposit within each 1m square. Minimum collection: 1 litre;
- Soil samples (uncscreened) collected from each cultural feature (e.g., hearth) encountered. A minimum of 1 soil sample from each cultural feature. If complex features are encountered (e.g., storage pit with multiple deposits) multiple representative samples should be collected. This will be done in addition to the minimum 1 litre soil sample from each horizon described above;
- A separate soil sample collection form shall be completed for each individual soil sample;
- Features are to be completely exposed for recording purposes if they extend between and beyond 1m units;
- Photographs and sketches will be taken of each cultural horizon within each excavation unit (1m sq.) and each exposed feature;
- Diagnostic artifacts (e.g., projectile points, rim sherds, fashioned stone tools, modified bone [bone tools]) provenience will be two-point within the cultural deposit. The four corners of the unit may be used as a reference for measuring vertical provenience;
- Provisions should be made for video recording of cultural features etc., in addition to standard photography;

- Suitable ceramics and lithic artifacts shall be processed to ensure recovery of residues for immediate and future analysis. A variety of lithic tools will be chosen for this process. The procedure will include:
  - Limited handling;
  - Storage within a separate labeled bag. The bag should be labeled with provenience and "Do Not Clean" for lab personnel; and
  - No cleaning or light brushing.
- Artifact catalogue be created acceptable to the repository institution;
- Suitable samples to be collected from each occupation level and features for chronological dating, for instance, radiocarbon (AMS/Radiometric) and TL dating.

Required: Excavation Area A: Deep Investigation

Within Excavation Area A, a location chosen by the project archaeologist, shall be investigated to a depth below required 3-3.5m. This excavation area will encompass 4m x 4m of contiguous surface area and be excavated to sterile deposits. Excavation of this area may take place after completion of the initial excavation so that mechanical means may be employed to assist the removal of deep non-cultural deposits. If any cultural areas are encountered, mechanical excavation shall cease and cultural deposits shall be removed by hand excavation according to the above procedures outlined for previous block excavation.

Required: Excavation Area B: Salvage Excavation of Peace Meeting Horizon components

Approximately 60% (100 square meters of surface area) of basement area (vicinity of planned water service room/storage tank and north) of Excavation Area B shall be removed in a controlled manner and screened (¼" [6mm] mesh screens). Cultural materials shall be extracted in a controlled manner; the minimum collection unit shall be no greater than 4 square meters. Mechanical removal is acceptable for Excavation Area B.

Required: Construction Monitoring

Drilling: All drilling connected with installation of caissons and pre-cast concrete piles including the 4" geo-technical bore shall have an archaeologist monitor each drill hole recovering cultural material and recording the depth and location of each cultural deposit.

Services installations: An archaeologist must monitor all service installation work that threatens intact cultural deposits. The depth and location of each cultural deposit will be recorded. During the excavation, vertical shafts and cultural deposits may be removed *en bloc* by the backhoe and processed by the archaeological team in the following manner:

- Each cultural deposit within each excavation area shall be processed separately;
- All diagnostic artifacts shall be collected from each cultural deposit;
- 80 litres of matrix from each cultural deposit shall be screened through ¼" [6mm] mesh screens with all diagnostic artifacts collected as above. The remaining cultural material from the screen shall be collected to be inventoried as a single sample; and
- All recovered artifacts will be processed – washed, identified and catalogued.

Other Requirements:

In the event that human remains are discovered, work in that area will be immediately ceased, the exposed remains left *in situ* and covered up. Information regarding any such discovery shall be kept confidential. The Historic Resources Branch will be notified immediately and will direct further activities concerning the remains.

Yours sincerely,

Brian J. Smith
Manager
Archaeological Assessment Services
945-1830

c. Mr. Sid Kroker
Ms Donalee Deck
Mr. Kevin Skinner
Mr. Patrick O'Reilly

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The Heritage Resources Act (Subsection 14(2) and Sections 52 and 53)

Manitoba
Culture, Heritage, Tourism and Sport

Heritage Permit No. A49-09

Pursuant to Section/~~Subsection~~ 53 of *The Heritage Resources Act*:

Name: Sid Kroker
Quaternary Consultants Ltd.
Address: 130 Fort Street
Winnipeg, MB R3C 1C7

Attention: **Sid Kroker**

(hereinafter referred to as "the Permittee"),

is hereby granted permission to:

Export to Paleo Research Institute, Golden, Colorado, USA for purposes of residue analysis the following archaeological specimens:
Lithic biface (DlLg-33:08A/16135)
Rimsherd, vessel 50 (DlLg-33:08A/10192)
Rimsherd, vessel 116 (DlLg-33:08A/22158)
Rimsherd, vessel 46 (DlLg-33:08A/13675)
Rimsherd, vessel 23 (DlLg-33:08A/13291)
Rimsherd, vessel 91 (DlLg-33:08A/15166)

during the period:

August 31 to October 30, 2009

This permit is issued subject to the following conditions:

(1) That the information provided in the application for this permit dated the 28th day of August 2009, is true in substance and in fact;

(2) That the permittee shall comply with all the provisions of *The Heritage Resources Act* and any regulations or orders thereunder; PLEASE NOTE ATTACHMENT RE CUSTODY AND OWNERSHIP OF HERITAGE OBJECTS;

(3) That the Permittee shall provide to the Minister a written report or reports with respect to the Permittee's activities pursuant to this permit, the form and content of which shall be satisfactory to the Minister and which shall be provided on the following dates:

March 31st, 2010

(4) That this permit is not transferable;

(5) This permit may be revoked by the Minister where, in the opinion of the Minister, there has been a breach of any of the terms or conditions herein or of any provision of *The Heritage Resources Act* or any regulations thereunder;

(6) Special Conditions:

a. The permittee must obtain permission from any landowner, lessee or regulatory authority as applicable, concerning access to any property to be examined;

b. Neither the Government of Manitoba nor the party issuing this permit shall be liable for any damages resulting from any activities carried out pursuant to this permit, and the Permittee specifically agrees, in consideration for receiving this permit, to indemnify and hold harmless the Minister and the Government of Manitoba, the Minister and any employees and officials of the Government, against any and all actions, liens, demands, loss, liability, cost, damage and expense including, without limitations, reasonable legal fees, which the Government, Minister or any employee or official of the Government may suffer or incur by reasons of any of the activities pursuant to or related to this permit..

c. The permittee has, along with this permit, received enclosure: *Provisions Regarding Found Human Remains Under THE HERITAGE RESOURCES ACT, And* Manitoba's *Policy Respecting the Reporting, Exhumation and Reburial of Found Human Remains* (1987).

Dated at the City of Winnipeg, in Manitoba, this 28th day August, 2009

for Minister of Culture, Heritage, Tourism and Sport

Manitoba Culture, Heritage, Tourism and Sport
Historic Resources Branch

APPENDIX B

Residue Analysis Report from
Paleo Research Institute

Samples Submitted by
Quaternary Consultants Ltd.

CERAMIC AND ORGANIC RESIDUE (FTIR) ANALYSIS ON CERAMICS AND PROTEIN ANALYSIS ON A BIFACE FROM SITE DlLg-33, MANITOBA, CANADA

By
Linda Scott Cummings,
Chad Yost,
and
Melissa K. Logan

With Assistance from
R.A. Varney

Paleo Research Institute
Golden, Colorado

Paleo Research Institute Technical Report 09-130

Prepared For

Quaternary Consultants Limited
Winnipeg, Manitoba, Canada

October 2009

INTRODUCTION

Four ceramic rimsherds from site DlLg-33, a prehistoric riverine trade loci, located in downtown Winnipeg, Manitoba, Canada, were submitted for ceramic and organic residue analysis. In addition, a single biface was examined for protein residue. Ceramics were tested for organic residues using Fourier Transform Infrared Spectroscopy (FTIR). Ceramic and organic residue analyses on the ceramics will be used to provide information regarding the foods processed in the vessels and their origins, and perhaps, shed light on decorative influences, beyond style types.

METHODS

Ceramic Analysis for Pollen, Phytoliths, and Starch

Use of ceramics for cooking occasionally leaves evidence of use in the form of visible residue on either the interior or exterior surfaces. Concentrations of pollen, phytoliths, and starches from these residues are expected to represent plants that were processed using the ceramic vessels. The visible residue was removed using a dental pick and placed in a beaker with reverse-osmosis de-ionized (RODI) water. Each sample was then sieved through 250 micron mesh to eliminate any large particle that remained in the residue.

The samples were freeze-dried using a vacuum line, then mixed with sodium polytungstate (density 2.3) and centrifuged to separate the phytoliths, which will float, from the other silica, which will not. Phytoliths, in the broader sense, may include opal phytoliths and calcium oxalate crystals. Any remaining clay was floated with the phytoliths, and was further removed by mixing with sodium hexametaphosphate and pure water. The samples were then acetolated for 3-5 minutes to remove any extraneous organic matter. Samples were rinsed with pure water, then alcohols to remove the water. After several alcohol rinses, a single slide was made and examined for phytoliths. Following this, the remainder of the sample received a short (20-30 minute) treatment in hot hydrofluoric acid (HF) to remove silica, then examined for pollen and starch.

A light microscope was used to count pollen at a magnification of 500x. Pollen preservation in these samples varied from good to poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible. Each slide was scanned using cross-polar illumination to search for and record starches. Phytoliths were mounted in immersion oil and also counted with a light microscope at a magnification of 500x.

Pollen and phytolith diagrams are produced using Tilia, a computer program developed by Dr. Eric Grimm of the Illinois State Museum. Total pollen concentrations are calculated in Tilia using the measurement of the ground/use surface washed in cm2, the quantity of exotics (spores) added to the sample, the quantity of exotics counted, and the total pollen counted and expressed as pollen per cm2 of use surface.

Indeterminate pollen includes pollen grains that are folded, mutilated, and otherwise distorted beyond recognition. These grains are included in the total pollen count, as they are part of the pollen record.

The estimated microscopic charcoal abundance is calculated by recording individual microscopic pieces of charcoal during a portion of the pollen count, then allowing the computer to extrapolate from those observations to the quantity of charcoal present in the total count. This number is presented on the pollen diagram.

Pollen analysis also includes identification of starch granules to general categories, if they are present. Starch granules are a plant's mechanism for storing carbohydrates. Starches are found in numerous seeds, as well as in starchy roots and tubers. The primary categories of starches include the following: with or without visible hila, hilum centric or eccentric, hila patterns (dot, cracked, elongated), and shape of starch (angular, ellipse, circular, eccentric). Some of these starch categories are typical of specific plants, while others are more common and tend to occur in many different types of plants.

Protein Residue

The artifact submitted for protein residue analysis was tested using an immunologically-based technique referred to as cross-over immunoelectrophoresis (CIEP). This method is based on an antigen-antibody reaction, where a known antibody (immunoglobulin) is used to detect an unknown antigen (Bog-Hansen, 1990). Antigens are usually proteins or polysaccharides. The method for CIEP is based on forensic work by Culliford (1964, 1971) with changes made by Newman (1989) following the procedure used by the Royal Canadian Mounted Police Serology Laboratory in Ottawa, and the Centre of Forensic Sciences in Toronto. Further changes were made at the Paleo Research Institute following the advice of Dr. Richard Marlar of the Thrombosis Research Laboratory at the Denver VA Medical Center and the University of Colorado Health Sciences Center. Although several different protein detection methods have been employed in archaeological analyses, including enzyme-linked immunosorbant assay (ELISA) and radioimmune assay (RIA), the CIEP test has been found to be extremely sensitive, with the detection of 10 to -8 g of protein possible Culliford (1964:1092). The specificity of CIEP is further strengthened by testing unknowns against non-immunized animal serum and the use of soil controls to eliminate the possibility of false positives due to non-specific protein interactions.

Ancient protein residues are preserved and have been detected on stone tools of considerable age using CIEP (Gerlach, 1996; Kooyman, 2001; Seeman, 2008; Yost, 2008; Hogberg, 2009). In one of the largest samples of reactive protein residues from an archaeological site, Gerlach (1996) report a total of 45 positive reactions obtained on 40 of the 130 stone tools tested from an early North American Paleoindian site (ca. 11,200-10,800 years BP).

In an archaeological context, an antigen is the unknown protein adhering to an artifact after its use. Ancient proteins undoubtedly break down into small fragments over time; however, antibodies can recognize small regions of antigens (Marlar, 1995). Studies by Loy (1983) and Gurfinkel and Franklin (1988) suggest that hemoglobin and other proteins bind to soil and clay particles through electrostatic interactions, and these interactions protect the proteins from microbial attack and removal by groundwater. Sensabaugh (1971) reported that dried blood proteins "covalently cross-linked to form a single proteinaceous mass with a high molecular weight, resulting in decreased solubility." Hyland (1990:105) suggests that protein molecules may be conjoined with fatty tissues, resulting in an insoluble complex that is secure against dissolution by water. These studies may explain, in part, mechanisms for prolonged protein preservation and adherence to stone surfaces; however, they also illustrate the challenges of recovery from artifact surfaces.

The artifact was washed using 1-2ml of a 0.02M Tris hydrochloride, 0.5M sodium chloride, and 0.5% Triton X-100 solution. The artifact was placed in an ultrasonic bath for 30 minutes, on a rotating mixer for 30 minutes, then in the ultrasonic bath for an additional 30 minutes. Because soils contain compounds such as bacteria and animal feces that can cause false positive results for artifacts buried in the soil, control samples usually also are tested; however, no soil control was submitted for the biface.

The residues extracted from the artifact first are tested against pre-immune goat serum (serum from a non-immunized animal) to detect non-specific binding of proteins. Samples testing negative against pre-immune serum then are tested against prepared animal antisera obtained from ICN Pharmaceuticals, Inc. and Sigma Chemical Company, and against antisera raised under the direction of Robert Sargeant in Lompoc, California, and Dr. Richard Marlar. Appropriate positive and negative controls were run for each antiserum. A positive control consists of the blood of an animal for which the antiserum is know to test positively, and a negative control consists of the serum/blood of the animal in which the antiserum was raised, either rabbit or goat.

CIEP is performed using agarose gel as the medium. Two holes are punched in the gel about 5 mm apart. The protein extract from the artifact was placed in the cathodic well and the antiserum is placed in the anodic well. The sample was electrophoresed in Barbital buffer (pH 8.6) for 45 minutes at a voltage of 130v to drive the antigens and antibodies towards each other. Positive reactions appear as a line of precipitation between the two wells. Gels are stained with coomassie blue to make the precipitate line easier to see. Positive reactions were re-tested with dilute antisera to determine between true and false positives. Antisera are diluted to increase specificity of reactions, usually 1:10 or 1:20. Positive reactions obtained after this step are reported.

Identification of animals represented by positive results is usually made to the family level. All mammalian species have serum protein antigenic determinations in common; therefore, some cross reactions will occur between closely and sometimes distantly related animals (Gaensslen, 1983:241). For example, bovine antiserum will react with bison blood, and deer antiserum will react with other members of the Cervidae (deer) family, such as elk and moose.

FTIR (Fourier Transform Infrared Spectroscopy)

A mixture of chloroform and methanol was used as a solvent to remove lipids and other organic substances that had soaked into the surface of the ceramic. This mixture is represented in the FTIR graphics as CHM. The CHM solvent and sample were placed in a glass container, and allowed to sit, covered, for several hours. After this period of time, the solvent was pipetted into an aluminum evaporation dish, where the CHM was allowed to evaporate. This process leaves the residue of any absorbed chemicals in the aluminum dishes. The residue remaining in the aluminum dishes was then placed on the FTIR crystal and the spectra were collected. The aluminum dishes were tilted during the process of evaporation to separate the lighter from the heavier fraction of the residue. The lighter and heavier fractions are designated Upper (lighter fraction) and Lower (heavier fraction) respectively in the subsequent analysis.

FTIR is performed using a Nicolet 6700 optical bench with an ATR and a silicon crystal. The sample is placed in the path of a specially encoded infrared beam. The infrared beam passes through the sample and produces a signal called an “inferogram.” The inferogram contains information about the frequencies of infrared that are absorbed and the strength of the absorptions, which is determined by the sample's chemical make-up. A computer reads the inferogram and uses Fourier transformation to decode the intensity information for each frequency (wave numbers) and presents a spectrum.

FTIR (FOURIER TRANSFORM INFRARED SPECTROSCOPY) REVIEW

Infrared spectroscopy (IR) is the study of how molecules absorb infrared radiation and ultimately convert it to heat, revealing how the infrared energy is absorbed, as well as the structure of specific organic molecules. Infrared spectroscopy has been experiencing a renaissance for identifying organic substances during the past few decades. It is currently considered one of the more powerful tools in organic and analytical chemistry. One of the primary advantages to the FTIR is that it measures all wave lengths simultaneously. It has a relatively high signal-to-noise ratio and a short measurement time. Each peak in the spectrum represents either a chemical bond or a functional group.

Since molecular structures absorb the vibrational frequencies or wavelengths of infrared radiation, the bands of absorbance can then be used to identify the composition of the materials under study. In the case of the current research, the portion of the electromagnetic spectrum between 4000-400 wave numbers is used for identifying organic materials. Carbohydrates, lipids, proteins and other organic molecules are associated with specific wave number bands (Isaksson 1999:36-39).

The infrared spectrum can be divided into two regions--the functional group region and the fingerprint region. These two groups are recognized by the effect that infrared radiation has on the respective molecules of these groups. The functional group region is located between 4000 and approximately 1500 wave numbers. The molecular bonds display specific characteristic vibrations that identify fats, lipids, waxes, lignins, proteins, carbohydrates, etc. The fingerprint region, located below 1500 wave numbers, is influenced by bending motions, which further identify the molecules present.

Using the FTIR, it is possible to identify different types of organic compounds and eventually recognize different types of materials such as plant or animal fats or lipids, plant waxes, esters, proteins, carbohydrates, and more. Specific regions of the spectrum are important in identifying these compounds.

The results of the identification of specific wavelengths can be compared with commercial or laboratory-created analytical standards to identify the specific types of bonds present in different materials. By combining the results of the analysis of individual samples with all of the reference materials in the Paleo Research Institute (PRI) library, the % match with individual reference items can be displayed. For instance, plant lipids or fats are identifiable between 3000-2800 wave numbers. A match might be obtained on this portion of the spectrum with nuts such as hickory, walnut, or acorn or with animal fats or corn oil. Recovery of high level matches with several types of nuts (in this example) indicates that nuts were processed. If the match with the PRI library is for meat fats, then the signature is more consistent with that produced by meat than plant parts such as nuts.

Samples containing many compounds are more difficult to identify – and many archaeological samples are complex mixtures. Multi-purpose artifacts, such as manos, which could have been used to crush or grind a variety of foodstuffs, or ceramic cooking vessels, which are expected to have been used to cook many different foods, present a mixture problem. Mixtures sometimes have many absorption bands that overlap, yielding only broad envelopes of absorption and few distinctive features. FTIR analysis is expected to be particularly valuable in examining fire-cracked rock (FCR), since the fats, lipids, waxes, and other organic molecules contained in liquids that seep out of the food being processed become deposited on the rocks during the baking process. The PRI extraction method gently removes these organic molecules from the rocks so that they can be measured with the FTIR and subsequently identified.

Organic molecules from sediments can be extracted and the sediments then characterized. This has the potential to be very useful in identifying signatures of the remains responsible for a dark horizon. For instance, if the dark horizons are the result of decaying organic matter (plant or animal), the FTIR will yield a signature of decaying organic remains. If the dark horizons are the result of blowing ash from cultural features, the FTIR signature will be considerably different. This is an affordable technique for making distinctions between horizons and identifying cultural horizons.

Amino Acids

Amino acids are essential to life because they play numerous roles in metabolic function. This makes them key to nutrition. Amino acids form the building blocks of proteins. Differences between proteins are distinguished by the unique arrangements of amino acids. Thus, amino acids can be combined in a multitude of ways to create a vast variety of proteins. Proteins are created through a process called translation, in which amino acids are added, one-by-one, to form short polymer chains called peptides, or longer chains called polypeptides or proteins (Rodnina 2007). The order in which the amino acids are added is determined by the genetic code of the mRNA template, which is a copy of an organism's genes (Creighton 1993). Amino acids are divided into standard and non-standard types.

Standard Amino Acids

There are twenty naturally occurring amino acids on earth called standard amino acids (Creighton 1993). These amino acids are encoded by the standard genetic code and are found in all forms of life (Creighton 1993). The standard amino acids are broken down into two different types, essential amino acids and nonessential amino acids.

Essential Amino Acids

Eight of the standard amino acids are considered "essential amino acids" because they are necessary for normal human growth and cannot be synthesized by the human body (Young 1994). Essential amino acids must be obtained from food sources, and include isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine (Furst 2004; P. J. Reeds 2000).

Isoleucine

Isoleucine is found in most common proteins. It is important for blood-clot formation and is concentrated in muscle tissues (Nelson 2005). Dietary sources of isoleucine include beef, poultry, fish, eggs, nuts, dairy, and legumes.

Leucine

Leucine is used in the liver, adipose tissue, and muscle tissue. In adipose and muscle tissue, leucine aids in the formation of sterols, and slows the degradation of muscle tissue by increasing the synthesis of muscle proteins (Combaret 2005; Rosenthal 1974). Common sources of leucine in the diet include beef, fish, shellfish, nuts and seeds, eggs, and legumes.

Lysine

Lysine is important for calcium absorption, building muscle, recovering from injuries or illnesses, and the production of hormones, enzymes, and antibodies (Nelson 2005). Plants that contain significant amounts of lysine include legumes, gourds/squash, spinach, amaranth, quinoa, and buckwheat. Other dietary sources of lysine include beef, poultry, pork, fish, eggs, and dairy.

Methionine

Methionine helps the body break down fats, and thus, prevents the build-up of fat in the arteries (Nelson 2005). It is found primarily in meats, fish, and nuts and seeds, and in lower quantities in spinach, potatoes, and corn. Most fruits, vegetables, and legumes only contain small amounts of methionine.

Phenylalanine

Phenylalanine is essential for the developmental growth of infants, and is found naturally in the breast milk of mammals (Nelson 2005). As a result, dairy foods contain the highest concentration of phenylalanine in the diet. Other sources of phenylalanine include fish and seafood, poultry, meat, legumes, and nuts and seeds. One of the common uses of phenylalanine today, is in the artificial sweetener aspartame, which is found in diet sodas and other sugar-free beverages and confections.

Threonine

Threonine is important for maintaining the proper balance of protein in the body (Nelson 2005). Foods high in threonine include poultry, fish, meat, legumes, seeds, and dairy.

Tryptophan

Tryptophan is important for normal growth in infants, and nitrogen balance in adults (Nelson 2005). It also increases brain levels of serotonin, which is a calming neurotransmitter when present in moderate levels, that causes relaxation and sleepiness (Wurtman 1980). This has lead to the belief that consuming large amounts of turkey, which contains high levels of tryptophan, results in drowsiness, such as that experienced after Thanksgiving and/or Christmas dinner. Dietary sources of tryptophan include poultry, beef, fish, eggs, dairy, cacao, oats, nuts and seeds, and legumes.

Valine

Valine plays a role in muscle metabolism, repair and growth of tissue, and maintaining nitrogen balance in the body (Nelson 2005). It also preserves the use of glucose by providing an energy source for muscles. Nutritional sources of valine include fish, poultry, and some legumes.

Nonessential Amino Acids

The majority of the standard amino acids are considered “nonessential.” This means that these amino acids, under normal circumstances, can be manufactured by the human body and are not required in the diet. Nonessential amino acids include Alanine, asparagine, aspartate, cysteine, glutamate, glutamine, glycine, proline, serine, tyrosine, arginine, and histidine (Furst 2004; P. J. Reeds 2000).

Alanine

Alanine plays an important role in the glucose-alanine cycle between tissues and liver (Nelson 2005). Common sources of alanine in the diet include such diverse things as meat, eggs, fish, legumes, nuts and seed, and maize.

Asparagine

Asparagine is one of the most common of the twenty natural amino acids, and is most abundant in asparagus, from which its name is derived (Nelson 2005). “The characteristic smell observed in the urine of individuals after their consumption of asparagus is attributed to various metabolic byproducts of asparagine” (Wikipedia 2009a). Common sources of asparagine include asparagus, potatoes, legumes, nuts and seeds, dairy, beef, poultry, eggs, fish, and seafood.

Aspartate

Aspartate, also known as aspartic acid, is an important neurotransmitter in the brain (Nelson 2005). Common sources of aspartate include wild game, meat, oats, avocado, asparagus, and sprouted seeds.

Cysteine

Cysteine is classified as a non-essential amino acid, however, in rare cases, cysteine may be essential for infants, the elderly, and individuals with certain metabolic disease or who suffer from malabsorption syndromes (Nelson 2005). Dietary sources of cystine include pork, chicken, turkey, duck, eggs, dairy, red peppers, garlic and onions, broccoli, brussels sprouts, oats, and wheat germ.

Glutamate

Glutamic acid, or glutamate, is an important molecule in cellular metabolism. It is the most abundant excitatory neurotransmitter in the nervous system of mammals (Nelson 2005). Glutamate is found in dairy products, eggs, and all meats, such as beef, pork, poultry, wild meats, and fish (P. J. Reeds, Douglas G. Burrin, Barbara Stoll, and Farook Jahoor 2000).

Glutamine

Glutamine is the most abundant and naturally occurring, non-essential amino acid in the human body. It is one of the few amino acids which directly crosses the blood-brain barrier (Lee 1998). The blood-brain barrier is a collection of high density cells joined with almost impenetrable connections that protect the brain from being exposed to all elements in the blood, particularly bacteria (Lee 1998). Unlike many other substances, such as solutes, which are redistricted from making this passage, glutamine in the blood can easily pass through these junctions (Lee 1998). Glutamine is not only found circulating in the blood, but is also stored in the skeletal muscles (Lee 1998). At times of illness or injury, glutamine can be considered a conditionally essential amino acid that must be obtained temporarily from the diet because the body is unable to synthesize it on its own (Lee 1998). Glutamine is also beneficial in healing the cells of the gastrointestinal tract by stimulating regeneration and promoting new cellular growth. Common sources of glutamine in the diet include beef, chicken, fish, eggs, dairy, legumes, cabbage, beets, spinach, and parsley.

Glycine

Glycine is the smallest of the twenty standard amino acids (Nelson 2005). It is an inhibitory neurotransmitter in the central nervous system, particularly in the spinal cord, brainstem, and retina. Glycine is required to build protein in the body, synthesize nucleic acids, and for the construction of RNA, DNA, bile acids, and other amino acids in the body. It also aids in the absorption of calcium in the body. Dietary sources of glycine include poultry, pork, fish, eggs, beef, peanuts, seaweed, and a variety of seeds and nuts, such as sunflower, pumpkin, and sesame.

Proline

Proline is critical for the production of collagen and cartilage, and is produced in the liver from other amino acids (Nelson 2005). Nutritional sources of proline include most meats.

Serine

Serine is important in metabolic function (Nelson 2005). It serves as a neuronal signal by activating NMDA receptors in the brain, and helps to build muscle tissue (Mothet 2000). Common sources of serine in the diet are beef, eggs, nuts and seeds, legumes, and milk.

Tyrosine

Tyrosine assists and supports neurotransmitters in the brain, which help nerve cells communicate (Nelson 2005). It is found in casein, which is prevalent in dairy products. Other dietary sources of tyrosine include chicken, turkey, fish, almonds, avocados, banana, legumes, and pumpkin and sesame seeds.

Arginine

Arginine plays an important role in cell division, the healing of wounds, immune function, and the release of hormones. Depending on developmental stage and health status, arginine can be considered a semiessential, or conditionally essential amino acid. This is particularly true for infants who cannot meet their requirements for arginine. Common dietary sources of arginine include dairy, beef, pork, poultry, wild game, seafood, wheat germ, hemp, buckwheat, oats, legumes, and nuts and seeds (Murray 1998).

Histidine

Histidine is another amino acid that is considered essential in infants because they are unable to synthesize this amino acid until three to four years of age. Histidine is necessary for the growth and repair tissue, and is required for the manufacture of red and white blood cells. During an allergic reaction, it is histidine that is released by the immune system cells (Wikipedia 2009c). Sources of histidine include dairy, meat, poultry, fish, rice, wheat, and rye.

Non-standard Amino Acids

Non-standard amino acids are amino acids that are chemically altered after they have been incorporated into a protein, and/or amino acids that exist in living organisms, but are not found in proteins (Driscoll 2003).

Carbohydrates

Carbohydrates are a product of photosynthesis in green plants. This group of compounds is the most abundant found on earth. Carbohydrates is a term that encompasses three main groups of compounds: 1) sugars, 2) starches, and 3) fibers. To elaborate, sugars include the simple carbohydrates found in table sugar, honey, natural fruit sugars, and molasses. Starches and complex carbohydrates are present in legumes, grains vegetables, and fruits. Fibers, including cellulose, hemicellulose, and pectin, are present in whole grains, legumes, vegetables, and fruits (Garrison and Somer 1985:13). Dietary carbohydrates provide energy for bodily functions, including our ability to digest and absorb other foods. They are the body's preferred source of energy, although proteins and lipids also may be converted to energy. Carbohydrates are so important that an inadequate intake may result in nutritional deficiencies such as ketosis, energy loss, depression, and even loss of essential body protein. On the other hand, excess intake of carbohydrates causes obesity and dental decay.

To understand carbohydrates and their detection with the FTIR it is important to know that they are formed of carbon atoms coupled to "hyrates", such as water, resulting in empirical formulas of CnH2nOn where "n" represents the number of atoms for C, H, and O, respectively. "Biochemically, carbohydrates are polyhydroxy alcohols with aldehyde or ketone groups that are potentially active" (Garrison and Somer 1985:13). Since carbohydrates are classified according to their structure and the FTIR detects the bonds between molecules, we will review the simple sugars (monosaccharides), multiple sugars (oligosaccharides), and complex molecules (polysaccharides) that are made up of simple sugars.

Monosaccharides

Monosaccharides or naturally occurring simple sugars, contain 3 to 7 carbon atoms each. The most important monosaccharides for the diet are referred to as hexoses because they contain 6 carbon atoms (C6H12O6). Although the formula is the same for simple sugars, variations in the arrangements of the atoms about the carbon chains creates different sugars.

Glucose

Glucose, dextrose, corn sugar, grape sugar, is the form that circulates in blood (blood sugar). It is also the form that cells use for energy. It is soluble in both hot and cold water and crystallizes easily. Glucose is somewhat less sweet than cane sugar.

Fructose

Fructose, levulose, or fruit sugar is present in honey, ripe fruits, and a few vegetables. It is highly soluble, does not crystallize, is not absorbed directly into the blood, and is much sweeter than cane sugar. It is produced as a product of the hydrolysis of sucrose (an oligosaccharide).

Galactose

This monosaccharide is produced during digestion of lactose (milk sugar, an oligosaccharide).

Mannose

This minor hexose carbohydrate present in aloe and probably other members of the lily family. Pentose carbohydrates (xylose and arabinose) are produced during digestion of certain fruits and meats. Ribose, another pentose produced during digestion, is also synthesized by the human body. Ribose is a constituent of riboflavin (a B complex vitamin), ribonucleic acid (RNA), and deoxyribonucleic acid (DNA).

Oligosaccharides

These carbohydrates have two or more hexoses combined with the loss of a water molecule ($C_{12}H_{22}O_{11}$). In other words, there will be one less oxygen than carbon and hydrogen will be double the quantity of carbon, minus 2. Oligosaccharides are all water soluble and can crystallize, but are of varying sweetness.

Sucrose

Sucrose or common table sugar is derived from sugar cane, sugar beets, sorghum, molasses, or maple sugar. This di-saccharide consists of one molecule of fructose and one molecule of glucose. It may be found in some vegetables and many fruits.

Lactose

Lactose or milk sugar is unusual in it's animal origin and is the only nutritionally significant sugar originating in animals. Lactose varies from 2% to 8% in mammalian milk, by volume.

Maltose

This short chain of glucose molecules is an intermediate product in the digestive hydrolysis of starch. It contributes its distinctive taste to malted beers.

Polysaccharides

These complex starchy compounds follow the empirical formula: $C_6H_{10}O_5$. They are not sweet, do not crystallize, and are not water soluble. Simply defined, polysaccharides are complex carbohydrates found in plants as starch and cellulose, and in animals as glycogen. Because the FTIR detects the bonds between atoms in molecules, it is important to know that polysaccharides are formed of repeating units of mono- or di-saccharides that are joined together by glycosidic bonds. Polysaccharides are often heterogeneous. The slight modifications of the repeating unit results in slightly different wave number signatures on the FTIR. Types of polysaccharides are descriptive and include storage (starches and glycogen), structural (cellulose and chitin), acidic (containing carboxyl groups, phosphate groups, and/or sulfuric ester groups), neutral (presumably without the acid features), bacterial (macromolecules that include peptidoglycan, lipipolysaccharides, capsules and exopolysaccharides), and more. The study of polysaccharides is an ever growing field and industry, since polysaccharides are important to proper immune function, bowel health, and a host of other factors that are important in human health. At present there is no comprehensive study of which plants and animal parts contain which polysaccharides. Research into this field is currently growing at a rapid pace. Some highlights for the purpose of our discussions are presented below.

Storage Polysaccharides

Starch

Starch is composed of long chains of glucose units. Amorphous starch granules are encased in cell walls. They burst free when cooked because the granules absorb water and expand. When these chains are long and straight, the starch is labeled Amylose. If the chains are short and branched, they are amylopectin. Shorter chains of glucose (dextrin) are the intermediate product of the hydrolysis of starch.

Glycogen

Glycogen is synthesized in the human liver and muscle from glucose. Structurally, it is similar to amylopectin starch, but with more branches.

Structural Polysaccharides

Cellulose and chitin provide structural support to animals and plants. Therefore, they are not water soluble.

Cellulose

Cellulose, hemicellulose, and pectin are all comprised of simple sugars, and their differences are defined by the various inclusions, exclusions, and combinations of these sugars, as well as how the sugars are bonded, and their molecular structure. Cellulose is comprised of a long linear chain of glucose, while hemicellulose consists of shorter branched chains of simple sugars in addition to glucose, including especially xylose, but also mannose, galactose, rhamnose, and arabinose (Crawford 1981; Updegraff 1969). Pectin, however, may be found in either a linear or branched from of simple sugars that is primarily composed of rhamnose.

Hemicellulose resides in the cell walls of almost all plants and comprises roughly 20% of their biological material (Wikipedia 2009b). Some specific hemicelluloses include glucomannan and galactoglucomannan. A peak at 873 wave numbers represents the presence of both glucomannan and galactoglucomannan. These polysaccharides are predominant in the woody tissues of coniferous plants (Gymnosperms), with galactoglucomannan being the primary component. Glucomannan is also present in the wood of dicotyledons, also known as dicots (Bochicchio 2003). Glucomannan, which may be very concentrated in some roots or corms and in the wood of conifers, is a soluble fiber used to treat constipation by decreasing fecal transit time (Marzio 1989).

Pectin is a structural heteropolysaccharide that is contained in the primary cell walls of non-woody terrestrial plants. Pectin is a common substance found in many plants (apples, plum, gooseberries, and citrus) and is a soluble dietary fiber often used for its gelling or thickening action. Specifically, pectin is a

> linear chain of α-(1-4)-linked D-galacturonic acid that forms the pectin-backbone, a homogalacturonan. Into this backbone, there are regions where galacturonic acid is replaced by (1-2)-linked L-rhamnose. From the rhamnose residues, side chains of various neutral sugars branch off. This type of pectin is called rhamnogalacturonan I. ... The neutral sugars are mainly D-galactose, L-arabinose and D-xylose, the types and proportions of neutral sugars varying with the origin of pectin. A third structural type of pectin is rhamnogalacturonan II, which is a less frequent complex, highly branched polysaccharide (Wikipedia 2009d).

Rhamnogalacturonans are specific pectic polysaccharides that reside in the cell walls of all land plants, and result form the degradation of pectin (Willats 2001). They are visible by the presence of peaks at 1150, 1122,1070, 1043, 989, 951, 916, 902, 846, and 823 wave numbers.

Chitin

Chitin forms the exoskeleton of insects and related animals such as crayfish, shrimp, crabs, lobsters, etc. It is one of the most abundant natural materials in the world, and first appeared in the exoskeletons of trilobites and other Cambrian arthropods (Briggs 1999).

Acidic Polysaccharides

Acidic polysaccharides are defined as containing carboxyl groups, phosphate groups, and/or sulfuric ester groups. Carboxylates, which are among the defining characteristics of acidic polysaccharides, are recognized in peaks located at 1560 cm -1 and 1410 cm -1.

Neutral Polysaccharides

These polysaccharides lack carboxyl groups, phosphate groups, and/or sulfuric ester groups. Examples of neutral polysaccharides cross other category boundaries of polysaccharides and include: chitin, chitosan, curdlan, dextran, inulin, arabinogalactan, and other compounds that often either are contained within individual plants or are the result of fermentation. Arabinogalactorhamnoglycan, is a specific polysaccharide, or complex carbohydrate, known as a neutral polysaccharide (Capek 1999). It exhibits peaks at 1049, 914, 837, and 810 wave numbers.

Bacterial Polysaccharides

These diverse macromolecules include peptidoglycan, lipopolysaccharides, capsules and exopolysaccharides. Their functions range from being structural cell wall components (peptidoglycan), virulence factors, and facilitating bacterium to survive in harsh environments (*Pseudomonas* in the human lung). Synthesis of these polysaccharides is both tightly regulated and an energy intensive process. Current research into the benefits of bacterial polysaccharides and their commercial exploitation is used to develop new applications for these products. Pathogenic bacteria often produce a thick, mucous-like, encapsulating layer of polysaccharide. This layer or capsule cloaks the antigenic proteins on the surface of the bacteria that would otherwise be identified by the host organism and provoke an immune response, leading to the destruction of the bacteria. Bacteria, fungi, and algae may secrete polysaccharides to help them adhere to surfaces and/or to prevent them from drying out. Humans have used some of these polysaccharides as thickening agents. The presence of these polysaccharides often may be identified by peaks at specific wave number locations using the FTIR.

Esters

Esters are an important functional group, as they are present as flavoring agents in food and are components of biological compounds such as fats, oils and lipids. In an ester, the basic unit of the molecule is known as a carbonyl. The presence of the double peak between 3000 and 2800 wave numbers identifies the presence of the aldehyde functional group, which is present in fats, oils, lipids, and waxes.

There are two important groups of esters, saturated esters and aromatic esters. Aromatic esters take their name from their ability to produce distinctive odors, and are present as flavoring agents in food. In contrast, saturated esters do not produce distinctive odors. Esters are expressed in the FTIR spectrum by three distinct peaks ("the rule of three") located at approximately 1700, 1200, and 1100 wave numbers, and a fourth peak in the region between 750 and 700 cm -1, which represents the CH2 bend associated with aromatic esters. The first peak for saturated esters falls in the 1750-1735 range, while the second peak lies between 1210 and 1160, and the third peak sits between 1100 and 1030. Saturated esters have a unique peak to acetates at 1240. This band can be very strong in the signature. The first peak for aromatic esters falls in the range between

1730 and 1715, followed by the second peak between 1310 and 1250, and finally the third peak between 1130 and 1100 (Smith 1999:110- 112). Distinguishing between saturated and aromatic esters, which are both components of foods, is easy if all three bands are present, since they occupy different wave number regions.

ETHNOBOTANIC REVIEW

It is a commonly accepted practice in archaeological studies to reference ethnographically documented plant uses as indicators of possible or even probable plant uses in prehistoric times. The ethnobotanic literature provides evidence for the exploitation of numerous plants in historic times, both by broad categories and by specific example. Evidence for exploitation from numerous sources can suggest a widespread utilization and strengthens the possibility that the same or similar resources were used in prehistoric times. Ethnographic sources outside the study area have been consulted to permit a more exhaustive review of potential uses for each plant. Ethnographic sources document that with some plants, the historic use was developed and carried from the past. A plant with medicinal qualities very likely was discovered in prehistoric times and the usage persisted into historic times. There is, however, likely to have been a loss of knowledge concerning the utilization of plant resources as cultures moved from subsistence to agricultural economies and/or were introduced to European foods during the historic period. The ethnobotanic literature serves only as a guide indicating that the potential for utilization existed in prehistoric times--not as conclusive evidence that the resources were used. Pollen and macrofloral remains, when compared with the material culture (artifacts and features) recovered by the archaeologists, can become indicators of use. Plants represented by pollen, phytoliths, and organic residues will be discussed in the following paragraphs in order to provide an ethnobotanic background for discussing the remains.

Native Plants

Allium (Wild onion)

All species of *Allium* (wild onion) are noted to be edible, and the bulbs vary in degree of onion odor and flavor. Bulbs were eaten fresh, cooked, and as a seasoning. Bulbs also were dried for future use. These herbaceous plants have long, slender basal leaves also with an onion aroma. Wild onions are found in moist ground around ponds, streams, in meadows, and marshes (Moerman 1998:58, 56).

Brassicaceae (Mustard family)

Several members of the Brassicaceae (mustard family), such as *Descurainia* (tansy mustard) and *Lepidium* (pepperweed) are noted to have been exploited for their greens and seeds. Leaves can be eaten fresh or cooked as potherbs. Indians often baked fresh young *Descurainia* leaves in firepits lined with stones. Alternating layers of leaves and hot rocks were used to create a type of steamer. The plants were steamed for about thirty minutes then used right away or dried for later use (Harrington 1964:308). The parched and ground seeds were used to thicken or flavor soup and to make pinole. Brassicaceae seeds ripen in early summer (Harrington 1967; Kirk 1975; Moerman 1986).

Cheno-ams

Cheno-ams are a group of plants that include the genus *Amaranthus* (pigweed) and members of the Chenopodiaceae (goosefoot family) such as *Atriplex* (saltbush, shadscale), *Chenopodium* (goosefoot), *Monolepis* (povertyweed), and *Suaeda* (sea blite). These plants were exploited for both their greens and seeds. The greens are most tender in the spring when young but can be used at any time. Leaves and tips often were steamed or boiled. The seeds were eaten raw or ground into a meal that was used to make a variety of mushes and cakes. The seeds are usually noted to have been parched prior to grinding. The high protein and fat content of the seeds result in a high caloric value. Seeds are usually harvested in the fall and early winter, and harvestable quantities of *Chenopodium* seed persists late into the winter. *Chenopodium* and *Amaranthus* are both weedy annuals capable of producing large quantities of seeds. A single plant can produce 100,000 seeds (Gilmore 1977:26; Kindscher 1987:18-22, 79- 83; Martin 1972:48; Peterson 1977:152, 154; Rogers 1980:43, 66; Seeman and Wilson 1984:301-305).

Amaranthus (Pigweed)

Amaranthus leaves were an important source of iron and contain a significant amount of protein, calcium, phosphorous, potassium, vitamin A, and vitamin C. *Amaranthus* poultices were used to reduce swellings and to soothe aching teeth. A leaf tea was used to stop bleeding and to treat dysentery, ulcers, diarrhea, mouth sores, sore throats, and hoarseness. *Amaranthus* commonly grows in rich cultivated soils of fields, gardens, and orchards, as well as in the dry soils of prairies, fields, roadsides, and waste places (Angier 1978:33-35; Foster and Duke 1990:216; Harris 1972:58; Kindscher 1987:18-22; Krochmal and Krochmal 1973:34-35).

Atriplex (Saltbush)

Atriplex (saltbush) occurs as both an annual herb and perennial shrub. Like *Chenopodium* and *Amaranthus*, saltbush also can be exploited for both its greens and seeds. The leaves and young shoots have a salty taste and can be used as a seasoning. A poultice of the chewed plant was applied to ant, bee, and wasp sting swellings. *A. canescens* (four-wing saltbush) was used for stomach pain or as an emetic. Dried leaves were used as a snuff for nose trouble, and a poultice of the warm, pulverized root was applied to toothaches (Moerman 1986:85-86; Weiner 1972:75). *Atriplex* seeds are very nutritious and can be ground into a meal, mixed with water and drunk as a beverage, or mixed with some other meal and used as flour. The seeds do not ripen until mid-fall and can remain on the shrubs throughout the winter into the next growing season. *Atriplex* is a native found widely scattered throughout the western United States in waste places and fields, growing in arid, alkaline, or saline soils (Kirk 1975:59; Muenscher 1987:180).

Chenopodium (Goosefoot)

Chenopodium leaves are rich in calcium and vitamins A and C. The leaves were eaten to treat stomachaches and to prevent scurvy. Leaf poultices were applied to burns, and a tea made from the whole plant was used to treat diarrhea. The Pawnee used *C. album* (lamb's quarters) to paint bows and arrows green. *Chenopodium* is commonly found along roadsides, in fields, gardens, waste places, open woods or thickets, and on stony hills. It is an opportunistic weed, often establishing itself rapidly in disturbed areas (Angier 1978:191; Fernald 1950:592-596; Foster and Duke 1990:216; Gilmore 1977:26; Krochmal and Krochmal 1973:66-67; Martin 1972:44-45).

Cleome (Beeweed)

Cleome (beeweed, bee plant) is a weedy plant that grows in disturbed areas. *Cleome* was used both as a food and a pottery paint. The young plants were usually gathered and boiled as potherbs from spring until mid-summer. The seeds also can be gathered and ground into meal, although utilization as a potherb appears to have been more common. The seeds ripen in the late summer and fall. Both the young and older plants can be gathered and the entire plant boiled down to a thick, black, fluid residue. This fluid is then dried and made into cakes, which keep for an indefinite period. The cakes can be reconstituted by soaking them in water for use as a dye or pottery paint, or fried in grease to be eaten. *Cleome* is found in sagebrush areas and in the more arid forests throughout the West (Harrington 1967:72; Kirk 1975:33).

Cyperaceae (Sedge Family)

A few members of the Cyperaceae (sedge) family are noted to have been important resources for Native Americans. *Carex* (sedge) stems are filled with a sugary juice, and the tuberous base of the stem was eaten (Yanovsky 1936:9). Most species are found in wet areas, although some are found in open, dry ground (Hitchcock and Cronquist 1973:578-595). Several species of *Cyperus* (flat sedge, nutgrass) have a tuber-like thickening at the base of the plant or possess tubers at the end of slender rootstalks. These tubers were eaten raw, boiled, dried and ground into a flour, or baked in a fire. The roots also can be roasted until dark brown and ground to make coffee. *Cyperus esculentus* is noted to have been a famous plant food since ancient Egyptian times. *Cyperus* is a grass-like perennial found in moist ground, especially in damp sandy soil and waste places (Harrington 1967:174; Kirk 1975:176; Peterson 1977:230). *Scirpus* and *Schoenoplectus* (bulrush) are perennial plants that were used extensively. Young shoots and older base stems were eaten raw or cooked. Pollen was formed into cakes and baked. The seeds can be used whole, or parched and ground into flour. The rootstalks are rich in starch and sugar. They can be eaten raw, roasted, or dried and ground into a flour. The rootstalks also were crushed and boiled to make a sweet syrup. The long stems were used to weave baskets and mats, and the plant used as a ceremonial emetic. *Scirpus* and *Schoeoplectus* are found in wet ground and in shallow water around pond, swamp, and lake edges (Duke 1986:141; Harrington 1967:210-213; Kirk 1975:175-176; Moerman 1986:446; Peterson 1977:230).

Helianthus (Sunflower)

Helianthus (sunflower) is an annual plant that was extensively used by many Native American tribes. Sunflowers were domesticated by some North American Indian groups, and the seed size was increased by 1000 percent during the last 3000 years. Sunflower "seeds" are actually a complete fruit called an achene. The seeds were eaten raw, cooked, or roasted. Seeds also were dried or parched and ground into a meal that was used to make breads, mushes, cakes, or to thicken soups and gravy. Ground seeds were made into a paste similar to peanut butter. Oil was extracted by boiling the flower heads or crushed seeds and skimming the oil from the water. Roasted seeds and/or shells were used to make a beverage similar to coffee. The seeds are very nutritious. They contain 24% protein, 47% fat, and are good sources of vitamin B. Purple and black dyes were obtained from sunflower seeds, while the flowers yielded a yellow dye. A sunflower tea was used to treat lung ailments, malaria, high fevers, as an astringent, and as a poultice for snake bites and spider bites. A root decoction was used as a warm wash for rheumatism. The sunflower's importance to Native Americans is indicated by its widespread presence in myths, art, and decoration. *H. tuberosus* (Jerusalem artichoke) produces a tuberous root that was harvested in the fall, winter, or spring and eaten raw, boiled, or roasted. The tubers are high in iron but low in fat and available carbohydrates. Sunflower plants can be found in waste places, fields, low meadows, prairies, and along roadsides and railroads (Foster and Duke 1990:132; Gilmore 1977:78-79; Kindscher 1987:124-133; Kirk 1975:133; McGee 1984:265, 272; Niethammer 1974:51-52; Sweet 1976:40).

***Pinus* (Pine)**

Pinus (pine) trees were utilized for a variety of purposes. The seeds of most pines are edible, although some are better than others. The inner bark can be mashed and formed into cakes or dried and made into flour. The inner bark also was used to make poultices and bandages. An inner bark tea and pine pitch were used as an expectorant. Pine pitch was used to draw out slivers and infections and was spread on sores and inflammations as a salve. The pitch also was heated and used to treat pneumonia, rheumatism, muscular sores, and insect bites. Pine needles are rich in vitamins A and C and were brewed into a medicinal tea. The fumes emitted from heated needles were breathed in to treat back pain. Buds were chewed to treat sore throats and steeped in water to make a laxative tea (Angier 1978:195-196; Moore 1979:126; Peterson 1977:166; Robinson 1979:123-124). Pine wood also was used for fuel and construction material. Pine was valued as a wood source because the pitch in the wood would readily start the wood burning, even when wet (Gallagher 1977:113). Travois and tipi poles were made from *Pinus contorta* (lodgepole pine), as well as back-rest poles and bed supports. Pine wood also could be used to make babies' cradles (Smith 1974:102).

Poaceae (Grass Family)

Members of the Poaceae (grass) family have been widely used as a food resource, including *Agropyron* (wheatgrass), *Beckmania syzigachne* (American slough grass), *Cenchrus* (sandbur), *Echinochloa* (barnyard grass), *Elymus* (ryegrass), *Eragrostis* (love grass), *Glyceria* (manna grass), *Hordeum* (barley), *Achnatherum* (ricegrass), *Phalaris* (may grass), *Phragmites* (reed grass), *Sporobolus* (dropseed), *Zizania* (wild rice), and others. Grass grains could be eaten raw or cooked, but usually they were parched and ground into a meal to make various mushes and cakes. Several species of grass contain hairs (awns) that were singed off by exposing the seeds to flame. Young shoots and leaves were cooked as greens. Roots were eaten raw, roasted, or dried and ground into a flour. Grass also is reported to have been used as a floor covering, tinder, basketry material, and to make brushes and brooms. Grass seeds ripen from spring to fall, depending on the species, providing a long-term available resource (Kindscher 1987:228-237; Kirk 1975:177-190; Rogers 1980:32-40).

***Polygonum/Persicaria* (Smartweed, Knotweed)**

The seeds of *Polygonum* (smartweed, knotweed) were parched and ground into a meal. The leaves of some species were collected in the spring and used raw in salads or cooked as potherbs. Some species' leaves are peppery and make a good seasoning. The Sioux are reported to have eaten young *Polygonum* shoots as a relish (Kindscher 1987:248). Young stems also may be eaten like asparagus. *P. bistoides* and *P. viviparum* have starchy roots that are edible raw and boiled, but are best when roasted. The whole plant was poulticed for pain, and rubbed on poison ivy rashes and horse's backs to keep the flies away. A tea made from the entire plant of *P. pennsylvanicum* was used for diarrhea. A tea made from the leaves of *P. persicaria* was used for heart troubles, stomachaches, and as a footsoak for rheumatic pains of the legs and feet. *Polygonum* plants are found in a variety of habitats throughout the West, including moist, dry, saline, rocky, sunny, and shady soils (Foster and Duke 1990:160; Harrington 1967:196; Kirk 1975:56; Peterson 1977:116; Rogers 1980:84).

Prunus (Cherry Group)

The *Prunus* group contains plums and various cherries, including chokecherries, black cherries, sand cherries, and pin cherries. Wild plums were used extensively, either fresh or made into a sauce. Plums were dried (with or without the pit), or pounded and made into cakes. Wild cherries also were important foods. A few can be eaten raw, but most are best when cooked. Both wild plums and cherries contain hydrocyanic acid, which is poisonous; however, cooking or pounding then drying removes this acid. *Prunus virginiana* (chokecherry) was an especially important wild cherry. Raw chokecherries are astringent, but can be eaten. More often, they were dried and stored, cooked, or pounded to a pulp, then shaped into cakes and dried. A mixture of dried, pounded cherries, dried meat, and fat called pemmican was commonly made. Chokecherry sticks were stripped and inserted into cooking meat to add flavoring. They also were used for arrows. *Prunus* shrubs form thickets in woodlands, prairies, fields, pastures, and along roadsides, fences, and streams (Angell 1981:44-46; Kindscher 1987:170-181; Peterson 1977:218; Rogers 1980:90-91).

Quercus (Oak) – Acorns

Oaks (*Quercus*) are distinctive deciduous or evergreen, hardwood shrubs to large trees found in dry to moist ground in many different habitats. Oak wood is very hard, heavy, and strong. It was valued as firewood because the hard wood would burn slowly, and a large log could burn all night. Acorns are noted to have been a food source for several aboriginal groups in North America. Acorns have a high degree of tannic acid, which must be removed in order to be palatable. Tannins were removed by leaching in water, sometimes with the help of wood ashes. Acorns have a high percentage of carbohydrates and relatively low percentages of protein and fat. The root bark was boiled and given for diarrhea and bowel trouble, especially in children (Gallagher 1977:113; Gilmore 1977:23; Kindscher 1992:82; Kirk 1975:104-106; McGee 1984:265).

Rosa (Wild Rose)

The "fruits" of *Rosa* sp. (wild rose) are called rose hips and were eaten raw, dried, and/or roasted. These rose hips are not true fruits, but are enlarged, fleshy receptacles that contain numerous seeds. Rose hips also can be stewed, candied, and made into preserves. Rose hips are very high in vitamin C and can be used to make a tea. Rose hips are best when fully ripe, and they tend to sweeten after a frost. Young shoots and stalks, collected in the spring, also can be cooked as potherbs or used to make a tea. Flower petals can be eaten raw in salads or candied. Rose hips often were used as an emergency or trail food. Necklaces of rose hips were made before trade beads were acquired. The inner bark sometimes was boiled for tea or smoked like tobacco. Flowers or buds seeped in water were used to treat diarrhea, as an eyewash, and as a mild astringent. *Rosa* is a common shrub found in prairies, thickets, woods, plains, and hills, from 3500 to 10,000 feet in elevation (Angell 1981:42, 300; Kindscher 1987:200-201; Kirk 1975:94; Rogers 1980:92).

Xanthium (Cocklebur)

Xanthium (cocklebur) is a common weedy annual found throughout the United States. The fruit is a pod about one inch long that is covered with stiff, hooked barbs and often called a bur. The inner seeds can be parched and ground into a flour. The leaves of *Xanthium* can be used to treat herpes, skin and bladder infections, and to stop the bleeding of skin cuts and abrasions. A tea made from the leaves is a useful diuretic. Crushed, boiled pods have analgesic, diuretic, and antispasmodic effects, and have been used for diarrhea, rheumatism, and arthritis; however, large quantities or constant use can have toxic effects. The crushed seeds can be used as a blood clotting agent and an antiseptic for skin abrasions, and is a good first aid dressing. *Xanthium* is found growing in dry areas and old fields, along roadsides, around alluvial washes and creek banks, and on beaches (Krochmal and Krochmal 1973:236-237; Moerman 1998:602; Moore 1979:59).

Cultigens

Phaseolus (Bean)

Phaseolus includes many varieties of domesticated beans, including *P. vulgaris* (common bean), *P. lunatus* (lima bean), *P. acutifolius* var. *latifolius* (tepary bean), and *P. coccineus* (runner bean). *Phaseolus* is believed to have first come under cultivation about 6000 B.C. in Central and South America. Charred beans have been recovered from Upper Republican (1200 to 1500 A.D.), Mandan, Late Woodland, and Arikara sites, and beans are noted to have been cultivated by Lakota groups. Beans could be eaten when green and immature but often were dried and stored for future use, both in the pod and shelled. Dried beans most often were boiled until soft and then eaten as is or fried (Cutler and Blake 1973; Edwards and Jennings 1948:41; Heiser 1990:124-126; McGee 1984:251-262; Rogers 1980:101).

Nicotiana (Tobacco)

Nicotiana (tobacco) is a member of the Solanaceae family that was used for ceremonial purposes. Tobacco is native to the American Southwest and is noted to have been dried and smoked ceremonially during historic times, usually rolled in corn husks or pipes. Tobacco may be mixed with dried leaves from other plants such as *Onosmodium* (marbleseed), *Gossypium* (cotton), *Phragmites* (reed), *Populus* (cottonwood/aspen), *Pinus* (pine), and *Pseudotsuga* (Douglas fir) (Robbins, et al. 1916:103-106; Whiting 1939:40, 90).

Zea mays (Maize, Corn)

Cultivation of *Zea mays* (maize, corn) originated in South America and spread throughout the United States. At the time of European contact, Heiser (1990:89) notes that "maize was the most widely grown plant in the Americas, extending from southern Canada to southern South America, growing at sea level in some places and at elevations higher than eleven thousand feet in others." Corn was (and still is) an important food, for which innumerable ways of preparation exist. Ripe corn kernels were dried, parched and ground into a meal, hulled with lye from ashes to make hominy, or prepared in various other ways (Gilmore 1977:15). Whole ears were also boiled and eaten. Corn silks were dried and ground with the parched corn to add sweetness. The corn smut fungus *Ustilago* was also used for food. The fungi was gathered when the spores were firm and ripe and boiled (Rogers 1980:42). There are five different types of maize determined by the endosperm composition. Pop and flint corn have a high protein content and a hard starch. Dent corn has a deposit of soft, waxy starch at the crown of the kernel. Flour corn contains little protein and mostly waxy starch, while sweet corn stores more sugar than starch (McGee 1984:241).

DISCUSSION

Site DlLg-33 is located near the junction of the Red and Assiniboine Rivers in downtown Winnipeg, Manitoba, Canada. Situated at the intersection of riverine trade routes, the site was a center for prehistoric commerce. Until recently, the site was buried beneath an active railroad yard that deposited a meter of debris, including coal cinders, coal dust, and gravel, on top of the site. A gravel parking lot occupies this area today. Modern vegetation in the area consists of dandelion (*Taraxacum* – a Liguliflorae) and pigweed (*Amaranthus* – a Cheno-am), along with ornamental and shade trees; however, when the site was occupied prehistorically, the local environment was characteristic of a riverine gallery forest with deciduous trees that transitioned into prairies or parklands beyond the forest edges.

Five cultural levels were recognized at the site, have been previously dated. Level 1dates to 825 BP, but this date is believed to be 125 years older than the occupation represented by this level. The date obtained for Level 2 (860 BP) is also thought to be 100 years too old. These dates were probably contaminated by the railroad fill and runoff from the parking lot during heavy rainstorms. A date of 895 BP for Level 2B is accepted as correct. Level 3 is dated to 875 BP, which is believed to be 100 year too recent, and Level 3A, which is inverted with Level 3, dates to 850 BP. This date is also thought to be 120 years too recent.

Ceramic rimsherds recovered from each level at the site were submitted for ceramic and organic residue analysis (Table 1). A biface from Level 2 was submitted for protein residue analysis. Ceramics were tested for organic residues using Fourier Transform Infrared Spectroscopy (FTIR). Ceramic residue analysis (pollen, starch, and phytolith) and organic residue analyses on the ceramics are used to provide information regarding the foods processed in the vessels, their origins, and perhaps to shed light on decorative influences beyond a stylistic tradition, as these sherds represent a transition from the production of a single widespread ceramic type to several distinct regional variants. This site is located at a major nexus of trade routes that might have been used to advantage by occupants of this site. These analyses were undertaken, in part, to shed light on possible trade influences.

Ceramic and Organic Residue (FTIR) Analysis of Rimsherds

Ceramic Rimsherd 10192

Pollen analysis of residue from sample 10192, representing from a ceramic rimsherd discovered during the excavation of site DlLg-33, located within the city limits of Winnipeg, Manitoba, Canada, yielded a large quantity of microscopic charcoal fragments, suggesting that ash was incorporated into the residue of this vessel as it was used. However, this sample yielded a low pollen count due to the limited quantity of pollen present in the residue. Pollen recorded in this sample includes *Alnus*, *Nyssa*, *Pinus*, *Salix*, High-spine Asteraceae, Cheno-am, *Eriogonum*, and Poaceae representing local and/or regional trees that included alder, gum, pine, willow, various members of the sunflower family, Cheno-ams, wild buckwheat, and grasses (Figure 1). It is likely that this group represents the environmental component of the sample. A small quantity of *Zea mays* pollen was also recovered, indicating preparation of maize in this ceramic vessel. In addition, Fabaceae starch was observed, which represents the processing of beans, a member of the legume family. It is likely that these were cultivated beans. Finally, a starch granule typical of grass seeds, including maize but not diagnostic for maize, was noted. This starch is consistent with cooking either maize, grass seeds, or both. Finally, a deteriorated hair from a rodent or cat was observed in this residue. The deterioration of the hair points to the probability that it was present as a result of cooking or other activities at the time of occupation. It is possible that rodent meat (whole, skinned, or cut up) was cooked in this vessel, as well. Only a small quantity of charred, amorphous organic matter was observed, probably representing food residue.

Phytolith analysis of the residue wash from ceramic rimsherd 10192 yielded a phytolith assemblage dominated by cool-season, C3 metabolism grasses (Figure 2), and appears to be mostly derived from the environment in which this vessel was used. Phytoliths from maize, beans, and squash were not observed; however, the presence of grass dendriforms, epidermal papillae, and epidermal sheet elements suggest that grass seeds were utilized. The presence of a moderate amount of *Stipa*-type bilobates, suggests that Indian ricegrass seed (*Achnatherum hymenoides*) was gathered for subsistence purposes. Some diatoms and a moderate amount of sponge spicules were observed, and are likely derived from water used for cooking and preparing foods in this vessel. One phytolith diagnostic of the obligate wetland grass *Phragmites australis* was observed, and indicates its presence and utilization. Although both pollen analysis and FTIR analysis (discussed next) detected the presence of beans *(Phaseolus*), bean phytoliths were not observed. This is not surprising since bean phytoliths (both silicified hairs and calcium oxalate druses) do not preserve well and are usually only discovered in contexts sealed from the environment. It is also possible that the beans had been shelled prior to cooking, and the pods discarded. This might be part of a storage or trade strategy, as shelled dry beans are more compact. Additionally, many of the foods detected by the FTIR analysis of this sherd, discussed next, do not produce silica phytoliths.

Organic residues were extracted from sample 10192, a ceramic rimsherd recovered from Level 1, Unit E17, for FTIR analysis. This rimsherd yielded peaks representing the presence of absorbed water, fats/oils/lipids and/or plant waxes, pectin, aromatic esters, protein, alanine, and cellulose and carbohydrates (Table 2). Alanine, represented in this sample by peaks at 1466 and 1464 wave numbers, is a nonessential amino acid found in a wide variety of foods that include legumes, maize, fish, and meat. Matches with these peaks were made with cooked wild onion (*Allium*) bulbs; cooked leaves from members of the sunflower family, such as coneflower; sunflower (*Helianthus*) seeds; pine (*Pinus*) nut and acorn (*Quercus*) nutshells; and chokecherry (*Prunus*) and saltbush (*Atriplex*) fruits (Table 3). These matches suggest a variety of local plants and plant parts, including bulbs, greens, seeds, nuts, and fruits might have been contained in the vessel represented by this sherd. A match with *Phaseolus* (beans) was made in three portions of the spectrum suggesting beans were processed regularly in the vessel, as well. Other matches also were made with *Bison* fat, pronghorn blood, and cooked trout. However, these matches are interpreted at a general, rather than specific, level, meaning that, although it appears the inhabitants of the site were preparing meat and fish, the particular species or types of animals that were being utilized cannot be specifically identified. Matches with deteriorated cellulose and humates probably indicate the presence of the environmental signal representing the natural decay of plant matter. Alternatively, the presence of cellulose and humates may represent other plant materials processed that have deteriorated to the point they are only recognizable by their general cellulose signatures.

Ceramic Rimsherd 22158

Pollen sample 22158 represents wash of another ceramic rimsherd from site DlLg-33. The pollen record from this sample was different from the previous sample in that it did not contain microscopic charcoal fragments. Poaceae and Cheno-am frequencies were slightly elevated suggesting the cooking of Cheno-ams (seeds and/or greens) and grass seeds. In addition, *Pinus*, Low-spine Asteraceae, and High-spine Asteraceae pollen were observed, representing pine and members of the sunflower family, likely as part of the local vegetation. This sample did not yield starch, although it did contain a moderately large quantity of charred organic matter.

Phytolith analysis of residue wash from ceramic rimsherd 22158 yielded a phytolith assemblage similar to that obtained from sample 10192, but with a few notable exceptions. Again, the phytolith assemblage was dominated by phytoliths diagnostic of cool-season, C3 metabolism grasses, likely derived from the surrounding environment. Phytolith indicators for grass seed utilization were observed, and are, again, most likely derived from Indian ricegrass (*Achnatherum hymenoides*). However, a few perforated platelets diagnostic of the inflorescence of members of the sunflower family (Asteraceae) were observed, suggesting that seeds from plants such as sunflower (*Helianthus*) and/or poverty weed (*Iva axillaris*) were utilized for subsistence, as well as one wavy-top rondel, diagnostic of maize (*Zea mays*), indicating its utilization. Also noted in this phytolith sample were diatoms and sponge spicules, suggesting the use of water in this vessel for cooking food, another similarity between this rimsherd and rimsherd sample 10192.

FTIR analysis of sample 22158, representing a ceramic rimsherd from Level 2, Unit G22, at site DlLg-33, yielded peaks indicating the presence of absorbed water, fats/oils/lipids and/or plant waxes, pectin, starch, aromatic and saturated esters, proteins including nucleic acids, alanine, calcium oxalate, humates, cellulose and carbohydrates, and the polysaccharides arabinogalactan and galactoglucomannan. Polysaccharides are complex carbohydrates found in plants as starch and cellulose, and in animals as glycogen. Arabinogalactan, represented in this sample by a peak at 985 wave numbers, is a sugar found in plant carbohydrate structures particularly gums and hemicelluloses. One of arabinogalactan's many functions is to bond with proteins to repair damage to a plant or its parts (Nothnagel 2000). Peaks at 961 and 935 represent the presence of galactoglucomannan. This polysaccharide is a primary component of the woody tissue of coniferous plants (Gymnosperms) (Bochicchio 2003). The presence of nucleic acids in the sample are represented by a peak at 1658 wave numbers. Nucleic acids, which exist in all living organisms, not only contain the genetic instructions for the proper development and functioning of living organisms, but also play a role in copying genetic information from DNA to protein (Saenger 1984).

Matches with the signal obtained from this ceramic sherd were made with pine (*Pinus*) and acorn (*Quercus*) nutshells, beeweed (*Cleome*) seed pods, sunflower (*Helianthus*) seed shells, and cooked leaves from members of the sunflower family. These matches suggest an assortment of native nuts and seeds, as well as greens, were prepared in the vessel for consumption. Multiple matches were also made with beans (*Phaseolus*) suggesting this cultigen was frequently in contact with the vessel, as well. Other matches with pronghorn blood and cooked venison indicate pronghorn, venison, and other meats were processed for consumption. Matches with skunkbush (*Rhus*) bark and humates indicate the presence of the environmental signal imparted on the sherd by the sediments in which it was buried.

Ceramic Rimsherd 13675

Pollen sample 13675 represents residue wash from another ceramic rimsherd discovered during the excavation of site DlLg-33. This pollen assemblage was similar to the previously discussed rimsherds, and appears to represent primarily an environmental signal. The *Pinus* frequency was slightly elevated and smaller quantities of High-spine Asteraceae, Brassicaceae, *Persicaria*, Poaceae, and Rhamnaceae pollen were noted representing pine, various members of the sunflower and mustard families, knotweed, grasses, and a member of the buckthorn family. No starches were observed in this sample. It is possible that seeds and/or greens from a member of the mustard family and perhaps even knotweed were prepared and eaten. *Persicaria* is a knotweed that prefers moist ground and has edible greens and seeds and also has been harvested for its medicinal properties. A small quantity of charred organic matter was noted in this sample, probably representing food residue.

Phytolith analysis of residue wash from ceramic rimsherd 13675 yielded a phytolith assemblage similar to that obtained from the other samples; however, the concentration was low. Most, if not all of the phytoliths observed here, are likely derived from the surrounding environment. Phytoliths diagnostic of cool-season grasses overwhelmingly dominated the assemblage. Most of these were trapeziform sinuate phytoliths diagnostic of the grass subfamily Pooideae. Common pooid grasses for this area include Canada bluejoint (*Calamagrostis*); bluegrass (*Poa*), canary grass (*Phalaris*), manna grass (*Glyceria*), and wild rye (*Elymus*); many of these are considered wetland taxa. A few phytoliths diagnostic of *Phragmites australis* were also observed. Diatoms were also numerous. With a lack of phytoliths from plants utilized for subsistence present in this sample, non-phytolith bearing plants were likely prepared in this vessel, along with fish and meat, and water for cooking.

FTIR analysis of ceramic rimsherd 13675 yielded peaks representing the presence of absorbed water, fats/oils/lipids and/or plant waxes, pectin, aromatic esters, aromatic rings, proteins including nucleic acids, and cellulose and carbohydrates. Matches with the signature for cooked *Allium* (wild onion) bulbs, charred *Xanthium* (cocklebur) seeds, and cooked leaves from members of the sunflower family suggest wild onion, cocklebur seeds, and greens were cooked in the vessel represented by this ceramic sherd. Other matches with *Phaseolus* (beans), cooked rabbit, and pronghorn and bird blood suggest beans and meat also were cooked often in the vessel. It is likely all of these ingredients were combined and cooked together in the vessel as a stew. Deteriorated cellulose and humates were also matched with this signal and probably represent the presence of the environmental signature; however, they may also indicate other foods processed for consumption that are only visible by their general cellulose signature.

Ceramic Rimsherd 13291

Pollen sample 13291 represents a ceramic rimsherd, also from site DlLg-33. Pollen recovered in this sample is most similar to that in sample 22158 and includes slightly elevated Cheno-am and Poaceae pollen frequencies suggesting that Cheno-am greens and/or seeds and grass seeds were cooked in this vessel. In addition, this sample contained *Allium* pollen, which is the most direct pollen evidence for the processing of wild onion recovered from these sherds. This supports the FTIR matches with *Allium* and the interpretation that wild onions were cooked in most of these vessels. A small quantity of charred organic matter also was noted in this sample, although no starches were observed.

Phytolith analysis of ceramic rimsherd sample 13291 yielded a phytolith assemblage almost identical to that obtained from the previously discussed sample 13675. Thus, no evidence for the utilization of phytolith bearing plants was observed. Diatoms were numerous, and likely derived from water used for food preparation. Thus, it seems likely that non-phytolith bearing plants and meats were cooked in this vessel.

FTIR analysis was conducted on ceramic rim fragment 13291, and yielded peaks indicating the presence of absorbed water, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, proteins including nucleic acids, alanine, humates, cellulose and carbohydrates, starch, calcium oxalate, and the polysaccharides glucomannan and galactoglucomannan. A peak at 1034 wave numbers represents the presence of both glucomannan and galactoglucomannan. These polysaccharides are predominate in the woody tissue of coniferous plants (Gymnosperms), with galactogclucomannan a primary component. Glucomannan is also present in the wood of dicotyledons, also known as dicots (Bochicchio 2003). Peaks were matched with cooked wild onion (*Allium*) bulbs, saltbush (*Atriplex*) fruit, rose (*Rosa*) hips, beeweed (*Cleome*) seed pods, sunflower (*Helianthus*) seed nutmeat and shells, and pine (*Pinus*) nutshells, suggesting a variety of bulbs, fruits, and nuts and seeds were contained in the vessel represented by this sherd. Multiple matches with *Phaseolus* (beans) suggest beans were prepared regularly in the vessel as well. Matches with cooked venison and fish suggest meat and fish were also consumed by the inhabitants of this site. While there appears to be a distinction between the FTIR signatures for fish and mammal blood, the variation within these two groups is very low. Therefore, the interpretation of the presence of fish versus mammals can only be made at a general level, suggesting a non-species specific utilization of these resources. A match with deteriorated cellulose likely indicates the presence of the local environmental signature in the sample, but it might also suggest preparation of other foods in the vessel that are only recognizable by their basic cellulose signature.

Ceramic Rimsherd 15166

Pollen sample 15166 was recovered from the wash of an additional ceramic rimsherd from site DlLg-33. This sample yielded a large quantity of charred organic matter, as well as small quantities of *Pinus*, *Quercus*, *Ulmus*, Low-spine Asteraceae, High-spine Asteraceae, and Poaceae pollen reflecting local pine, oak, elm, various members of the sunflower family, and grasses. This appears to be primarily an environmental signal. No starches were observed in this sample.

Phytolith analysis of ceramic rimsherd15166 yielded an environmental signal similar to the other samples, but with a few notable differences. The phytolith assemblage was dominated by cool-season grasses, likely all members of Pooideae, and possibly wetland grasses. A *Phragmites australis* phytolith was observed, indicating its presence and usage. A few dendriform phytoliths were observed, indicating the utilization of grass seed. Also, several perforated platelets were observed, suggesting the use of seeds from a member of the sunflower family. This sample differed from previously discussed samples due to the presence of several phytoliths diagnostic of the sedge family (Cyperaceae). Multiple Cyperaceae cone cell phytoliths, likely derived from the achenes (seeds) of a sedge were present, suggesting the gathering of sedge seeds for subsistence. Also, a single phytolith identical to those found in the edible roots of bullrush (*Schoenoplectus)* was observed, indicating the utilization of Cyperaceae roots as a food source. It should be noted that a significant amount of diatoms were again present in this sample, suggesting that water for food preparation (boiling) was an important component of the foods cooked in this vessel. This is supported by the presence of several charred tracheid elements from a woody conifer tree, likely used for fuel and introduced accidently as ash into the vessel.

FTIR analysis of ceramic rimsherd sample 15166 yielded peaks indicating the presence of absorbed water; fats/oils/lipids and/or plant waxes; pectin; aromatic rings; aromatic and saturated esters; protein; alanine; humates; cellulose and carbohydrates; β-D-cellulose; glucan; and the polysaccharides arabinogalactan, galactoglucomannan, and arabinoglucuronoxylan. Arabinoglucuronoxylan, represented in this sample by a peak at 1161 wave numbers, is a polysaccharide found in the cell walls of softwoods and herbaceous plants (Sjostrom 1981). A peak at 916 wave numbers represents the presence of both arabinogalactan, a sugar found in plant carbohydrate structures, and glucan. Glucan, often found in association with pectin, is also a polysaccharide that contains only glucose, or simple sugar, as a structural component (Stephen 2006). Glucans reside in the cell walls of plants and many forms of bacteria and fungi (Stephen 2006). Many people are familiar with beta glucans, which are harvested from these sources and administered to humans as immune boosting supplements. The presence of β-D-cellulose in the sample is represented by a peak at 916 wave numbers. β-D-cellulose, found in the cell walls of plants, is one of three specific types of cellulose that include alpha cellulose (true cellulose), beta cellulose, and gamma cellulose, differentiated by their molecular structures and properties.

Matches made with the signature from this sample occurred with cooked wild onion (*Allium*), cooked leaves from members of the sunflower family, charred cocklebur (*Xanthium*) seeds, acorn (*Quercus*) nutshells, and saltbush (*Atriplex*) fruit. These matches suggest wild onion, an assortment of native greens, nuts, and seeds, and saltbush fruit were prepared in this vessel. Other matches with pronghorn blood and cooked fish suggest meat and fish were also consumed, perhaps in combination with the other foods mentioned, as a stew. Multiple matches were also made with dried *Nicotiana* (tobacco) leaves suggest tobacco might also have been contained in the vessel. It is unlikely the vessel was used for the preparation of food simultaneously, or in alternation, with the storage of tobacco, as the presence of the tobacco would have significantly altered the taste of the food. The vessel could have originally served as a cooking pot, and then later, possibly because it was readily accessible or no longer suitable for cooking, was used to contain the tobacco. It is also possible that the alkaloids present in tobacco are also present in a more edible member of this family, and this match should be considered to be representative of another member of the nightshade family. As in previous samples, the presence of deteriorated cellulose might indicate either the local environmental signal, or other foods prepared in the vessel that have deteriorated to a point they are only visible by their general cellulose signature.

Protein Residue Analysis of Biface Sample 16135

Sample 16135, a biface tool recovered from Level 2, Unit B18 of site DlLg-33 was tested against the antisera listed in Table 4 for the presence of protein residues. This artifact yielded one positive result to sheep antiserum (Table 5), indicating that this tool was used to kill or process remains from a bighorn sheep (*Ovis canadensis*). Although confined to the Rocky Mountain region today, bighorn sheep, possibly in large herds, once ranged across much of Alberta.

SUMMARY AND CONCLUSIONS

Pollen and starch analyses of ceramic rimsherds provide a variety of evidence for the processing of food resources. Maize, beans, and possibly wild grass seeds were cooked in the vessel represented by sample 10192. Grass seeds and perhaps Cheno-am grass seeds and/or greens were probably cooked in the vessel represented by samples 22158 and 13291. In addition, wild onions were cooked in the vessel represented by sample 13291. Mustard greens and/or seeds probably were cooked in the vessel represented by sample 13675. Unfortunately, pollen analysis was not able to contribute to the understanding of foods cooked in the vessel represented by sample 15166.

The phytolith record from the ceramic rimsherd residue samples were fairly similar, with the majority of the phytoliths derived from the surrounding environment, which was dominated by cool-season grasses. Rimsherds 10192, 22158, and 15166 exhibited phytolith evidence for the utilization of grass seed as a subsistence resource. Rimsherd 22158 yielded one wavy-top rondel phytolith diagnostic of maize (*Zea mays*) cob material, and indicating its acquisition and use. Rimsherd sample 15166 contained a very strong wetland signature, and exhibited phytolith evidence for the exploitation of bullrush (Cyperaceae) seeds and roots for subsistence. Diatoms were present in all of the samples with an increase in relative abundance in the lower levels. This most likely indicates that wetter conditions existed at and near the site during the time represented by the lowest levels.

The organic residues extracted from the ceramic rimsherds exhibited complex cultural and environmental signals. The porosity of the ceramics is evident due to the presence of a number of matches attributable to the environment. It appears that ceramics tend to acquire signatures of deteriorating plant matter from the sediments in which they are buried. Matches to bark, humates, and deteriorated cellulose attest to the presence of an environmental signal. Evidence of probable food processing includes animals, and native, cultivated, and imported plants products. Local bulbs like wild onion, greens, fruits, nuts, and seeds were harvested, and beans were obtained through long distance trade. Animals, including bighorn sheep, deer, pronghorn, bison, bird, rabbit, and fish were probably procured locally for their meat, which might have been cooked in a variety of combinations with wild and cultivated plants. The FTIR signatures indicate these vessels were cooking pots used to cook a variety of meat and plant products.

As a whole, the FTIR record for the ceramic rimsherds does not indicate a significant temporal change in the utilization of local and non-local foods. The majority of the foods prepared in the vessels appear to be collected locally, and remain relatively consistent throughout the different occupation levels at the site. Beans and maize, again, are the only potentially non-local foods contained regularly in the vessels. The frequency of the matches with beans suggests they were a regular part of the diet, while recovery of maize pollen in sample 10192 and maize phytoliths in sample 22158 indicate that maize was cooked in at least two of the vessels. Each sample's signature displayed multiple peaks in the protein portion of the spectrum with several of these peaks representing the presence of the amino acid alanine. Alanine, along with protein, is present in legumes, as well as meat, fish, nuts, and seeds; these are the foods matched with the signatures representing the sherds.

Interestingly, sample 15166 representing the sherd from Level 3A, did not match with beans, but rather with tobacco. The presence of tobacco could suggest trade was occurring with groups in southern Canada or slightly further south where tobacco is more easily grown. The trade of tobacco would demonstrate the greater expanse of the trade network. The absence of beans and the presence of tobacco in the ceramics during this period could suggest a shift in trade partners, perhaps due to hostilities between groups, or seasonal changes. However, tobacco, like beans, is a storable commodity, which means that it could have been utilized at leisure and placed in the vessel at any time. Alternatively, it is possible that the match with tobacco is also appropriate for other plants in the nightshade family.

The question of tobacco use, or perhaps use of another member of the nightshade family, remains and should be considered in future analyses. Unfortunately, only a single sherd from each occupation level was submitted for analysis, and these few samples should not be used to generalize ceramic use during each period. It is strongly suggested that multiple sherds from each level be analyzed to determine if these signatures are typical for the population of ceramics from these levels.

Protein residue analysis of a biface tool recovered from Level 2, Unit B18 yielded a positive to sheep antiserum, indicating that a bighorn sheep was killed, or that bighorn sheep remains were processed with this tool. Bighorn sheep were once much more abundance in Alberta than they are today.

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM SITE DlLg-33, WINNIPEG, MANITOBA, CANADA

Sample No.	Level	Unit	Provenience/Description	Analysis
DlLg-33:08A/10192	1	E17	Ceramic rimsherd	Pollen/Starch Phytolith FTIR
DlLg-33:08A/16135	2	B18	Biface tool	Protein
DlLg-33:08A/22158		G22	Ceramic rimsherd	Pollen/Starch Phytolith FTIR
DlLg-33:08A/13675	2B	G5	Ceramic rimsherd	Pollen/Starch Phytolith FTIR
DlLg-33:08A/13291	3	K11	Ceramic rimsherd	Pollen/Starch Phytolith FTIR
DlLg-33:08A/15166	3A	A2	Ceramic rimsherd	Pollen/Starch Phytolith FTIR

TABLE 2
FTIR PEAK SUMMARY TABLE FOR SAMPLES FROM SITE DlLg-33, WINNIPEG, MANITOBA, CANADA

Peak Range	Represents	DlLg-33:08A/10192 Ceramic	DlLg-33:08A/22158 Ceramic	DlLg-33:08A/13675 Ceramic	DlLg-33:08A/13291 Ceramic	DlLg-33:08A/15166 Ceramic
3600-3200	Absorbed Water	3574 3556 3548 3367 3341 3295 3269	3351	3576 3303 3290	3358	3339 3322 3285
3371, 3342, 3334	O-H Stretch	3341				
3089, 3088, 3085, 3084, 3068, 3064, 3063, 3062, 3041, 3031, 3029, 3027	Aromatic C-H stretch				3028 3026	
3000-2800	Aldehydes: fats, oils, lipids, waxes	2980 2956 2916 2917 2871 2849	2986 2954 2917 2848	2921 2918 2850	2954 2916 2849	2981 2971 2916 2849
2974, 2968, 2965, 2962, 2956, 2872	CH3 Asymmetric stretch	2956				
2959, 2938, 2936, 2934, 2931, 2930, 2926, 2924, 2922	CH2 Asymmetric stretch			2921		
2879, 2875, 2873, 2871, 2870	CH3 Symmetric stretch	2871				

TABLE 2 (Continued)

Peak Range	Represents	DILg-33:08A/ 10192 Ceramic	DILg-33:08A/ 22158 Ceramic	DILg-33:08A/ 13675 Ceramic	DILg-33:08A/ 13291 Ceramic	DILg-33:08A/ 15166 Ceramic
1750-1730	Saturated esters				1739 1736	1733
1730-1705	Aromatic esters	1705	1709 1706 1702		1707 1705 1703	1705
1700-1500	Protein, incl. 1650 protein	1654 1641 1577 1573 1559 1541 1536 1516 1507	1692 1678 1665 1658 1649 1640 1630 1619 1587 1572 1565 1551 1543 1535 1529 1515 1503	1658 1641 1631 1580 1575 1547 1540 1537 1514 1503	1655 1637 1631 1608 1578 1560 1552 1541 1536 1508	1684 1669 1653 1647 1635 1616 1575 1559 1539 1508
1680-1600, 1260, 955	Pectin	1654 1641	1692 1678 1665 1658 1649 1640 1630 1619	1658 1641 1631	1655 1637 1631 1608	1684 1669 1653 1647 1635 1616
1660-1655	Proteins, Nucleic acids		1658	1658	1655	
1652 1643	Alkene C=C					1653
1620	Calcium oxalate		1619			
1500-1400	Protein	1466 1464 1432 1426 1412	1464 1433 1426 1413	1479 1467 1427 1416	1464 1436 1432 1420 1412	1497 1471 1464 1435 1418

TABLE 2 (Continued)

Peak Range	Represents	DILg-33:08A/ 10192 Ceramic	DILg-33:08A/ 22158 Ceramic	DILg-33:08A/ 13675 Ceramic	DILg-33:08A/ 13291 Ceramic	DILg-33:08A/ 15166 Ceramic
1497, 1494, 1488	Aromatic ring mode					1497
1465-1455	Protein/lipids	1464	1464		1464	1464
1465	Alanine (amino acid) CH_2 bending	1466 1464	1464		1464	1464
1490-1350	Protein	1466 1464 1432 1426 1412 1379 1351	1464 1433 1426 1413 1377 1366	1479 1467 1427 1416 1365	1464 1436 1432 1420 1412 1377	1497 1471 1464 1435 1418 1381 1378
1394, 1379, 1366	Split CH3 umbrella mode, 1:2 intensity	1379	1366			1378
1377	Fats, oils, lipids, humates		1377		1377	1378
1188	Saturated ester C-C-O		1187		1188	
1170-1150, 1050, 1030	Cellulose	1163 1162			1165	1161
1161, 1151	Arabinoglucuronoxylan + Galactoglucomannan					1161
1130-1100	Aromatic esters		1111 1107 1100		1112	
1110	Starch		1111			
1100	Pectin		1100			
1100-1030	Saturated esters		1037 1032		1099 1036 1034	
1028-1000	Cellulose Carbohydrates	1020 1004	1016	1009 1005	1019	1009 1007
1043, 985	Arabinogalactan		985			
1034, 960	Galactoglucomannan		961		1034	
1034	+Glucomannan (9:1, w/w), Glucomannan				1034	

TABLE 2 (Continued)

Peak Range	Represents	DILg-33:08A/ 10192 Ceramic	DILg-33:08A/ 22158 Ceramic	DILg-33:08A/ 13675 Ceramic	DILg-33:08A/ 13291 Ceramic	DILg-33:08A/ 15166 Ceramic
1019	Primary alcohol CH_2-O stretch	1020			1019	
969	C-C-C Stretch					969
934	Galactoglucomannan		935			
931	Starch				932	
930	Cellulose		930			
916, 908	β-D-cellulose					916
916	Arabinogalactan (Type II), Glucan					916
830	Symmetric C-C-O stretch	830				829
780	Calcium oxalate				780	
750-700	Aromatic esters	727 726	729 727 721	728 720	727 721 720	722 721
763, 760, 745, 737, 736	Aromatic out-of-plane C-H bend		763			
719-22	CH_2 Rock (methylene)		721	720	721 720	722 721
692	Aromatic ring bend (phenyl ether)			693	691	693

TABLE 3
MATCHES SUMMARY TABLE FOR FTIR RESULTS FROM SITE DlLg-33, WINNIPEG, MANITOBA, CANADA

Match (Scientific Name)	Match (Common Name)	Part	DlLg-33: 08A/10192 Ceramic (Range)	DlLg-33: 08A/22158 Ceramic (Range)	DlLg-33: 08A/13675 Ceramic (Range)	DlLg-33: 08A/13291 Ceramic (Range)	DlLg-33: 08A/15166 Ceramic (Range)
CULTURAL							
Allium	Wild onion	Bulb (cooked)	1246-1074 1197-1103 1086-935 817-731		3000-2800 1491-1389 1249-816 824-738 706-670	1140-1042 1066-927 829-743	1217-1066 1078-948 817-739 711-667
Atriplex	Saltbush	Fruit	3000-2800 1197-894			1058-952	1495-1442
Cleome	Beeweed	Seed pod		1744-1675 993-894		1769-1650	
Helianthus	Sunflower family	Leaves (cooked)	1246-1074 1086-935	3000-2800 1671-1483 1477-1385 1385-1250 1074-952	3000-2800 1491-1389 1385-1254 1152-1046 1074-939		3000-2800 1495-1385 1393-1250 1148-1050 1078-948 817-735
		Seed Nutmeat	1495-1438 927-845 756-702			1769-1650 1487-1438 1389-1324 743-706	
		Seed Shell		3000-2800 1475-1442 747-706		3000-2800 1507-1446 1446-1393 1213-1197	
Nicotiana	Tobacco	Leaves (dried)					3000-2800 1409-1352
Phaseolus	Beans	Bean	1487-1438 940-841 743-711	3000-2800 1757-1667 1491-1450 1401-1336 1242-1144 997-890 747-706	3000-2800 1765-1675 1487-1385	1426-1393 1242-1217 747-711	
Pinus	Pine	Nutshell	3000-2800 1773-1638 1495-1438	3000-2800 1761-1654 1487-1446 1385-1332 993-894		3000-2800 1757-1650 1491-1446 1193-1152	

TABLE 3 (Continued)

Match (Scientific Name)	Match (Common Name)	Part	DILg-33: 08A/10192	DILg-33: 08A/22158	DILg-33: 08A/13675	DILg-33: 08A/13291	DILg-33: 08A/15166
Prunus	Chokecherry	Fruit	3000-2800 1495-1438				
Quercus	Acorn	Nutshell	3000-2800	1438-1393 1385-1250 1254-1152 1074-952 956-817			1393-1250 1250-1156
Rosa	Rose hips	Fruit				3000-2800 1187-1140	
Xanthium	Cocklebur	Seed (charred)			3000-2800 1597-1565 1556-1520 1491-1389 1385-1332 1258-1099		1491-1393 1552-1524 1597-1561
Antilocapra	Pronghorn	Blood	3000-2800	1477-1385 1254-1148 1148-1078	3000-2800		3000-2800 1495-1385 1250-1156
Aves	Bird	Blood			3000-2800 1491-1389 1258-1099		
Bison	Bison	Fat from long bone marrow	3000-2800 747-702				
Cervidae	Deer	Venison (cooked)		3000-2800 1487-1446 1131-1086		3000-2800	
Salvelinus	Fish	Meat (cooked)	1187-1070			1140-1042	1197-1090 1119-976 706-662
Sylvilagus	Rabbit	Meat			3000-2800		
ENVIRONMENTAL							
Deteriorate Cellulose	Deteriorated cellulose		1086-935 943-886		1249-816 1078-943 952-833	1103-935	1078-948
Humates	Humates		3000-2800	3000-2800	3000-2800		
Rhus	Skunkbush	Bark		1499-1446 1230-1144 743-698			

TABLE 4
LIST OF ANTISERA USED IN TESTING THE BIFACE TOOL FROM SITE DILg- 33, WINNIPEG, MANITOBA, CANADA

ANTISERUM	SOURCE	POSSIBLE RESULTS
Bear	ICN Pharmaceuticals, Inc.	Black bear, Brown bear, Grizzly, Polar bear
Bison	Prepared under the direction of Dr. Richard Marlar at the University of Colorado Health Sciences Center	Bison, Domestic bovids
Bovine	Sigma Chemical Company	Domestic bovids, Bison
Cat	Sigma Chemical Company	Domestic cat, Mountain lion, Bobcat, Lynx, other wild cat species
Chicken	Sigma Chemical Company	Domestic chicken, Partridge, Quail, Grouse, Ptarmigan, Pheasant
Deer	ICN Pharmaceuticals, Inc.	White tail deer, Mule deer, Elk, Moose, Caribou
Dog	Sigma Chemical Company	Domestic dog, Coyote, Wolf, Fox
Duck	Nordic Immunological Laboratories	Duck, Goose, Pigeon, Domestic turkey, Wild turkey
Goat	Sigma Chemical Company	Pronghorn, Mountain goat, Domestic goat
Guinea pig	Sigma Chemical Company	Guinea pig, Porcupine, Beaver, Squirrel family (Squirrel, Marmot, Ground squirrel, Chipmunk, etc.)
Human	ICN Pharmaceuticals, Inc.	Human
Mouse	Sigma Chemical Company	Members of the rats and mice family
Rabbit	Sigma Chemical Company	Rabbit, Jackrabbit (hare)
Rat	Sigma Chemical Company	Members of the rats and mice family
Sheep	ICN Pharmaceuticals, Inc.	Domestic sheep, Bighorn sheep
Turkey	Sigma Chemical Company	Domestic turkey, Wild turkey, Ducks
American Eel	Robert Sargeant	American eel
Catfish	Sigma Chemical Company	Catfish, Carp
Gizzard Shad	Robert Sargeant	Gizzard shad
Sturgeon	Robert Sargeant	Acipenseridae family (Sturgeons)

TABLE 4 (Continued)

ANTISERUM	SOURCE	POSSIBLE RESULTS
American Eel	Robert Sargeant	American eel
Catfish	Sigma Chemical Company	Catfish, Carp
Gizzard Shad	Robert Sargeant	Gizzard shad
Sturgeon	Robert Sargeant	Acipenseridae family (Sturgeons)
Striped bass	Robert Sargeant	Perciformes order (Spiny-rayed/percoid fish)
Trout	Sigma Chemical Company	Salmonidae family (Trout and salmon)

TABLE 5
POSITIVE PROTEIN RESIDUE RESULTS FOR SAMPLES FROM SITE DlLg-33,
WINNIPEG, MANITOBA, CANADA

Sample No.	Description	Positive Result (Antiserum Type)	Possible Animal Represented
16135	Biface tool	Sheep	Bighorn Sheep (*Ovis canadensis*)

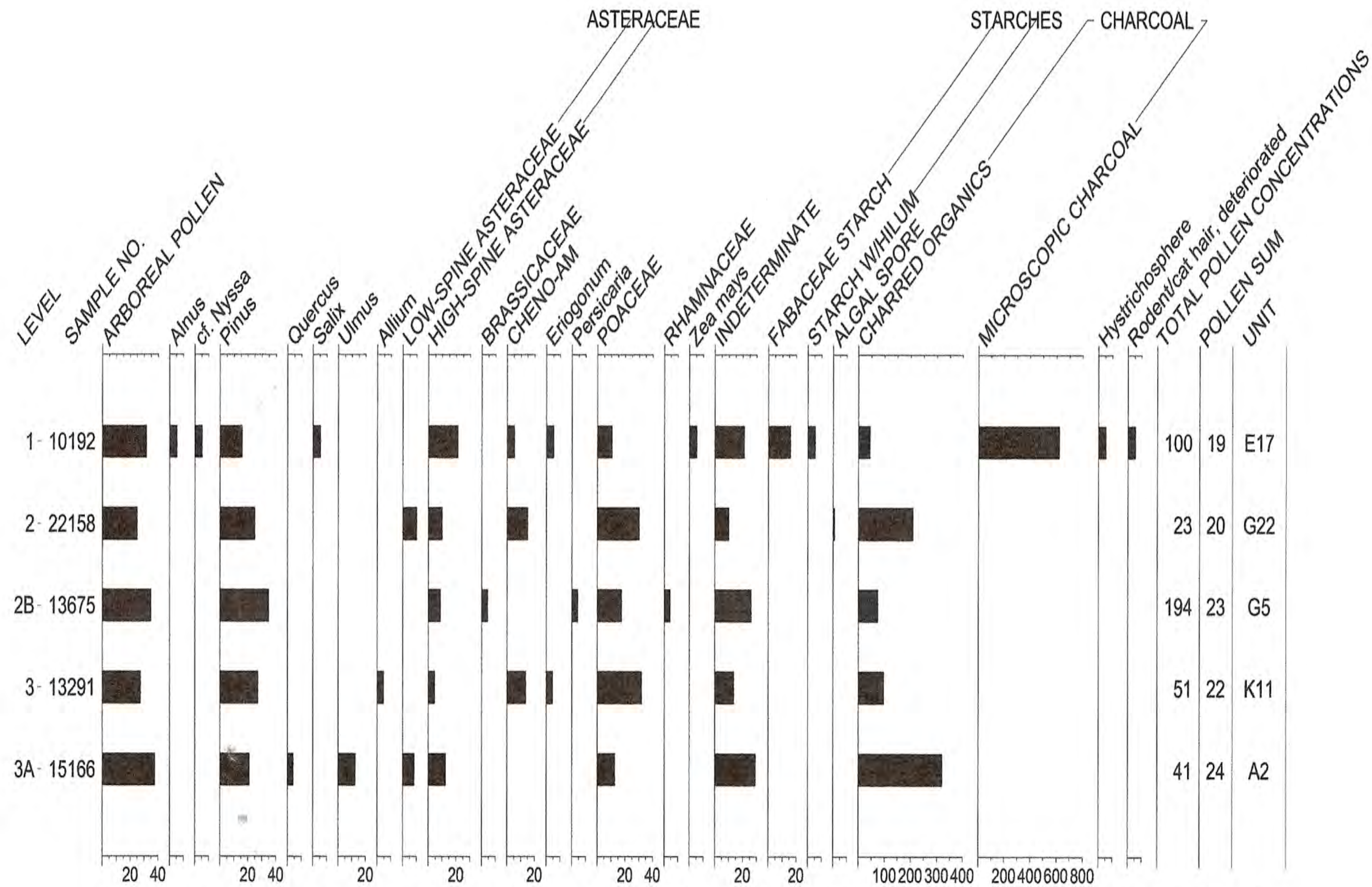

FIGURE 1. POLLEN DIAGRAM FOR CERAMIC RESIDUES, SITE DLLG 33, WINNIPEG, CANADA.

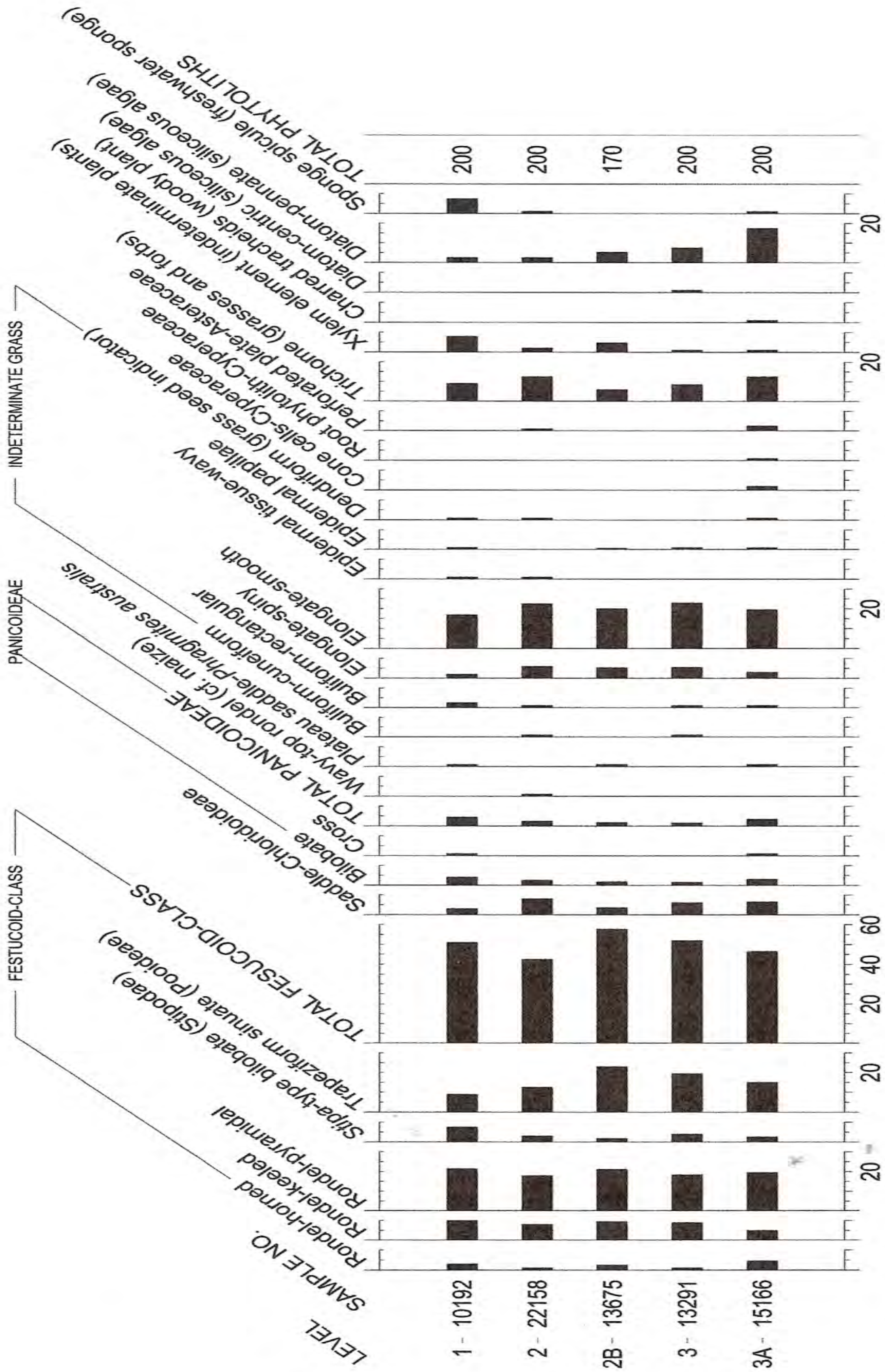

FIGURE 2. PHYTOLITH DIAGRAM FOR CERMAIC RESIDUE FROM SITE DLLG 33, WINNIPEG, CANADA.

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APPENDIX C

Residue Analysis Report from
Paleo Research Institute

Samples Submitted by
Parks Canada

CERAMIC, PROTEIN, X-RAY DIFFRACTION (XRD), AND ORGANIC RESIDUE (FTIR) ANALYSIS OF SAMPLES FROM THE FORKS SITE (DlLg-33/08A), WINNIPEG, MANITOBA

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Parks Canada
Western and Northern Service Centre
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INTRODUCTION

Four ceramic rim sherds and a chitho from the Forks Site (DlLg-33/08A), a prehistoric riverine trade loci, located in downtown Winnipeg, Manitoba, Canada, were submitted for ceramic and organic residue analysis. In addition, a grinder/hammer stone, a biface, and a retouched flake were examined for protein residue. The grinder/hammer stone was also tested for organic residues, as was visible residue from a limestone ochre bowl. X-Ray Diffraction (XRD) will be used to verify the residue on the limestone bowl is ochre, and visual examination of the residues under the microscope will be used to assess if the materials are organic or mineral based. Ceramics were tested for organic residues using Fourier Transform Infrared Spectroscopy (FTIR). Ceramic and organic residue analyses on the ceramics will be used to provide information regarding the foods processed in the vessels and their origins, and perhaps, shed light on decorative influences, beyond style types.

METHODS

Ceramic and Stone Washes for Pollen and Starch

Residue from ceramics was processed to recover starch and pollen representing foods that were cooked in the vessels. In addition, the surface of the chitho also was washed in an effort to recover pollen and starch that might assist in interpreting the function of this tool.

Concentrations of pollen and starches from the artifact surfaces and residue may represent plants that were processed or cooked. If dirt was present, it was removed prior to sample collection.

Residue was scraped from the ceramics and chitho and prepared for extraction of pollen and starch. Each sample was then sieved through 250 micron mesh to eliminate any large particles that might have been released during the washing process. After centrifuging, the samples were dried under vacuum, then mixed with sodium polytungstate (density 1.8) and centrifuged to separate the pollen and starch, which will float, from the silica, which will not. The samples were treated with hydrofluoric (HF) acid to remove silica, then acetolated for 3-5 minutes to remove any extraneous organic matter. Samples were then rinsed several times with RODI water, then stained with basic fuschin. A light microscope was used to count pollen at a magnification of 500x. Pollen preservation in these samples varied from good to poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible. Pollen diagrams were produced using Tilia 2.0 and TGView 2.0.2. A plus (+) on the pollen diagram indicates that pollen was observed, in spite of the fact that pollen was not present in a sufficient concentration to obtain a full count. Total pollen concentrations were calculated in Tilia using the measurement of the ground/use surface washed in cm_2, the quantity of exotics (spores) added to the sample, the quantity of exotics counted, and the total pollen counted and expressed as pollen per cm_2 of use surface. Indeterminate pollen includes pollen grains that are folded, mutilated, and otherwise distorted beyond recognition. These grains are included in the total pollen count, as they are part of the pollen record. The estimated microscopic charcoal abundance is calculated by recording individual microscopic pieces of charcoal during a portion of the pollen count, then allowing the computer to extrapolate from those observations to the quantity of charcoal present in the total count. This number is presented on the pollen diagram.

Pollen analysis also includes identification of starch granules to general categories, if they were present. Starch granules are a plant's mechanism for storing carbohydrates. Starches are found in numerous seeds, as well as in starchy roots and tubers. The primary categories of starches include the following: with or without visible hila, hilum centric or eccentric, hila patterns (dot, cracked, elongated), and shape of starch (angular, ellipse, circular, eccentric). Some of these starch categories are typical of specific plants, while others are more common and tend to occur in many different types of plants.

Phytoliths

Extraction of phytoliths from ceramic sherd residue was based primarily on heavy liquid floatation, as treatment with oxidizing chemicals was kept to an absolute minimum to preserve starch grains and calcium carbonate microfossils that are likely to be extracted along with the phytolith fraction. First, a small amount of residue was flaked from each ceramic sherd, then a sonicating toothbrush was used to remove residue adhering to the sherd surface. Next, a 3% sodium hypochlorite (bleach) solution was used to destroy a portion of the organic fraction of each residue sample. Once this reaction was complete (a few days), each sample was rinsed thoroughly and centrifuged using short-duration spins (10 seconds at 3000 rpm) to remove clays. This step was repeated several times until no more clays remained in suspension. Next, a 5% solution of potassium hydroxide was added to each sample for 10 minutes to remove humates, and then thoroughly rinsed. Once most of the organic and clay fraction was removed the silt and sand size fraction was dried under vacuum. The dried silts and sands were then mixed with potassium cadmium iodide (density 2.3 g/ml) and centrifuged to separate the phytoliths, which will float, from most of the inorganic silica fraction, which will not. After several water rinses and then a final alcohol rinse, the samples were mounted in optical immersion oil for counting with a light microscope at a magnification of 500x. A phytolith diagram was produced using Tilia 2.0 and TGView 2.0.2.

Protein Residue

Artifacts submitted for protein residue analysis were tested using an immunologically-based technique referred to as cross-over immunoelectrophoresis (CIEP). This method is based on an antigen-antibody reaction, where a known antibody (immunoglobulin) is used to detect an unknown antigen (Bog-Hansen 1990). Antigens are usually proteins or polysaccharides. The method for CIEP is based on forensic work by Culliford (1964; 1971) with changes made by Newman (1989) following the procedure used by the Royal Canadian Mounted Police Serology Laboratory in Ottawa, and the Centre of Forensic Sciences in Toronto. Further changes were made at the PaleoResearch Institute following the advice of Dr. Richard Marlar of the Thrombosis Research Laboratory at the Denver VA Medical Center and the University of Colorado Health Sciences Center. Although several different protein detection methods have been employed in archaeological analyses, including enzyme-linked immunosorbant assay (ELISA) and radioimmune assay (RIA), the CIEP test has been found to be extremely sensitive, with the detection of 10 to -8 g of protein possible Culliford (1964:1092). The specificity of CIEP is further strengthened by testing unknowns against non-immunized animal serum and the use of soil controls to eliminate the possibility of false positives due to non-specific protein interactions.

Ancient protein residues are preserved and have been detected on stone tools of considerable age using CIEP (Gerlach, et al. 1996; Hogberg, et al. 2009; Kooyman, et al. 2001; Seeman, et al. 2008; Yost and Cummings 2008). In one of the largest samples of reactive protein residues from an archaeological site, Gerlach (1996) report a total of 45 positive reactions obtained on 40 of the 130 stone tools tested from an early North American Paleoindian site (ca. 11,200-10,800 years BP).

In an archaeological context, an antigen is the unknown protein adhering to an artifact after its use. Ancient proteins undoubtedly break down into small fragments over time; however, antibodies can recognize small regions of antigens (Marlar, et al. 1995). Studies by Loy (1983) and Gurfinkel and Franklin (1988) suggest that hemoglobin and other proteins bind to soil and clay particles through electrostatic interactions, and these interactions protect the proteins from microbial attack and removal by groundwater. Sensabaugh (1971) reported that dried blood proteins "covalently cross-linked to form a single proteinaceous mass with a high molecular weight, resulting in decreased solubility." Hyland (1990:105) suggest that protein molecules may be conjoined with fatty tissues, resulting in an insoluble complex that is secure against dissolution by water. These studies may explain, in part, mechanisms for prolonged protein preservation and adherence to stone surfaces; however, they also illustrate the challenges of recovery from artifact surfaces.

Artifacts were washed using 1-2ml of a 0.02M Tris hydrochloride, 0.5M sodium chloride, and 0.5% Triton X-100 solution. Artifacts were placed in an ultrasonic bath for 30 minutes, on a rotating mixer for 30 minutes, then in the ultrasonic bath for an additional 30 minutes. Because soils contain compounds such as bacteria and animal feces that can cause false positive results for artifacts buried in the soil, control samples also are tested. However, no soil controls were submitted with these artifacts.

The residues extracted from the artifacts and the soil controls first were tested against pre-immune goat serum (serum from a non-immunized animal) to detect non-specific binding of proteins. Samples testing negative against pre-immune serum were then tested against prepared animal antisera obtained from ICN Pharmaceuticals, Inc. and Sigma Chemical Company, and against antisera raised under the direction of Robert Sargeant in Lompoc, California, and Dr. Richard Marlar. Appropriate positive and negative controls were run for each antisera. A positive control consists of the blood of an animal for which the antiserum is known to test positively, and a negative control consists of the serum/blood of the animal in which the antiserum was raised, either rabbit or goat.

CIEP is performed using agarose gel as the medium. Two holes were punched in the gel about 5 mm apart. The protein extract from each artifact was placed in the cathodic well and the antiserum was placed in the anodic well. The sample was electrophoresed in Barbital buffer (pH 8.6) for 45 minutes at a voltage of 130v to drive the antigens and antibodies towards each other. Any positive reaction will appear as a line of precipitation between the two wells. The gels were stained with coomassie blue to make the precipitate line easier to see. Samples with initial positive reactions were re-tested with dilute antisera, usually 1:10 or 1:20, to determine between true and false positives, increase specificity, and to replicate the initial positive reaction. Positive reactions obtained after this second test were then reported.

Identification of animals represented by positive results is usually made to the family level. All mammalian species have serum protein antigenic determinations in common; therefore, some cross reactions will occur between closely and sometimes distantly related animals (Gaensslen 1983:241). For example, bovine antiserum will react with bison blood, and deer antiserum will react with other members of the Cervidae (deer) family, such as elk and moose.

XRD and XRF

The XRD sample was collected by putting small quantities of isopropyl alcohol on the “bowl” portion of the artifact, scraping gently with a pointed, stainless steel probe, and suctioning off the resulting liquid plus particles that had been loosened. This was placed onto a glass disk that is designed specifically for use in the XRD diffractometer. The sample was scanned with the diffractometer over the range, 3-61° 2Θ using Cu-Kα radiation. The results of the scan are summarized as approximate relative mineral weight percent concentrations in the text (below). Mineral weight percent concentrations were estimated using the relative peak areas/heights on the XRD scan. This sample may contain “amorphous” (noncrystalline) material, but any amorphous material in the sample cannot be distinguished from the amorphous (glass) substrate upon which the sample is thinly smeared. Amorphous material appears only as a broad elevation in the background of the XRD scan, so its composition cannot be determined. Therefore, mineral (crystalline phase) concentrations in this sample should be considered to be relative weight percent concentrations. The detection limit for an average mineral in this sample is ~1-3% and the analytical reproducibility is approximately equal to the square root of the amount. “Unidentified” accounts for that portion of the XRD scan that could not be resolved.

The XRF sample was collected with a ThermoFisher Niton Gold handheld unit, using standard protocol. Since there is no pre-treatment or collection protocol, the results are discussed below.

FTIR (Fourier Transform Infrared Spectroscopy)

A mixture of chloroform and methanol was used as a solvent to remove lipids and other organic substances that had soaked into the visible residues and the surfaces of the ceramic and stone. This mixture is represented in the FTIR graphics as CHM. The CHM solvent and sample were placed in a glass container, and allowed to sit, covered, for several hours. After this period of time, the solvent was pipetted into an aluminum evaporation dish, where the CHM was allowed to evaporate. This process leaves the residue of any absorbed chemicals in the aluminum dishes. The residue remaining in the aluminum dishes was then placed on the FTIR crystal and the spectra were collected. The aluminum dishes were tilted during the process of evaporation to separate the lighter from the heavier fraction of the residue. The lighter and heavier fractions are designated Upper (lighter fraction) and Lower (heavier fraction) respectively in the subsequent analysis.

FTIR is performed using a Nicolet 6700 optical bench with an ATR and a diamond crystal. The sample is placed in the path of a specially encoded infrared beam. The infrared beam passes through the sample and produces a signal called an “inferogram.” The inferogram contains information about the frequencies of infrared that are absorbed and the strength of the absorptions, which is determined by the sample’s chemical make-up. A computer reads the inferogram and uses Fourier transformation to decode the intensity information for each frequency (wave numbers) and presents a spectrum.

FTIR (FOURIER TRANSFORM INFRARED SPECTROSCOPY) REVIEW

Infrared spectroscopy (IR) is the study of how molecules absorb infrared radiation and ultimately convert it to heat, revealing how the infrared energy is absorbed, as well as the structure of specific organic molecules. Infrared spectroscopy has been experiencing a renaissance for identifying organic substances during the past few decades. It is currently considered one of the more powerful tools in organic and analytical chemistry. One of the primary advantages to the FTIR is that it measures all wave lengths simultaneously. It has a relatively high signal-to-noise ratio and a short measurement time. Each peak in the spectrum represents either a chemical bond or a functional group.

Since molecular structures absorb the vibrational frequencies or wavelengths of infrared radiation, the bands of absorbance can then be used to identify the composition of the materials under study. In the case of the current research, the portion of the electromagnetic spectrum between 4000-400 wave numbers is used for identifying organic materials. Carbohydrates, lipids, proteins and other organic molecules are associated with specific wave number bands (Isaksson 1999:36-39).

The infrared spectrum can be divided into two regions--the functional group region and the fingerprint region. These two groups are recognized by the effect that infrared radiation has on the respective molecules of these groups. The functional group region is located between 4000 and approximately 1500 wave numbers. The molecular bonds display specific characteristic vibrations that identify fats, lipids, waxes, lignins, proteins, carbohydrates, etc. The fingerprint region, located below 1500 wave numbers, is influenced by bending motions, which further identify the molecules.

Using the FTIR, it is possible to identify different types of organic compounds and eventually recognize different types of materials such as plant or animal fats or lipids, plant waxes, esters, proteins, carbohydrates, and more. Specific regions of the spectrum are important in identifying these compounds.

The results of the identification of specific wavelengths can be compared with commercial or laboratory-created analytical standards to identify the specific types of bonds present in different materials. By combining the results of the analysis of individual samples with all of the reference materials in the PaleoResearch Institute (PRI) library, the % match with individual reference items can be displayed. For instance, plant lipids or fats are identifiable between 3000-2800 wave numbers. A match might be obtained on this portion of the spectrum with nuts such as hickory, walnut, or acorn or with animal fats or corn oil. Recovery of high level matches with several types of nuts (in this example) indicates that nuts were processed. If the match with the PRI library is for meat fats, then the signature is more consistent with that produced by meat than plant parts such as nuts.

Samples containing many compounds are more difficult to identify – and many archaeological samples are complex mixtures. Multi-purpose artifacts, such as groundstone, which could have been used to crush or grind a variety of foodstuffs, or ceramic cooking vessels, which are expected to have been used to cook many different foods, might present a mixture problem. Mixtures sometimes have many absorption bands that overlap, yielding only broad envelopes of absorption and few distinctive features. FTIR analysis is expected to be particularly valuable in examining fire-cracked rock (FCR), for which few other means of analysis exist, since the fats, lipids, waxes, and other organic molecules contained in liquids that seep out of the food being processed become deposited on the rocks during the baking process. Once again, these rocks might have been present in more than one cooking episode, thus having the potential to yield a complex signature. The PRI extraction method gently removes these organic molecules from the groundstone, ceramics, and/or rocks so that they can be measured with the FTIR and subsequently identified. Organic molecules from sediments can be extracted and the sediments then characterized. This has the potential to be very useful in identifying signatures of the remains responsible for a dark horizon. For instance, if the dark horizons are the result of decaying organic matter (plant or animal), the FTIR will yield a signature of decaying organic remains. If the dark horizons are the result of blowing ash from cultural features, the FTIR signature will be considerably different. This is an affordable technique for making distinctions between horizons and identifying cultural horizons.

Carbohydrates

Carbohydrates are a product of photosynthesis in green plants. This group of compounds is the most abundant found on earth. Carbohydrates is a term that encompasses three main groups of compounds: 1) sugars, 2) starches, and 3) fibers. To elaborate, sugars include the simple carbohydrates found in table sugar, honey, natural fruit sugars, and molasses. Starches and complex carbohydrates are present in legumes, grains, vegetables, and fruits. Fibers, including cellulose, hemicellulose, and pectin, are present in whole grains, legumes, vegetables, and fruits (Garrison and Somer 1985:13). Dietary carbohydrates provide energy for bodily functions, including our ability to digest and absorb other foods. They are the body's preferred source of energy, although proteins and lipids also may be converted to energy. Carbohydrates are so important that an inadequate intake may result in nutritional deficiencies such as ketosis, energy loss, depression, and even loss of essential body protein. On the other hand, excess intake of carbohydrates causes obesity and dental decay.

To understand carbohydrates and their detection with the FTIR it is important to know that they are formed of carbon atoms coupled to "hyrates," such as water, resulting in empirical formulas of $C_nH_{2n}O_n$ where "n" represents the number of atoms for C, H, and O, respectively. "Biochemically, carbohydrates are polyhydroxy alcohols with aldehyde or ketone groups that are potentially active" (Garrison and Somer 1985:13). Since carbohydrates are classified according to their structure and the FTIR detects the bonds between molecules, we will review the simple sugars (monosaccharides), multiple sugars (oligosaccharides), and complex molecules (polysaccharides) that are made up of simple sugars.

Polysaccharides

These complex starchy compounds follow the empirical formula: $C_6H_{10}O_5$. They are not sweet, do not crystallize, and are not water soluble. Simply defined, polysaccharides are complex carbohydrates found in plants as starch and cellulose, and in animals as glycogen. Because the FTIR detects the bonds between atoms in molecules, it is important to know that polysaccharides are formed of repeating units of mono- or disaccharides that are joined together by glycosidic bonds. Polysaccharides are often heterogeneous. The slight modifications of the repeating unit results in slightly different wave number signatures on the FTIR. Types of polysaccharides are descriptive and include storage (starches and glycogen), structural (cellulose and chitin), acidic (containing carboxyl groups, phosphate groups, and/or sulfuric ester groups), neutral (presumably without the acid features), bacterial (macromolecules that include peptidoglycan, lipipolysaccharides, capsules and exopolysaccharides), and more. The study of polysaccharides is an ever growing field and industry, since polysaccharides are important to proper immune function, bowel health, and a host of other factors that are important in human health. At present there is no comprehensive study of which plants and animal parts contain which polysaccharides. Research into this field is currently growing at a rapid pace. Some highlights for the purpose of our discussions are presented below.

Storage Polysaccharides

Storage polysaccharides are digestible polysaccharides. Starch and glycogen are the two primary groups of these polysaccharides (Wardlaw 1996:80-81).

Starch

Starch is the primary digestible polysaccharide in the human diet, and the most important carbohydrate food source (Murray, et al. 2000:155; Wardlaw 1996:80). Starch is composed of long chains of glucose units. “Cooking increases the digestibility of...starches...making them more soluble in water and thus more available for attack by digestive enzymes” (Wardlaw 1996:80). Amorphous starch granules encased in cell walls burst free when cooked because the granules absorb water and expand. The two primary constituents of starch are amylose and amylopectin, both of which are a source of energy for plants and animals (Murray, et al. 2000:155; Wardlaw 1996:80). When the glucose chains are long and straight, the starch is labeled amylose. If the chains are short and branched, they are amylopectin. Shorter chains of glucose (dextrin) are the intermediate product of the hydrolysis of starch. Glucan, which is often found in association with pectin, resides in the cell walls of plants and trees and many forms of bacteria and fungi (Stephen 2006). Most people are familiar with beta glucans, which are a diverse group of molecules that occur commonly in the cellulose of plants, bran of cereals, cell walls of baker’s yeast, and certain fungi, mushrooms, and bacteria. Some beta glucans may be useful as texturing agents and soluble fiber supplements. Beta glucans derived from yeast and medicinal mushrooms have been used for their ability to modulate the immune system.

Structural Polysaccharides

Structural polysaccharides, which are also known as dietary fiber, are indigestible by humans and other animals. Structural polysaccharides are primarily composed of cellulose, hemicellulose, pectin, gum, and mucilage (Wardlaw 1996:82). “The only noncarbohydrate components of dietary fiber are lignins, which are complex alcohol derivatives” (Wardlaw 1996:82). Lignins are complex alcohol derivatives that make up the non-carbohydrate components of insoluble plant fibers (Wardlaw 1996:82). As such, they cannot be digested by the enzymes animals produce (Carlile 1994). Lignin is found in all plants and is an important component of the secondary cell walls (Lebo, et al. 2001; Martone 2009; Wardlaw 1996:82). One of the important functions of lignin is to provide support through strengthening of the xylem cells of wood in trees (Arms 1995; Esau 1977; Wardrop 1969). In linking plant polysaccharides, lignin provides strength to the cell walls and by extension to the entire plant (Chabannes, et al. 2001). Cellulose and chitin also provide structural support to animals and plants. Therefore, they are not water soluble. Cellulose, hemicellulose, and pectin are all comprised of simple sugars, and their differences are defined by the various inclusions, exclusions, and combinations of these sugars, as well as how the sugars are bonded, and the molecular structure of the sugars of these polysaccharides.

Cellulose

Cellulose is comprised of a long linear chain of glucose, whereas hemicellulose consists of shorter branched chains of simple sugars in addition to glucose, including especially xylose, but also mannose, galactose, rhamnose, and arabinose (Crawford 1981; Updegraff 1969). Pectin, however, may be found in either a linear or branched form of simple sugars that is primarily composed of rhamnose.

Galactoglucomannan

Galactoglucomannan is a primary component of the woody tissue of coniferous plants (Gymnosperms) (Bochicchio and Reicher 2003).

Glucomannan

Glucomannan, which may be very concentrated in some roots or corms and in the wood of conifers and dicotyledons (dicots), is a soluble fiber used to treat constipation by decreasing fecal transit time (Bochicchio and Reicher 2003; Marzio 1989).

Glucuronoxylan

Glucuronoxylans, often abbreviated GX, "are one of the major hemicellulosic components found within the secondary cell walls of hardwoods" (Awano 2000:72). They have also been isolated from fruits and seeds, and found in various dicotyls including ground nutshells, sunflower hulls, and coneflower (*Rudbeckia*) (Ebringerova, et al. 2005:8).

Xyloglucan

Xyloglucan is the most abundant hemicellulose in the cell walls of most dicotyledonous plants, and all vascular plants (Fry 1989).

> The primary cell wall of [these plants] is composed of cellulose microfibrils embedded in a matrix of hemicellulosic and pectic polysaccharides, of which the hemicellulose xyloglucan is a major component. Xyloglucan and cellulose together make up about two-thirds of the dry weight of primary cell walls and are the major tension-bearing components of the matrix. During cell expansion and elongation, the cell wall continually undergoes temporary loosening followed by rapid reinforcement of wall structure. Xyloglucan endotransglycosylases (XETs) are unique enzymes in plants that are capable of modulating the chemistry of the matrix and therefore performing both of these functions (Eckardt 2004:792).

It is through this process that plant cell wall growth and repair occurs (Moore 1988).

Pectin, Gums, and Mucilages

Pectin, gums, and mucilages are soluble fibers found inside and around plant cells that help "glue" them together (Wardlaw 1996:82). Pectin is a structural heteropolysaccharide and common substance found in many plants (apples, plums, gooseberries, and citrus) often used for its gelling or thickening action. Plant derived gums and mucilages such as gum arabic, guar gum, and locus bean gum are also used for this same purpose. Arabinan, arabinogalactan, arabinoglucuronoxylan, and rhamnogalacturonan are some examples of these types of polysaccharides (Wilkie 1985).

Arabinan

In plants, arabinan is essential for the function of guard cells which "play a key role in the ability of plants to survive on dry land, because their movements regulate the exchange of gases and water vapor between the external environment and the interior of the plant" (Jones, et al. 2003:11783).

Arabinogalactan

Arabinogalactan is a sugar found in plant carbohydrate structures, particularly gums and hemicelluloses. One of arabinogalactan's many functions is to bond with proteins to repair damage when it occurs to a plant or its parts (Nothnagel 2000).

Arabinoglucuronoxylan

Arabinoglucuronoxylan is found in the cell walls of softwoods and herbaceous plants (Sjostrom 1981).

Rhamnogalacturonan

Rhamnogalacturonans are specific pectic polysaccharides that reside in the cell walls of all land plants, and result from the degradation of pectin (Willats, et al. 2001). They are visible by the presence of peaks at 1150, 1122, 1070, 1043, 989, 951, 916, 902, 846, and 823 wave numbers.

Neutral Polysaccharides

These polysaccharides lack carboxyl groups, phosphate groups, and/or sulfuric ester groups. Examples of neutral polysaccharides cross other category boundaries of polysaccharides and include chitin, chitosan, curdlan, dextran, glucan, inulin, arabinogalactan, arabinogalactorhamnoglycan, and other compounds that often either are contained within individual plants or are the result of fermentation.

Arabinogalactorhamnoglycan

Arabinogalactorhamnoglycan is a specific polysaccharide, or complex carbohydrate, known as a neutral polysaccharide that is found in plant cell walls (Capek, et al. 1999; Kacurakova, et al. 2000). It exhibits peaks at 1049, 914, 837, and 810 wave numbers.

Esters

Esters are an important functional group because they are present as flavoring agents in food and are components of biological compounds such as fats, oils, and lipids. In an ester, the basic unit of the molecule is known as a carbonyl. The presence of the double peak between 3000 and 2800 wave numbers identifies the presence of the aldehyde functional group, which is present in fats, oils, lipids, and waxes.

There are two important groups of esters, saturated esters and aromatic esters. Aromatic esters take their name from their ability to produce distinctive odors and are present as flavoring agents in food. In contrast, saturated esters do not produce distinctive odors. Esters are expressed in the FTIR spectrum by three distinct peaks ("the rule of three") located at approximately 1700, 1200, and 1100 wave numbers, and a fourth peak in the region between 750 and 700 wave numbers, which represents the CH_2 bend associated with aromatic esters. The first peak for saturated esters falls in the 1750-1735 range, the second peak lies between 1210 and 1160, and the third peak sits between 1100 and 1030. Saturated esters have a unique peak to acetates at 1240. This band can be very strong in the signature. The first peak for aromatic esters falls in the range between 1730 and 1715, the second peak between 1310 and 1250, and the third peak between 1130 and 1100 (Smith 1999:110-112). Distinguishing between saturated and aromatic esters, which are both components of foods, is easy if all three bands are present, since they occupy different wave number regions.

Lipids

Lipids that are solid at room temperature are called “fats,” and those that are liquid at room temperature are referred to as “oils” (Wardlaw 1996:108). Both forms of lipids can be detrimental, as well as beneficial, to human health. Consumption of certain animal fats rich in saturated fatty acids can lead to heart disease, while ingesting omega-3 fatty acids such as EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) found in fish and other plant sources are essential to good health.

Fatty Acids

Fatty acids are found in most lipids in the human and animal body, as well as in the lipids in foods (Wardlaw 1996:108). Long chains of carbons bonded together which are then bonded to hydrogens define the structure of fatty acids (Wardlaw 1996:109). A fatty acid is considered saturated if the carbons are connected by single bonds. Saturated fatty acids are high in animal fats. If the carbon chain has one double bond between two of the carbons then this fatty acid is called monounsaturated. If there are two or more double bonds between carbons than the fatty acid is polyunsaturated.

Essential Fatty Acids

Essential fatty acids, are those lipids critical to human health, such as omega-3 and omega-6 fatty acids, alpha-lineolic acid, and linoleic acid, that cannot be created within the body and must be obtained from dietary sources (Wardlaw 1996:110-111). These essential fatty acids are part of “vital body structures, perform vital roles in immune system function and vision, help form cell membranes, and produce hormone like compounds,” and are necessary to maintain good health (Wardlaw 1996:111). Diets high in essential fatty acids, like omega-3 and omega-6, reduce the risk of heart attacks because they minimize the tendency for blood to clot (Wardlaw 1996:112). Fish oils contain high concentrations of omega-3 and omega-6 fatty acids and may be administered as a dietary supplement.

Proteins

The human body uses protein from dietary plant and animal sources to form body structures and other constituents (Wardlaw 1996:152). “Proteins contribute to key body functions, including blood clotting, fluid balance, production of hormones and enzymes, vision, and cell growth and repair” (Wardlaw 1996:152). This constant regulation and maintenance of the body requires thousands of different types of proteins that are not all available within the body (Wardlaw 1996:152). The majority of the building blocks for these proteins, which are also known as amino acids, are produced by plants.

Amino Acids

Within the body amino acids are linked to form the necessary proteins, making them not only essential for life, but key to nutrition. Amino acids can be combined in a multitude of ways to create a vast variety of proteins. Differences between these proteins are distinguished by the unique arrangements of amino acids. Proteins are created through a process called translation, in which amino acids are added, one-by-one, to form short polymer chains called peptides, or longer chains called polypeptides or proteins (Rodnina 2007). The order in which the amino acids are added is determined by the genetic code of the mRNA template, which is a copy of an organism's genes (Creighton 1993). Amino acids are divided into standard and non-standard types.

Standard Amino Acids

There are twenty naturally occurring amino acids on earth called standard amino acids (Creighton 1993). These amino acids are encoded by the standard genetic code and are found in all forms of life (Creighton 1993). The standard amino acids are broken down into two different types, essential and nonessential.

Essential Amino Acids

Eight of the standard amino acids are considered "essential amino acids" because they are necessary for normal human growth and cannot be synthesized by the human body (Young 1994). Essential amino acids must be obtained from food sources, and include histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine (Furst and Stehle 2004; Reeds 2000; Wardlaw 1996:154).

Valine

Valine plays a role in muscle metabolism, repair and growth of tissue, and maintaining nitrogen balance in the body (Nelson and Cox 2005). It also preserves the use of glucose by providing an energy source for muscles. Nutritional sources of valine include fish, poultry, and some legumes.

Nonessential Amino Acids

The majority of the standard amino acids are considered "nonessential," meaning that under normal circumstances these amino acids can be manufactured by the human body and are not required in the diet. However, some amino acids that are normally nonessential may become an essential part of the diet for a person whose health has been compromised (Wardlaw 1996:155). Nonessential amino acids include alanine, arginine, asparagine, aspartate (aspartic acid), cysteine, glutamate (glutamic acid), glutamine, glycine, proline, serine, and tyrosine (Furst and Stehle 2004; Reeds 2000)(Wardlaw 1996:154).

Alanine

Alanine plays an important role in the glucose-alanine cycle between tissues and liver (Nelson and Cox 2005). Common sources of alanine in the diet include such diverse things as meat, eggs, fish, legumes, nuts and seeds, and maize.

Nucleic Acids

Millions of proteins exist in all living organisms to assist with the daily functions of these complex systems. Proteins are produced and assembled locally to exact specifications, and a large amount of information is necessary to properly manage the system. This information is stored in a set of molecules called nucleic acids. Nucleic acids not only contain the genetic instructions for the proper development and functioning of living organisms, but also play a role in copying genetic information to protein (Saenger 1984). The most common examples of nucleic acids are DNA (deoxyribonucleic acid) and RNA (ribonucleic acid).

ETHNOBOTANIC REVIEW

It is a commonly accepted practice in archaeological studies to reference ethnographically documented plant uses as indicators of possible or even probable plant uses in prehistoric times. The ethnobotanic literature provides evidence for the exploitation of numerous plants in historic times, both by broad categories and by specific example. Evidence for exploitation from numerous sources can suggest a widespread utilization and strengthens the possibility that the same or similar resources were used in prehistoric times. Ethnographic sources outside the study area have been consulted to permit a more exhaustive review of potential uses for each plant. Ethnographic sources document that with some plants, the historic use was developed and carried from the past. A plant with medicinal qualities very likely was discovered in prehistoric times and the usage persisted into historic times. There is, however, likely to have been a loss of knowledge concerning the utilization of plant resources as cultures moved from subsistence to agricultural economies and/or were introduced to European foods during the historic period. The ethnobotanic literature serves only as a guide indicating that the potential for utilization existed in prehistoric times--not as conclusive evidence that the resources were used. Pollen and macrofloral remains, when compared with the material culture (artifacts and features) recovered by the archaeologists, can become indicators of use. Plants represented by pollen, phytolith, starch, and organic residues will be discussed in the following paragraphs in order to provide an ethnobotanic background for discussing the remains.

Native Plants

Allium (Wild onion)

All species of *Allium* (wild onion) are noted to be edible, and the bulbs vary in degree of onion odor and flavor. Bulbs and leaves were eaten fresh, cooked, and as a seasoning. Bulbs were also dried for future use. These herbaceous plants have long, slender basal leaves also with an onion aroma. Wild onions are found in moist ground around ponds, streams, in meadows, and marshes (Moerman 1998:58, 56).

Asteraceae (Sunflower Family)

The Asteraceae (sunflower or aster family) is the largest family of dicots worldwide. Members of the Asteraceae family were used in a variety of ways, including as construction materials, tools, crafts, medicines, and as food. Seeds were exploited from several members of this group including *Ambrosia trifida* (giant ragweed), *Artemisia* (sagebrush), *Aster* (aster), *Balsamorhiza sagittata* (balsam root), *Cirsium* (thistle), *Helianthus* (sunflower), and *Iva annua* (marshelder, sumpweed). Most Asteraceae seeds ripen in the late summer and fall. The young shoots of *Arctium minus* (burdock) can be boiled as potherbs, and the first year root from a basal rosette can be eaten in the fall or early the following spring. Young *Aster* (aster), *Balsamorhiza*, *Bidens* (beggar ticks), *Chicorium* (chicory), *Cirsium*, *Lactuca* (wild lettuce), *Petasites sagittatus* (coltsfoot), *Silphium perfoliatum* (cup plant), *Solidago* (goldenrod), *Sonchus* (sow-thistle), and *Tragopogon dubius* (goat's beard, salsify) leaves also were eaten cooked as greens or sometimes raw. The green shoots of *Petasites* were rolled into a ball, dried, burned, and the ashes used as salt. *Balsamorhiza*, *Cirsium*, *Chicorium*, *Helianthus tuberosus* (Jerusalem artichoke), and *Liatris punctata* (gayfeather) roots were eaten raw or cooked, while young *Microseris cuspidata* (false dandelion) roots were eaten raw. Several plants were used as chewing gum including *Antennaria neglecta* (field pussy-toes), *Lygodesmia juncea* (skeleton plant), sticky *Grindelia* (gumweed) flower heads, the green plants and coagulated juice of *Hieracium* (hawkweed), and resin from the upper stem of *Silphium laciniatum* (compass-plant).

Members of this family also were important medicinal resources. *Achillea* (yarrow) is noted to have been used by many groups in a wide variety of medicinal treatments. A leaf tea has been used to treat coughing, fainting, menstrual and urinary disorders. The entire plant was dried, chewed, then placed on wounds. A tea made from *Ambrosia artemisifolia* (small ragweed), *Antennaria* (pussy-toes), and *Kuhnia eupatorioides* (false boneset) was applied to swellings. *Ambrosia* tea also was used to cure bloody flux and stop vomiting. *Artemisia* was used for a variety of purposes. Leaves were used to make a medicinal tea for stomach trouble, easing menstrual cramps, and during childbirth. A tea made from the roots was given to people who had difficulty urinating or having bowel movements, or to a woman who was having difficulty giving birth. *Artemisia* was an important ceremonial plant, used for cleansing, purification, and as an incense to drive away evil powers. A tea made from *Conyza canadensis* (horseweed) roots and lower stalks was used to treat diarrhea and pain in the bowels, especially in children. *Coreopsis* (tickseed) flowers are noted to make a good, red-colored tea. The dried plant tops also were used to make a tea to strengthen the blood. *Dyssodia* (fetid marigold) leaves were pulverized and given to people having difficulty breathing. The plant was boiled with the yellow blossoms of *Grindelia* to make a tea to treat spitting of blood. *Grindelia* also was used for treating indigestion, kidney problems, throat and lung problems, and children with stomachaches. A fluid extract was used externally on itching and skin irritations such as poison ivy rash. *Echinacea angustifolia* (purple coneflower) is noted to be the most widely used medicinal plant of the Plains Indians. It was used as a painkiller and to treat a variety of ailments. The roots or green fruits were chewed as a remedy for toothaches, stomachaches, or when one is thirsty or perspiring. The chewed root was applied to snakebites and insect bites. Burns were bathed with the juice, and a smoke treatment was given to people with headaches. A tea was made from *Erigeron philadelphicus* (fleabane) to treat rheumatism, lameness, stomach disorders, children with sore mouths, and adults who had difficulty urinating. *Gutierrezia* (matchbrush, snakeweed) was boiled for to make a tea for treating coughs, colds, and dizziness. *Liatris* roots were pulverized and eaten to stimulate the appetite. The entire plant was powdered and made into a tea for heart pains. A tea made from *Lygodesmia juncea* is noted to stop diarrhea in children. The tops of *Ratibida columnifera* (yellow coneflower) was made into a tea for treating headaches and stomachaches. The plant also was used to stop internal and external hemorrhaging. An antiseptic lotion was made from boiled *Solidago* stems and leaves (Gilmore 1977:82-83; Kindscher 1987:24-26, 85-87, 124-133, 141-145, 239-240, 242, 250, 1992; Rogers 1980:49`-`59; Kindscher, 1992:16-21, 32-35, 46-52, 84-98, 118-121, 136-140, 179-181, 236-238, 240-241, 251-254).

***Helianthus* (Sunflower)**

Helianthus (sunflower) is an annual plant that was extensively used by many Native American tribes. Sunflowers were domesticated by some North American Indian groups, and the seed size was increased by 1000 percent during the last 3000 years. Sunflower "seeds" are actually a complete fruit called an achene. The seeds were eaten raw, cooked, or roasted. Seeds also were dried or parched and ground into a meal that was used to make breads, mushes, cakes, or to thicken soups and gravy. Ground seeds were made into a paste similar to peanut butter. Oil was extracted by boiling the flower heads or crushed seeds and skimming the oil from the water. Roasted seeds and/or shells were used to make a beverage similar to coffee. The seeds are very nutritious. They contain 24% protein, 47% fat, and are good sources of vitamin B. Purple and black dyes were obtained from sunflower seeds, while the flowers yielded a yellow dye. A sunflower tea was used to treat lung ailments, malaria, high fevers, as an astringent, and as a poultice for snakebites and spiderbites. A root decoction was used as a warm wash for rheumatism. The sunflower's importance to Native Americans is indicated by its widespread presence in myths, art, and decoration. *H. tuberosus* (Jerusalem artichoke) produces a tuberous root that was harvested in the fall, winter, or spring and eaten raw, boiled, or roasted. The tubers are high in iron but low in fat and available carbohydrates. Sunflower plants can be found in waste places, fields, low meadows, prairies, and along roadsides and railroads (Foster and Duke 1990:132; Gilmore 1977:78-79; Kindscher 1987:124-133; Kirk 1975:133; McGee 1984:265, 272; Niethammer 1974:51-52; Sweet 1976:40).

Xanthium **(Cocklebur)**

Xanthium (cocklebur) is a common weedy annual found throughout the United States. The fruit is a pod about one inch long that is covered with stiff, hooked barbs and often called a bur. The inner seeds can be parched and ground into a flour. The leaves of *Xanthium* can be used to treat herpes, skin and bladder infections, and to stop the bleeding of skin cuts and abrasions. A tea made from the leaves is a useful diuretic. Crushed, boiled pods have analgesic, diuretic, and antispasmodic effects, and have been used for diarrhea, rheumatism, and arthritis; however, large quantities or constant use can have toxic effects. The crushed seeds can be used as a blood clotting agent and an antiseptic for skin abrasions, and is a good first aid dressing. *Xanthium* is found growing in dry areas and old fields, along roadsides, around alluvial washes and creek banks, and on beaches (Krochmal and Krochmal 1973:236-237; Moerman 1998:602; Moore 1979:59).

Atriplex **(Saltbush)**

Atriplex (saltbush) occurs as both an annual herb and perennial shrub. Like *Chenopodium* and *Amaranthus*, saltbush also can be exploited for both its greens and seeds. The leaves and young shoots have a salty taste and can be used as a seasoning. A poultice of the chewed plant was applied to ant, bee, and wasp sting swellings. *A. canescens* (four-wing saltbush) was used for stomach pain or as an emetic. Dried leaves were used as a snuff for nose trouble, and a poultice of the warm, pulverized root was applied to toothaches (Moerman 1986:85-86; Weiner 1972:75). *Atriplex* seeds are very nutritious and can be ground into a meal, mixed with water and drunk as a beverage, or mixed with some other meal and used as flour. The seeds do not ripen until mid-fall and can remain on the shrubs throughout the winter into the next growing season. *Atriplex* is a native found widely scattered throughout the western United States in waste places and fields, growing in arid, alkaline, or saline soils (Kirk 1975:59; Muenscher 1987:180).

Brassicaceae (Mustard family)

Several members of the Brassicaceae (mustard family), such as *Descurainia* (tansy mustard) and *Lepidium* (pepperweed) are noted to have been exploited for their greens and seeds. Leaves can be eaten fresh or cooked as potherbs. Indians often baked fresh young *Descurainia* leaves in firepits lined with stones. Alternating layers of leaves and hot rocks created a type of steamer. The plants were steamed for about thirty minutes then used right away or dried for later use (Harrington 1964:308). The parched and ground seeds were used to thicken or flavor soup and to make pinole. Brassicaceae seeds ripen in early summer (Harrington 1967; Kirk 1975; Moerman 1986).

Cheno-ams

Cheno-ams are a group of plants that include *Amaranthus* (pigweed) and members of the Chenopodiaceae (goosefoot) family, such as *Atriplex* (saltbush), *Chenopodium* (goosefoot), *Cycloloma atriplicifolium* (winged pigweed), *Monolepis* (povertyweed, patata), *Sarcobatus* (greasewood), and *Suaeda* (seepweed). These plants are weedy annuals or perennials, often growing in disturbed areas such as cultivated fields and site vicinities. Plants were exploited for both their greens and seeds, which are very nutritious. Young shoots and stems can be eaten fresh or cooked as greens, either alone or with other foods. The greens are most tender in the spring when young but can be used at any time. The small seeds can be eaten raw, but most often they were ground into a meal and used to make a variety of mushes and cakes. The seeds usually are noted to have been parched prior to grinding. The red fleshy fruit clusters of *Chenopodium capitatum* (strawberry blite) and *Monolepis* roots were eaten raw or cooked. The ashes of *Atriplex canescens* (four-wing saltbush) make a good substitute for baking powder, while a black dye can be obtained by soaking *Suaeda* stems and leaves in water for many hours. Various parts of the Cheno-am plants are noted to have been gathered from early spring (greens) through the fall (seeds) (Harrington 1967:55-62, 69-71, 80-82, 234-236; Harrington 1972:68-71, 82-84; Kirk 1975:56-63; Sweet 1976:48; Tilford 1997:14-15, 88-89).

Cleome (Beeweed)

Cleome (beeweed, bee plant) is a weedy plant that grows in disturbed areas. *Cleome* was used both as a food and a pottery paint. The young plants were usually gathered and boiled as potherbs from spring until mid-summer. The seeds also can be gathered and ground into meal, although utilization as a potherb appears to have been more common. The seeds ripen in the late summer and fall. Both the young and older plants can be gathered and the entire plant boiled down to a thick, black, fluid residue. This fluid is then dried and made into cakes, which keep for an indefinite period. The cakes can be reconstituted by soaking them in water for use as a dye or pottery paint, or fried in grease to be eaten. *Cleome* is found in sagebrush areas and in the more arid forests throughout the West (Harrington 1967:72; Kirk 1975:33).

Nelumbo (Lotus)

Nelumbo (lotus) is a large, aquatic herb with wide-spreading, horizontal, thickened rhizomes rooted in mud. Lotus tubers and seeds both are edible. Numerous Native American groups are noted to have processed *Nelumbo* seeds and tubers. The tubers were used with acorns, cooked with meat, or boiled and eaten as vegetables. Shoots were collected and cooked with meat or other vegetables. They also were dried and kept for winter food. Seeds were gathered and roasted like chestnuts or cooked with meat to make soup. *Nelumbo* is found in ponds and quiet streams (Bailey and Bailey 1976:757; Moerman 1998:353; Niering 1985:429-430).

Persicaria (Persicaria, Smartweed, Pinkweed)

The genus *Persicaria* (periscaria, smartweed, pinkweed) was formerly included in the genus *Polygonum*. Species of *Persicaria* are annual or perennial herbs, some of which are climbers or floating or submersed aquatics. They can be evergreen, semi-evergreen, or deciduous. They are recognized by their spikes or panicles of small, usually long-lasting, funnel-, bell-, or cup-shaped, pink, red, or sometimes white flowers. A total of 35 species once classified in the genus *Polygonum* are now classified in the genus *Persicaria*, including *P. bistoides*; however, pollen from *P. bistoides* is identifiable as a separate pollen type and is not included in the *Periscaria*-type designation. Seeds found in archaeological sites suggest that native groups utilized species such as *P. lapathifolium* (pale persicaria, nodding smartweed), and *P. pennsylvanicum* (Pennsylvania smartweed) (Murray and Sheehan 1984:282-283). The seeds were parched and ground into a meal. The leaves were collected in the spring and used raw, cooked as potherbs, or as a seasoning. Young stems also can be eaten like asparagus. *P. bistoides* and *P. viviparum* have starchy roots that are edible raw and boiled, but are best when roasted. *Persicaria* plants are found in moist or wet soil, marshes, swamps, ponds, or lakes (Brickell 1997:773-774; Britton and Brown 1970:665-670; Burlage 1968:141-142; Densmore 1928:291; Dimbleby 1967:32; Harris 1972:118; Murray and Sheehan 1984:283-284).

***Pinus* (Pine)**

Pinus (pine) trees were utilized for a variety of purposes. The seeds of most pines are edible, although some are better than others. The inner bark can be mashed and formed into cakes or dried and made into flour. The inner bark also was used to make poultices and bandages. An inner bark tea and pine pitch were used as an expectorant. Pine pitch was used to draw out slivers and infections and was spread on sores and inflammations as a salve. The pitch also was heated and used to treat pneumonia, rheumatism, muscular sores, and insect bites. Pine needles are rich in vitamins A and C and were brewed into a medicinal tea. The fumes emitted from heated needles were breathed in to treat back pain. Buds were chewed to treat sore throats and steeped in water to make a laxative tea (Angier 1978:195-196; Moore 1979:126; Peterson 1977:166; Robinson 1979:123-124). Pine wood also was used for fuel and construction material. Pine was valued as a wood source because the pitch in the wood would readily start the wood burning, even when wet (Gallagher 1977:113). Travois and tipi poles were made from *Pinus contorta* (lodgepole pine), as well as back-rest poles and bed supports. Pine wood also could be used to make babies' cradles (Smith 1974:102).

Poaceae (Grass Family)

Members of the Poaceae (grass) family have been widely used as a food resource, including *Agropyron* (wheatgrass), *Hordeum* (barley), *Elymus* (ryegrass), *Eragrostis* (lovegrass), *Achnatherum* (ricegrass), *Poa, Sporobolus* (dropseed), and others. Grass grains normally were parched and ground into a meal to make various mushes and cakes. Several species of grass contain hairs (awns) that were singed off by exposing the seeds to flame. Young shoots and leaves may have been cooked as greens. Roots were eaten raw, roasted, or dried and ground into a flour. Grass also is reported to have been used as a floor covering, tinder, basketry material, and to make brushes and brooms. Grass seeds ripen from spring to fall, depending on the species, providing a long-term available resource (Chamberlin 1964:372; Harrington 1964:322; Kirk 1975:177-190; Rogers 1980:32-40).

***Quercus* (Oak) – Acorns**

Oaks (*Quercus*) are distinctive deciduous or evergreen, hardwood shrubs to large trees found in dry to moist ground in many different habitats. Oak wood is very hard, heavy, and strong. It was valued as firewood because the hard wood would burn slowly, and a large log could burn all night. Acorns are noted to have been a food source for several aboriginal groups in North America.

Acorns have a high degree of tannic acid, which must be removed in order to be palatable. Tannins were removed by leaching in water, sometimes with the help of wood ashes. Acorns have a high percentage of carbohydrates and relatively low percentages of protein and fat. The root bark was boiled and given for diarrhea and bowel trouble, especially in children (Gallagher 1977:113; Gilmore 1977:23; Kindscher 1992:82; Kirk 1975:104-106; McGee 1984:265).

Rhus (Sumac)

Rhus (sumac) shrubs have thin-fleshed, sweet, acidic berries that were used by several Native American groups. *Rhus trilobata* (skunkbush, skunkbrush, squawbush), *R. glabra* (smooth sumac), and *R. integrifolia* (lemonade berry) all have edible berries that were eaten both green and when ripe, either raw or cooked. Berries sometimes were pounded into cakes that were sun-dried for future use, or dried whole and ground. Berries ripen in September, then dry and remain on the bushes throughout the winter. *R. trilobata* and *R. typhina* (staghorn sumac) berries were used to make a drink similar to lemonade. Skunkbush berries yielded a light orange-brown dye. Stems and twigs were used to weave baskets and construct cradle boards. Roots were used with pinyon pine for a consumptive. The buds also were used medicinally and as a deodorant or perfume. *R. trilobata* and *R. cismontana* (sumac) leaves were dried and smoked, either with tobacco or alone. *Rhus* shrubs often are common in chaparral, and can be found on mesas, slopes, plains, and in canyons (Angell 1981:56; Harrington 1967:261; Kirk 1975:116).

Ribes (Currant, Gooseberry)

All species of *Ribes* (currant, gooseberry) produce edible berries. The berries of *R. odoratum* (buffalo currant) are noted to be sweet and flavorful, while others can be very tart. Gooseberries have one to three thorns at the bases of the leafstalks and bristly berries; currants generally have spineless twigs and smooth berries. Gooseberries and currants can have red, yellow, orange, purple, or black fruits. The berries were eaten raw, cooked, or dried in the sun and stored for future use. Dried berries were boiled or pounded with animal fat to make pemmican. *Ribes* berries are high in vitamin C and are ready for harvest in mid-summer. Nectar-rich flowers also were eaten, and the dried leaves were made into a tea. The different species of *Ribes* can be found in a variety of habitats, although all require a fair amount of moisture. *Ribes* shrubs are found in moist soil in shaded or open land (Angell 1981:36-38, 146; Harrington 1967:262-269; Kirk 1975:87-88; Meuninck 1988:14).

Shepherdia (Buffaloberry)

All species of *Shepherdia* (buffaloberry) produce edible berries that can be eaten raw, or dried and stored for future use. *S. argentea* (silver buffaloberry) is a shrub or small tree with silvery leaves and bright red or golden fruits. The berries are noted to have a pleasantly tart flavor and make a good jelly. Native peoples are reported to have gathered the fruits by hand-picking or by spreading a thin cover on the ground and beating off the berries onto it. These berries were eaten raw, cooked into a sauce to flavor buffalo meat, or dried for winter use. The berries are said to be sweeter after a frost. The wood is light, soft, and weak. *S. argentea* grows along stream banks in the western one-third of the United States (Angell 1981:64; Elmore 1976:32; Harrington 1967:282-284; Kirk 1975:115-116; Lamb 1989:92).

Symphoricarpos (Snowberry, Coralberry)

Symphoricarpos (snowberry, coralberry) shrubs produce waxy, white berries that are edible but "not especially good" (Rogers 1980:64). *S. occidentalis* (wolfberry, western snowberry) leaves were steeped to make an infusion used for weak or inflamed eyes. It is noted to be one of the few woody plants that grows freely on open prairies in dry, rocky soil, as well as on hillsides, sandy flats, roadsides, in ravines, pastures, and occasionally in moist soil (Angell 1981:136; Gilmore 1977:64; Stephens 1973:468-471).

Zizania (Wild Rice)

Wild rice (*Zizania* sp.) is an aquatic emergent grass that grows in clear, shallow, slow-moving waters of lakes, streams and rivers. Three species of wild rice are native to northern and eastern North America. Wild rice produces an edible grain that has been a staple food for many Native peoples. The grain is mature and ready for harvest by August or September; a canoe is then typically used for harvesting. Stalks are sometimes tied into sheaves or gathered by hand and then the grains are knocked-off into the canoe using wooden sticks. After gathering, the grains are brought to shore and cured, typically using sun, smoke and heat from a slow fire underneath, or by parching in a vessel over a slow fire. The hull is then separated from the grain by threshing. Threshing was usually carried out by lining a pit with deer skin, filling it with wild rice, and then stepping on the grains to break-up the hulls. Winnowing was then employed to separate the broken hull material from the grain. The cleaned and dried grain was then stored, usually in the ground, and used throughout the next year. It is also reported that some wild rice was put out to rot in shallow basins of water, where it would be collected and eaten the next spring. Preserved wild rice was cooked in water and used to thicken soups, such as broths of venison, bear, fish, and fowl. The winnowed or unwinnowed grains were also pounded into a meal and combined with maize, meats, berries, and grease, to make pemmican. Cooked wild rice was also combined with maple syrup (Jenks 1977; Vennum 1988).

Wild rice is high in protein, the amino acid lysine, and dietary fiber, and is a good source of the minerals potassium and phosphorus, and the vitamins thiamine, riboflavin and niacin. The grain is comprised of approximately 30% starch, and thus is rich in carbohydrates (Motoko and Etsu 2000; Oelke 1976). In an archaeological context, wild rice can be detected in the macrofloral record through carbonized grains. These were most likely green or parched grains that fell near the edge of parching or cooking fires. Where preservation of the grain is not possible, wild rice pollen, starch and silica phytoliths can be recovered. Wild rice pollen, while not diagnostic, does fall within a specific diameter size range (typically 32 to 37 μm); however, there is some overlap with other aquatic grasses. Wild rice seed contains dense packs of angular starch granules that vary in size from about 4 μm to 16 μm in diameter (typically 5 to 8 μm). Recognizable starch grains can withstand the drying and parching steps of processing, but typically do not survive high heat cooking such as boiling in water. However, cooking often does not produce uniform results, meaning that not all grains are always fully cooked. Wild rice plants produce significant quantities of silica phytoliths, especially within the spikelet material (hull) that surrounds wild rice seed (Yost 2007). Throughout the drying, parching and winnowing process, small amounts of this phytolith-bearing material can be retained within the seed stores and cooked along with the grains. Thus, wild rice phytoliths, as well as starches and sometimes pollen, can adhere to the inner surface of ceramic vessels and be incorporated into feature fill.

Cultigens

Phaseolus (Bean)

Phaseolus includes many varieties of domesticated beans, including *P. vulgaris* (common bean), *P. lunatus* (lima bean), *P. acutifolius* var. *latifolius* (tepary bean), and *P. coccineus* (runner bean). *Phaseolus* is believed to have first come under cultivation about 6000 B.C. in Central and South America. Charred beans have been recovered from Upper Republican (1200 to 1500 A.D.), Mandan, Late Woodland, and Arikara sites, and beans are noted to have been cultivated by Lakota groups. Beans could be eaten when green and immature but often were dried and stored for future use, both in the pod and shelled. Dried beans most often were boiled until soft and then eaten as is or fried (Cutler and Blake 1973; Edwards and Jennings 1948:41; Heiser 1990:124-126; McGee 1984:251-262; Rogers 1980:101).

Zea mays (Maize, Corn)

Cultivation of *Zea mays* (maize, corn) originated in South America and spread throughout the United States. At the time of European contact, Heiser (1990:89) notes that "maize was the most widely grown plant in the Americas, extending from southern Canada to southern South America, growing at sea level in some places and at elevations higher than eleven thousand feet in others." Corn was (and still is) an important food, for which innumerable ways of preparation exist. Ripe corn kernels were dried, parched and ground into a meal, hulled with lye from ashes to make hominy, or prepared in various other ways (Gilmore 1977:15). Whole ears were also boiled and eaten. Corn silks were dried and ground with the parched corn to add sweetness. The corn smut fungus *Ustilago* was also used for food. The fungi was gathered when the spores were firm and ripe and boiled (Rogers 1980:42). There are five different types of maize determined by the endosperm composition. Pop and flint corn have a high protein content and a hard starch. Dent corn has a deposit of soft, waxy starch at the crown of the kernel. Flour corn contains little protein and mostly waxy starch, while sweet corn stores more sugar than starch (McGee 1984:241).

DISCUSSION

Site DlLg 33 is located near the junction of the Red and Assiniboine Rivers in downtown Winnipeg, Manitoba, Canada. Situated at the intersection of riverine trade routes, the site was a center for prehistoric commerce. Until recently, the site was buried beneath an active railroad yard that deposited a meter of debris, including coal cinders, coal dust, and gravel, on top of the site. A gravel parking lot occupies this area today. Modern vegetation in the area consists of dandelion (*Taraxacum* – a Liguliflorae) and pigweed (*Amaranthus* – a Cheno-am), along with ornamental and shade trees; however, when the site was occupied prehistorically, the local environment was characteristic of a riverine gallery forest with deciduous trees that transitioned into prairies or parklands beyond the forest edges.

Five cultural levels were recognized at the site and have been previously dated. Level 1 dates to 825 BP, but this date is believed to be 125 years older than the occupation represented by this level. The date obtained for Level 2 (860 BP) is also thought to be 100 years too old. These dates were probably contaminated by the railroad fill and runoff from the parking lot during heavy rainstorms. A date of 895 BP for Level 2B is accepted as correct. Level 3 is dated to 875 BP, which is believed to be 100 year too recent, and Level 3A, which is inverted with Level 3, dates to 850 BP. This date is also thought to be 120 years too recent.

Ceramic rim sherds recovered from Levels 1 and 2 and a chitho from Level 2 were submitted for ceramic and organic residue analysis (Table 1). A possible grinder or hammer stone and a biface from Level 1, and a retouched flake from Level 2 were submitted for protein residue analysis. The grinder/hammer stone was also examined for organic residues, as was visible residue from a limestone ochre bowl recovered from Level 2. X-Ray Diffraction (XRD) was performed on the residue from the limestone bowl to verify the material was ochre, and visual examination of the residues under the microscope was used to assess if the materials were organic or mineral based. Ceramics were tested for organic residues using Fourier Transform Infrared Spectroscopy (FTIR). Ceramic residue analysis (pollen, starch, and phytolith) and organic residue analyses on the ceramics and chitho are used to provide information regarding the foods processed, their origins, and perhaps to shed light on decorative influences on ceramics beyond a stylistic tradition, as the ceramic sherds represent a transition from the production of a single widespread ceramic type to several distinct regional variants. This site is located at a major nexus of trade routes that might have been used to its advantage by occupants of this site. These analyses were undertaken, in part, to gain insight into possible trade influences. Results from these analyses are discussed below by cultural level.

Level 1

Residue Sample 7795

Sample 7795, representing visible residue collected from an earthenware rim sherd, was examined for pollen, starch, phytolith, and an FTIR signature for organic residue. Pollen analysis yielded a very small quantity of pollen that included *Carya*, *Pinus*, *Artemisia*, High-spine Asteraceae, and Cheno-am, representing local vegetation that included hickory, pine, sagebrush, various members of the sunflower family, and goosefoot, saltbush, or other members of the Cheno-am group (Table 2, Figure 1). No starches were observed in this sample.

Phytolith analysis of the sample 7795 yielded a well preserved assemblage; however, this phytolith record appears to be mostly an environmental signal derived from the surrounding plant community (Figure 2). The phytolith assemblage was dominated by morphotypes diagnostic of cool-season, C3 metabolism grasses. In particular, trapeziform sinuates diagnostic of the grass subfamily Pooideae were the single most dominant morphotype. Pooid grasses such as fescue (*Festuca*), Junegrass (*Koeleria*), bluegrass (*Poa*), wild rye (*Elymus*), and brome (*Bromus*) are very common in this area. In addition, most wetland grasses in this region are pooid grasses such as canary grass (*Phalaris*), manna grass (*Glyceria*), and Canada bluejoint (*Calamagrostis*). Some pooid taxa such as *Poa* are shade tolerant and can comprise part of a herbaceous layer in a closed-canopy forest. Thus, the cool-season grass phytoliths observed in this sample are likely derived from a mix of wetland/riparian and forest understory habitats that surrounded this site during the time of occupation. A few phytoliths diagnostic of the obligate wetland grasses common reed (*Phragmites australis*) and one phytolith highly suggestive of cutgrass (*Leersia*) were observed. A few globular echinate phytoliths derived from the sedge family (Cyperaceae) were observed, indicating the presence of sedges growing in the area. Diatoms and sponge spicules were also noted, further supporting the presence of a nearby wetland or riparian zone. No phytoliths diagnostic of maize, beans, squash, or grass seed processing were observed for this sample.

For the organic residue (FTIR) analysis of sample 7795, this sample yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, ketones, proteins including nucleic acids, the amino acid alanine, humates, starch, cellulose and carbohydrates, and polysaccharides including glucomannan, galactoglucomannan, xyloglucan, arabinan, arabinogalactorhamnoglycan, and rhamnogalacturonan (Table 3). Polysaccharides are complex carbohydrates found in plants as starch and cellulose, and in animals as glycogen. A peak at 823 wave numbers indicates the presence of rhamnogalacturonan. Rhamnogalacturonans are specific pectic polysaccharides that reside in the cell walls of all land plants, and result from the degradation of pectin (Willats, et al. 2001). Arabinogalactorhamnoglycan is another plant cell wall polysaccharide (Kacurakova, et al. 2000), represented in this sample by a peak at 838 wave numbers. Arabinan is represented in the sample by a peak at 919 wave numbers. In plants, arabinan is essential for the function of guard cells, which "play a key role in the ability of plants to survive on dry land, because their movements regulate the exchange of gases and water vapor between the external environment and the interior of the plant" (Jones, et al. 2003:11783). Xyloglucan, indicated by a peak at 946 wave numbers, is the most abundant hemicellulose in the cell walls of most dicotyledonous plants, and all vascular plants (Fry 1989).

> "The primary cell wall of [these plants] is composed of cellulose microfibrils embedded in a matrix of hemicellulosic and pectic polysaccharides, of which the hemicellulose xyloglucan is a major component. Xyloglucan and cellulose together make up about two-thirds of the dry weight of primary cell walls and are the major tension-bearing components of the matrix. During cell expansion and elongation, the cell wall continually undergoes temporary loosening followed by rapid reinforcement of wall structure. Xyloglucan endotransglycosylases (XETs) are unique enzymes in plants that are capable of modulating the chemistry of the matrix and therefore performing both of these functions" (Eckardt 2004:792).

It is through this process that plant cell wall growth and repair occurs (Moore 1988). A peak at 1034 wave numbers represents the presence of both glucomannan and galactoglucomannan, the final two polysacchrides found in this sample. Galactoglucomannan is also indicated by a second peak at 935 wave numbers. These polysaccharides are predominate in the woody tissue of coniferous plants (Gymnosperms), with galactoglucomannan being a primary component. Glucomannan is also present in the wood of dicotyledons, also known as dicots (Bochicchio and Reicher 2003).

Peaks between 1700 and 1400 wave numbers represent proteins; however, a peak at 1655 wave numbers specifically indicates the presence of nucleic acids. Nucleic acids exist in all living organisms. They not only contain the genetic instructions for the proper development and functioning of living organisms, but also play a role in copying genetic information from DNA to protein (Saenger 1984). Alanine, represented in this sample by a peak at 1465 wave numbers, is a nonessential amino acid found in a wide variety of foods that include legumes, maize, and meat. This amino acid plays an important role in the glucose-alanine cycle between tissues and liver (Nelson and Cox 2005).

Peaks at 1718 and 1707 wave numbers indicate the presence of ketones. Ketones are a water-soluble class of compounds including acetone, acetoacetate, and 3-hydroxybutyrate that contain a carbon atom double bonded to an oxygen atom (Guch and Wayman 2007:190). They occur naturally in terrestrial and aquatic plants, and are found in several sugars (Encyclopedia Britannica Online 2010b; Wenchuan, et al. 1999). In mammals, ketones are produced by the breakdown of fatty acids for energy and provide an important alternative source of tissue fuel for the brain and heart under certain conditions such as starvation when glucose levels in the body are low (Murray, et al. 2000:173). Ketones are also synthesized artificially for medical and pharmaceutical use (e.g. natural and synthetic hormones, cortisone), as well as for the production of cosmetics, plastics, and paints (Encyclopedia Britannica Online 2010b; Guch and Wayman 2007:190). Amines, represented in this sample by a peak at 3329 wave numbers, are organic compounds derived from ammonia in which one or more of the hydrogen atoms has been replaced with a carbon-based group (Guch and Wayman 2007:176). Amines are produced naturally by the breakdown of amino acids. This process occurs in the environment as plant and animal materials decompose, as well as within the living tissues of plants and animals as they chemically process amino acids. Naturally occurring amines include alkaloids, which are present in some plants, as well as in the fight-or-flight hormones of animals, such as dopamine, epinephrine, and norepinephrine, and chemical mediators, like histamine, that occur in most animal tissues (Encyclopedia Britannica Online 2010a). Amines are also artificially synthesized and used as corrosion inhibitors, antioxidants for asphalt, stabilizers, protectants against gamma radiation, photographic developers, waterproofing agents, fabric softeners, paper coatings, pharmaceuticals (e.g. ephedrine, epinephrine), and anesthetics (e.g. novocaine) (Encyclopedia Britannica Online 2010a; Guch and Wayman 2007:182).

Matches with these peaks were made with *Helianthus* (sunflower) seeds and shells, which is consistent with recovery of High-spine Asteraceae pollen; charred *Xanthium* (cocklebur) seeds (another member of the Asteraceae); raw *Zizania* (wild rice) seeds (representing grass seeds in general), raw *Cleome* (beeweed) seed pods, raw *Pinus* (pine) nut skin and shells, roasted *Pinus* (pine) nut shells, and *Quercus* (acorn) nutmeat (Table 4). This variety of plants appears to represent primarily an environmental signature picked up from the sediments, as the sunflower family, and pine are represented in the pollen samples and grasses are represented in the phytolith record. The matches with *Cleome* (beeweed) seed pods and stems are likely to represent plant stems in general rather than this genus of plant. Raw *Allium* (wild onion) bulbs, raw *Ribes* (current), and *Symphoricarpos* (snowberry) fruits were also matched with the signature obtained from the sample. These matches suggest locally available tubers and fruits were also consumed. Other matches with boiled *Zea mays* (maize) cupules, raw *Zea mays* (maize) kernels, and *Phaseolus* (bean) beans suggest these cultigens were incorporated into the diet as well. *Bison* fat and duck skin were also matched, which suggests meat was cooked in the vessel, perhaps in various combinations with these plants as a stew mixture. The matches with bison fat and duck skin are interpreted at a general, rather than specific level, meaning that although it appears the inhabitants of the site were processing meat, the particular species or types of animals that were being utilized cannot be identified using FTIR. Identification of raw protein using protein residue analysis, which is based on immunological techniques, is the only method to identify specific animal proteins.

Like the phytolith and starch record for this sample, FTIR analysis also detects the presence of the local environmental signal in the organic residues extracted from this sherd by matches with *Helianthus* (sunflower) flowers, *Achillea* (yarrow) and *Poaceae* (grass) stems, and *Rhus* (skunkbush) leaves, as well as humates and deteriorated cellulose. Although the match with cellulose probably represents the natural breakdown of plant matter in the sediments from which the sherd was recovered, it could also indicate other plants processed in the vessel that have deteriorated to the point they are only visible by their general cellulose signature. FTIR analysis specializes in identifying chemical compounds, particularly fats and lipids, found in plant and animal materials, and this might explain why in the absence of phytolith and starch evidence for foods in the sample, organic residue analysis (FTIR) suggests plants and animals were prepared and/or contained in the vessel.

Residue Sample 7810

Sample 7810, representing the second earthenware rim sherd from Unit A14, was submitted for pollen, starch, phytolith and organic residue (FTIR) analysis. The pollen record yielded more variety that included *Alnus*, *Juglans*, *Juniperus*, *Pinus*, High-spine Asteraceae, Liguliflorae, Brassicaceae, Cheno-am, Corylaceae, Poaceae, and Saxifragaceae, representing a rather wide variety of plants, most of which are expected to be part of an environmental signal. Alder, walnut, juniper, and pine trees appear to have been growing in the area. Various members of the sunflower family, including some from the chicory tribe, as well as members of the mustard family, cheno-am group, hazelnut family, grasses, and saxifrage family also appear to have grown in the area. Alternatively, it is possible that a member of the mustard family was processed in this vessel. A single *Nelumbo*-type starch was recovered from this sample, suggesting processing lotus tubers. The most unusual aspect of the pollen record is the presence of a rather large quantity of *Sporormiella* dung fungal spores (Figures 3A and 3B).

Sporormiella is an ascomycete fungus found only on the dung of herbivores. The genus is widespread in subboreal and temperate regions of the world. *Sporormiella* spores are borne in ascomata on the surface of drying dung, and are spread passively to nearby vegetation, where they are ingested (Davis and Shafer 2006). Many coprophilous fungi, such as *Sporormiella* rely on a cyclic process involving herbivore ingestion of spores with foliage; germination of spores following passage through the gut; mycelial growth within, and eventual sporulation on dung (Wicklow, et al. 1980). While grazing, herbivores can also inadvertently ingest ascomata, the fruiting bodies on dung that contain millions of individual spores, especially in areas where dense herbivore populations exist (Aptroot and Geel 2006). Depending on the context of the sample, recovery of *Sporormiella* in archaeological samples may be an indicator for the presence and utilization of herbivores. Interpretations can range from presence of dung on the landscape to burning dung for fuel to the utilization of intestinal material for cooking and subsistence. The significance of the presence of *Sporormiella* will be discussed below.

Phytolith analysis yielded a well preserved assemblage with both an environmental and subsistence component. The environmental signal was analogous to that previously described for residue sample 7795, indicating the presence of a wetland/riparian habitat and possibly a forested area during the time of occupation. For the subsistence signal, several rondel phytoliths diagnostic for wild rice (*Zizania* sp.) were observed (Figure 3 C). These rondels are produced in large numbers in the husk material (lemma and palea) that surrounds wild rice seed (Yost 2007). Small fragments of this material can be retained on the seed, where the phytoliths then are incorporated into the cooked grain material. A few opaque perforated platelets derived from the inflorescence of the sunflower family (Asteraceae) were observed, suggesting that sunflower seeds may have been utilized for subsistence.

Perhaps the most interesting observation in this residue sample was the extremely high relative abundance of non-phytolith crystalline faecal spherulites (Figure 3 D-F). Faecal spherulites are small crystalline objects made of radially or concentric crystallized calcium carbonate fibers, typically 5 to 15 µm in diameter, Spherulites can be found in micromorphological samples from archaeological sites, and when present, typically occur singly or in dense layers where fresh or burnt dung has accumulated. Their presence here in a ceramic vessel residue sample is unique and might be worthy of additional analysis and publication. Spherulites can form in the gut of carnivores and omnivores, but are most abundant in herbivores (deer, sheep, goat, pronghorn, bovine, bison, etc.). Their formation is a product of feeding and digestive strategy. Environmental conditions may influence both spherulite production and preservation. Higher calcium carbonate intake may produce more spherulites; however, low pH soils may be detrimental to spherulite preservation, especially under periodically moist conditions. In addition, the sex of the animal and calcium deficiencies may bias spherulite production. Like starch grains, when observed under cross polarized light, spherulites will produce a cross of extinction (Canti 1997, 1998, 1999). With the amount of spherulites observed in this residue sample, their incorporation into the ceramic vessel contents seems unlikely to be derived from burning dung for fuel. In combination with the recovery of *Sporormiella* in the pollen record, the presence of spherulites in this sample suggests that intestine material was cooked and eaten or utilized as a casing to cook other foods, such as wild rice and meat. The presence of the coprophilous fungi *Sporormiella* in the pollen fraction further suggests that a lower portion of the gut may have been utilized.

Organic residue (FTIR) analysis of sample 7810 yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, ketones, proteins including nucleic acids, the amino acid alanine, humates, cellulose and carbohydrates, and polysaccharides including arabinan. Matches with the signature obtained from this sample were made with raw *Allium* (wild onion) bulbs, flowers, and leaves, *Cleome* (beeweed) stems, and raw *Ribes* (currant) and *Rhus* (skunkbush) fruits suggesting fruits, greens, and tubers were prepared and/or contained in the vessel. A wide variety of nuts and seeds were also matched including *Quercus* (acorn) and *Pinus* (pine) nut shells, *Helianthus* (sunflower) seed nutmeat, charred *Xanthium* (cocklebur) seeds, and raw *Zizania* (wild rice) seeds. Processing seeds from members of the sunflower family, such as sunflower and cocklebur, as well as wild rice seeds, is also confirmed by the phytolith record for this sample. Matches with *Phaseolus* (bean) beans suggests this cultigen was incorporated into the diet as well. Meat processing in the vessel, which is also visible in this sample by the presence of spherulites, is supported by organic residue analysis with matches to *Bison* fat and duck skin. The FTIR signal for unburnt spherulites, as determined by Canti (1997:229), might also be contributing to the fats and lipids portion of the signature obtained from this sample. Other matches with *Populus* (aspen/cottonwood) bark, *Pinus* (pine) needles, *Symphoricarpos* (snowberry) leaves, *Schoenoplectus* (bulrush) and *Achillea* (yarrow) stems, and deteriorated cellulose suggest the presence of the local environmental signature. Cellulose in the sample likely indicates the natural decay of plant materials in the sediments at the site; however, the match with cellulose could also represent other plants processed in the vessel that are no longer visible beyond their general cellulose signature due to deterioration.

Granite Tool (Sample 7851)

A granite artifact (sample 7851) believed to be either a grinder or hammer stone was also recovered from Unit A14 and sampled for protein residues (cross-over immunoelectrophoresis) and organic residues (FTIR). This tool was first washed for protein residues and tested against the antisera listed in Table 5, yielding a positive result to sturgeon antiserum (Table 6). This result suggests that lake sturgeon (*Acipenser fulvescens*) remains were processed with this tool. This tool may have been used to pound dried meat or perhaps used to pound various sturgeon fish parts for collagen-based glue. Collagen is the structural fibrous protein of tissues in humans, animals and fish. It gains adhesive properties when degraded into gelatine by treatment (prolonged boiling) with hot water (Rots 2008). A semitransparent, whitish, and very pure from of gelatin called isinglass can be prepared from the air bladders of various species of sturgeons. Glue made from fish skins and heads were used as hafting material by some California tribes. The Maidu of the Sierra Nevada Mountains made sinew-backed bows of yew with the sinew attached with salmon skin glue (Justice 2002).

Organic residue (FTIR) analysis of sample 7851 yielded peaks representing the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic and saturated esters, ketones, proteins including nucleic acids, humates, cellulose, starch, calcium oxalate, methyl $-D-glucopyranoside, and the polysaccharides galactoglucomannan, rhamnogalacturonan, and arabinoglucuronoxylan. Arabinoglucuronoxylan, represented in this sample by a peak at 1109 wave numbers, is a polysaccharide found in the cell walls of softwoods and herbaceous plants (Sjostrom 1981). A peak at 850 wave numbers indicates the presence of methyl $-D-glucopyranoside. Methyl $-D-glucopyranoside is most notably recognized as a compound found in the leaves, rhizomes, and roots of members of the Rosaceae (rose) family and woods of the *Quercus* (oak) species, but it is probably found in a host of other plants, as well (Aubert, et al. 2004; Fudge, et al. 2008:51). In oak methyl β-D-glucopyranoside might be a precursor to oak lactone, which “imparts ‘coconut’, ‘citrus’, and ‘vanilla’ aroma characters” (Fudge, et al. 2008:51). Today methyl $-D-glucopyranoside “is widely used in the production of medicinal and cosmetic preparations, and also a number of glue compositions” (Korolevich, et al. 2007:822). Finally, the presence of calcium oxalate in the sample is represented by a peak at 781 wave numbers. Calcium oxalate is present in many plants, often in the form of crystals, particularly in various plants in the Chenopodiaceae such as saltbush, goosefoot, and others. Some edible plants that contain calcium oxalate include legumes (leaves and pods), goosefoot (and spinach) greens (leaves) and the salty fruits of saltbush. The presence of calcium oxalates could suggest processing seeds or fruits from one of the plants that contains these crystals.

The best matches for these peaks were made with nuts and seeds including Quercus (acorn) nutmeat, raw and roasted *Pinus* (pine) nut shells and skin, *Helianthus* (sunflower) seeds and shells, and *Cleome* (beeweed) seed pods. These matches suggest primarily processing of nuts and seeds with the tool represented by this sample. Other matches with raw *Allium* (wild onion) bulbs, *Cleome* (beeweed) stems, the cultigen *Phaseolus* (bean), and duck skin suggest wild onion, greens, beans or even native legumes, and meat might also have been prepared with this artifact. Once again the interpretation of meat is made based on matches with proteins, which are not as distinct in the FTIR record as they are in protein residue analyses. Therefore, it is best to interpret processing of meat, rather than specific meats, with the tool. Although a good match with the entire spectrum was not made with fish blood, a match between 2962 and 2823 wave numbers might suggest fish processing is contributing to the fats and lipids portion of the spectrum. The presence of the environmental signal is evident in this sample by matches with *Helianthus* (sunflower) flowers, *Rhus* (skunkbush) wood, *Achillea* (yarrow) stems, and humates.

Biface Tool (Sample 7836)

A Selkirk chert biface tool from Unit B16 was submitted for protein residue analysis and tested against the antisera listed in Table 5. This tool yielded negative results to all of the antisera tested.

Residue Sample 24658

An earthenware ceramic rim sherd recovered from Unit B16, represented by sample 24658, was submitted for pollen, starch, phytolith, and organic residue (FTIR) analysis. The pollen record from this residue sample yielded only single High-spine Asteraceae and poorly preserved (indeterminate) pollen, representing an environmental signal. No starches were observed.

Phytolith analysis of sample 24658 yielded mostly an environmental signature, dominated by phytoliths from cool-season grasses. For the most part, this environmental signal is analogous to that previously described, with one notable exception. This residue sample contained a relatively high abundance of ligneous plant fibers of an indeterminate origin. It is quite possible that the presence of these fibers in the residue matrix is subsistence based and not derived from the surrounding vegetation, especially since they were not observed in the environmental signal from any of the other residue samples. Also unique to this sample was the elevated abundance of silicified plant xylem fragments. These phytoliths are observed in a wide variety of both herbaceous and woody plants and cannot be assigned any particular taxonomic origin. Thus, the phytolith record from this residue sample suggests that some type of fibrous plant resource may have been prepared in this vessel. Phytoliths indicative of maize, bean, squash, wild rice, or grass seed utilization were not observed in this sample.

Organic residue (FTIR) analysis of the sample 24658 residue sample yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, ketones, proteins including nucleic acids, the amino acid alanine, humates, lignin, cellulose and carbohydrates, and polysaccharides including arabinogalacto-rhamnoglycan. A peak at 1508 represents the presence of lignin in the sample, supporting the observation of ligneous fibers in the phytolith portion of the sample. Lignin forms the structural components of plants and some algae (Gropper, et al. 2008:110; Lebo, et al. 2001; Martone 2009). It's primary function is to provide support to the entire plant by linking the polysaccharides to strengthening the xylem cells (Arms 1995; Chabannes, et al. 2001; Esau 1977; Wardrop 1969). Lignin is not only a functional fiber, but is also a dietary fiber that cannot be digested by animal enzymes (Carlile 1994). It is especially found in wood, stems, seeds, cereal grains, and tubers (Gropper, et al. 2008:110).

These peaks were matched with *Quercus* (acorn) nutmeat and shells, *Pinus* (pine) nut skin and shells, *Helianthus* (sunflower) seeds and shells, and *Zizania* (wild rice) seed, as well as *Ribes* (currant) and *Atriplex* (saltbush) fruit, *Cleome* (beeweed) leaves, and *Allium* (wild onion) bulbs, leaves, and flowers suggesting a variety of locally available nuts, seeds, fruits, greens, and tubers were prepared for consumption in the vessel represented by this sherd. Matches with raw *Zea mays* (maize) cupules suggest this cultigen was also incorporated into the diet. Bison fat and duck skin, which are a proxy for the general presence of meat in the sample, were also matched suggesting meat processing. Matches with seeds, tubers, and cereals grains, such as rice and maize, for this sample are expected given the high abundance of ligneous plant fibers in the phytolith fraction and support processing of fibrous plant materials in the vessel. FTIR matches with maize and wild rice, in the absence of phytolith evidence, probably results from the presence of fats/lipids and proteins from these plants in the organic residues found in the vessel that can be detected through FTIR analysis, but are not visible in the phytolith record. This suggests cooking well cleaned maize kernels and wild rice seeds. Other matches with *Rhus* (skunkbush) wood, *Populus* (aspen/cottonwood) bark, *Helianthus* (sunflower) flowers, and *Achillea* (yarrow), *Cicuta* (hemlock), and *Schoenoplectus* (bulrush) stems representing the local environmental signal, are probably also contributing to the large quantity of ligneous plant fibers found in the phytolith fraction.

Level 2

Residue Sample 10633

An earthenware rim sherd (sample 10633) recovered from Unit A17 was submitted for pollen, starch, phytolith and organic residue (FTIR) analysis. The pollen record yielded a signature that appears to represent the local environment. High-spine Asteraceae pollen was most abundant, followed by Poaceae, then small quantities of *Carya*, *Pinus*, *Ulmus*, *Artemisia*, Cheno-am, and Poaceae, representing members of the sunflower family, grasses, hickory, pine, elm, sagebrush, cheno-am group, and grasses. No starches were observed in this sample.

Phytolith analysis of this residue sample yielded mostly an environmental record derived from the surrounding environment. This environmental signal is analogous to that described for the previously discussed residue samples, indicating that cool-season grasses dominated a wetland/riparian zone at this site during the time of occupation. The only evidence of possible food processing/cooking from the phytolith fraction was the observed presence of non-phytolith crystalline faecal spherulites (Figure 4 A-C). These spherulites were observed in relatively high abundance, approximately 1 for every phytolith counted, and are the second occurrence for this project, with the previously discussed residue sample 7810 from Level 1 also yielding spherulites. What is very interesting about these spherulites is the fact that they are square to rectangular in shape, as opposed to the round/globular forms observed in sample 7810. This may be evidence that either a different type of animal was utilized for subsistence, that a different portion of the intestine was utilized, or a combination of both. It is important to note that spherulites crystallize over a period of time, and thus, their shape changes as the crystallization process progresses with digested food movement through the gut of an animal. When an animal eats food, it passes through the acidic environment (pH 3) of the stomach (omnivores and carnivores) or abomasum (ruminants). From there, the semi-digested food enters the duodenum where it receives alkaline secretions from the gut wall, gall bladder and pancreas (calcium chloride and sodium bicarbobate), and calcium carbonate spherulites start to form. In its passage down the gut it receives further neutral or alkaline secretions, and its pH gradually rises, reaching pH 7 approximately midway down the small intestine (Canti 1999). Controlled experiments that mimic the changing conditions of the digestive tract of ruminants resulted in a range of spherulite crystallization shapes (Fernandez-Diaz, et al. 1996). Further (Granasy, et al. 2005) describe the formation of spherical spherulites from a square-shaped single crystal. Thus, the square-shaped spherulites observed in this residue sample may be derived from a portion of the intestine where spherulites just start to form, as the literature does not indicate that different species of herbivores produce species-specific or even consistently different spherulite shapes. Also, the absence of the coprophilous fungi *Sporormiella* in the pollen fraction is suggestive that an upper portion of the intestine was utilized.

Residue sample 10633 was also analyzed for organic residues using FTIR. This sample 10633 yielded peaks representing the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, ketones, proteins including nucleic acids, humates, cellulose, and polysaccharides (Table 7). *Quercus* (acorn) nutmeat, *Pinus* (pine) nut skin, *Helianthus* (sunflower) seed shells, and *Zizania* (wild rice) seeds were matched with these peaks, suggesting processing locally available nuts and seeds that might have including acorn, pine, sunflower, and wild rice (Table 8). Other matches with raw *Allium* (wild onion) bulbs, and *Ribes* (currant) and *Atriplex* (saltbush) fruits suggest that fruits from these or similar plants were also contained in the vessel represented by this sherd. Matches with boiled *Zea mays* (maize) cupules and *Phaseolus* (bean) beans were also made indicating cultigens might have been processed or contained in this vessel. Meat or water fowl processing in the vessel is suggested by matches with duck skin. The presence of the local environmental signal is visible in this sample by matches with *Achillea* (yarrow) stems, *Helianthus* (sunflower) flowers, and *Rhus* (skunkbush) bark, and humates. Matches with humates likely indicate the natural decay of plant matter in the sediments from which the artifact was recovered.

Chitho Sample 6816

Organic residues were also extracted from a granite chitho recovered from Unit C10, as well as two different colored types of visible residue (black and brown) on the surface of the artifact. Separate pollen, starch, phytolith, and FTIR analysis was conducted on the black residue (sample 6816A) and the brown residue (Sample 6816B).

Sample 6816, representing the chitho, yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic rings, aromatic and saturated esters, ketones, proteins including nucleic acids, the amino acid alanine, humates, cellulose and carbohydrates, and polysaccharides. Matches for this sample with raw *Allium* (wild onion) bulbs, *Cleome* (beeweed) flowers, *Atriplex* (saltbush) and *Ribes* (currant) fruits, and *Bison* fat suggest tubers, greens, fruits, and meats that might have included wild onion, beeweed, saltbush, currant (and/or similar plants and fruits), and bison (or other meat) were processed with the chitho. The match with bison is interpreted to represent preparing meats since the signatures for meat overlap to a high degree. Other matches with *Schoenoplectus* (bulrush) stems, *Populus* (aspen/cottonwood) bark, and deteriorated cellulose attest to the presence of the environmental signal in the sample.

Residue Sample 6816A (black)

Pollen analysis of the black residue removed from the chitho surface was heavily dominated by High-spine Asteraceae pollen, representing members of the sunflower family. This sample also yielded a moderately large quantity of pollen that was deteriorated. Recovery of moderate to moderately small quantities of *Pinus*, *Tsuga*, *Quercus*, *Salix*, *Ulmus*, Low-spine Asteraceae, Cheno-am, Corylaceae, Poaceae, and Rosaceae pollen indicate the presence of pine, hemlock, oak, willow, elm, members of the ragweed portion of the sunflower family, members of the cheno-am group, members of the hazelnut family, grasses, and members of the rose family were present in the local vegetation communities. In addition, this sample yielded fern spores and algal spores, documenting local growth of ferns and algae.

Starch grain analysis of the black residue yielded several starch grains. Cooked starch consistent with starches produced by seeds in the grass family was recovered in the pollen sample, while a total of nine starch grains were observed in the phytolith fraction. Seven of these grains were small, round to angular, lenticular forms consistent with those found in grass seed of little barley grass, wild rye, and wheatgrass (Figures 4 E and F). Two of the starch grains (Figure 4 G and H) were large, eccentric hilum-types, consistent in shape with those produced by the edible roots of arrowhead/wapato (*Sagittaria* sp.). Thus, the starch record indicates that food (possibly a ground meal) comprised of grass seed and starchy roots, possibly *Sagittaria*, were cooked on this chitho. Grass seed utilization is also supported by the phytolith record, which will be discussed next. It should be noted that *Sagittaria* does not produce phytoliths.

Phytolith analysis of the black residue yielded the typical environmental signal observed from all of the other residue samples, but also evidence of grass seed utilization for subsistence. Numerous dendriform phytoliths were observed in this sample (Figure 4 D). Dendriforms originate in bract material (lemmas, paleas and glumes) that surround the seed (caryopsis) of some wild and domesticated grasses. They are very common in the bract material of Pooideae grasses, especially domesticated cereal grain taxa, and wild grasses gathered for subsistence such as Indian ricegrass (*Oryzopsis*), foxtail barley (*Hordeum*), and wildrye (*Elymus*). Although dendriforms are produced by many grasses and can be a part of the environmental signal, their abundance here is well above the typical background level, and is a clear indication that grass seed was processed for subsistence.

Organic residue analysis of the black residue (sample 6816BK for FTIR, sample 6816A for pollen and phytolith) yielded peaks indicating the presence of pectin, aromatic and saturated esters, proteins including nucleic acids, the amino acid alanine, and polysaccharides including glucomannan. Only weak matches with cooked leaves from members of the sunflower family were made with these peaks. These matches could represent plant processing with the chitho; however, it is more likely they indicate the local environmental signal representing the natural breakdown of plant materials in the sediments from which the artifact was recovered. Although no matches were made with deteriorated cellulose, which is often part of the environmental signature, similarities in the signals produced by cooked greens and cellulose due to similar decaying processes suggest the presence of decomposed plant material in the sample. None of the food matches made for the chitho were found in this sample representing black residues recovered from the tool.

Residue Sample 6816B (brown)

Pollen analysis of the brown residue removed from the chitho surface yielded a smaller quantity of High-spine Asteraceae pollen and most of the pollen types observed in the black residue. Differences include recovery of *Acer*, *Juniperus*, *Abies*, *Artemisia*, *Persicaria*-type, *Phlox*, Saxifragaceae, and *Shepherdia* pollen, representing maple, juniper, fir, sagebrush, knotweed, phlox, a member of the saxifrage family, and buffaloberry. The Cheno-am frequency was elevated relative to that recovered in other samples, suggesting the possibility that Cheno-am seeds were processed and are represented in this residue. It is also possible that knotweed greens and/or seeds and buffaloberry were cooked and represented in this portion of the residue. Fern spores were noted again, as were *Peziza* spores, which represent a cup fungus that grows on rotting food and dung. *Sporormiella* dung fungal spores also were present, suggesting that the cup fungus grew on dung or intestinal contents. No starches were observed in this sample.

Phytolith analysis yielded what appears to be entirely an environmental signal with no phytolith-based evidence of food associated with this brown residue sample. This evidence, combined with the differences in the pollen record, indicates that the black and brown residues are of different origins.

Organic residue analysis of sample 6816BRN (sample 6816B for pollen and phytolith), representing brown residue recovered from the chitho, yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, aromatic and saturated esters, proteins including nucleic acids, lignin from hardwoods, calcium oxalate, and polysaccharides including glucomannan. Matches with these peaks were made with cooked leaves from members of the sunflower family (Asteraceae), *Cleome* (beeweed) flowers, and humates. These matches suggest the brown residue might be composed of naturally decayed plant materials and plants processed with the chitho. Matches with cooked leaves and humates suggest the presence of the environmental signal; while the presence of beeweed, which is also found in the sample representing the chitho, probably resulted from preparing this plant with the tool. Although the matches with cooked greens could indicate other plants processed, it is more likely they represent the cellulose signature of deteriorated plants in general.

As a whole, the matches made for the sample representing the chitho were not found in either residue, with the exception of beeweed, which was matched for sample 6816BRN, representing the brown residue. Both the black and brown residues exhibited strong environmental signatures, suggesting they are composed primarily of decayed plant matter that could have been derived from either natural or cultural activities.

Utilized Flake (Sample 8762)

A Knife River flint retouched flake was submitted for protein residue analysis and tested against the antisera listed in Table 5. This tool yielded a positive result to goat antiserum, and since this antiserum cross-reacts with both mountain goat (*Oreamnos americanus*) and pronghorn (*Antilocapra americana*) blood, either animal may be responsible for the positive result obtained here. However, since mountain goats are restricted to alpine and subalpine habitats, the positive to goat on this tool is most likely from pronghorn, which may have once ranged much closer to this area.

The pronghorn (*Antilocapra americana*), often mistakenly called an antelope, is neither a goat nor an antelope. True antelopes are confined to the Old World, and domestic goats are descendants of European species (McSpadden 1917:207, 213). Mountain goats are not true goats, but belong to a group known as goat-antelopes. Pronghorns are currently found only in western North America, from southern Canada to northern Mexico and Baja California, inhabiting grasslands, grassland-brushlands, and bunch grass-sagebrush areas. Pronghorns are found in scattered bands throughout the summer and in larger herds in the winter (Whitaker 1980:662-663).

In the past, pronghorns were an important source of food for native peoples in the western United States. Although pronghorns are considered one of the fastest American animals, they could not jump fences. One method of hunting used by historic Indians involved building a three-foot fence around the herd. Pronghorns were unable to jump over the fence, and the men would take turns chasing the animals until they were too tired to fun anymore. Men would shoot the animals and/or women would club the animals to death (Kelly 1964:50; Work Projects Administration 1940:29).

Guns and fences nearly drove the animals to extinction; however, some of today's pronghorns have acquired the ability to jump fences, and transplantation and management have increased the pronghorn's numbers (Whitaker 1980:664).

Ochre Bowl (Sample 12742)

Visible residues, both black and red, on a limestone ochre bowl recovered from Unit D18 were tested for organic residues using FTIR and for minerals utilizing both X-Ray Fluorescence (XRF) and X-Ray Diffraction (XRD).

Organic residue analysis of sample 12742B, representing the black residues on the limestone bowl, yielded peaks indicating the presence of absorbed water, amines, fats/oils/lipids and/or plant waxes, pectin, saturated esters, proteins including nucleic acids, the amino acid valine, humates, cellulose and carbohydrates, and the polysacchride arabinogalactan. Arabinogalactan, represented in this sample by a peak at 879 wave numbers, is a sugar found in plant carbohydrate structures, particularly gums and hemicelluloses. One of arabinogalactan's many functions is to bond with proteins to repair damage when it occurs to a plant or its parts (Nothnagel 2000). A peak at 1450 wave numbers indicates the presence of the amino acid valine. Valine is an essential amino acid necessary for the normal functioning of the human body and it's repair (Nelson and Cox 2005). Dietary sources of valine include fish, poultry, and some seeds and legumes.

Matches with these peaks were made with *Cleome* (beeweed) flowers and humates. The presence of humates in the sample represents the local environmental signature and the natural breakdown of plant materials; however, the match with beeweed could suggest the preparation of this plant as paint in the bowl. *Cleome* plants can be boiled down to a thick, black, fluid residue for use as a dye or paint.

Red residues, which have the appearance of red ochre, were tested for minerals using both XRF and XRD analyses. The hand-held XRF analysis was considered to be experimental and was conducted to compare with the XRD analysis, which is often considered to be more conclusive in determining the presence of ochre. However, Gil et al. (Gil, et al. 2007) used both XRF and XRD to identify several elements that, when present in colored deposits, are used to define that deposit as ochre. In this study, only the XRF results were presented. Iron (Fe), calcium ©), potassium (K), and titanium (Ti) all were identified as useful in identifying ochre. Copper (Cu), zinc (Zn), arsenic (as), lead (Pb), and rubidium (Rb) were important only in identifying sulphide ores and enrichment of clay and mica of schist rocks. Since Gil *et al*. used the K/Ca ratio and titanium percents, we also plotted this ratio plotted against Ti, producing a graph that clearly separates the ochre areas of this rock from the parent rock (Table 9). XRD analysis provides an identification of the parent rock as containing primarily dolomite (more than 90%). A small quantity of quartz (less than 5%) and a small quantity of mineral that could not be identified (less than 5%) also are reported. Unfortunately, the small quantity of red ochre on this artifact was not sufficient to detect or identify using XRD (x-ray diffraction).

Red residues recovered from the surface of the limestone bowl, represented by sample 12742R, yielded peaks indicating the presence of absorbed water, amines, pectin, aromatic and saturated esters, proteins including nucleic acids, lignin, calcium oxalate, and the polysaccharides arabinogalactan and glucuronoxylan (GX). A peak at 1085 wave numbers indicates the presence of glucuronoxylan in the sample. “Glucuronoxylans are one of the major hemicellulosic components found within the secondary cell walls of hardwoods” (Awano 2000:72). They have also been isolated from fruits and seeds, and found in various dicotyls including ground nutshells, sunflower hulls, and coneflower (*Rudbeckia*) (Ebringerova, et al. 2005:8). Matches with the signature obtained from the red residue were made with cooked leaves from members of the sunflower family, *Quercus* (acorn) nut shells, and pronghorn blood. These matches suggest the red residue might represent a combination of greens, nuts, and blood, perhaps mixed together with the red ochre as a paste used as a paint or dye. Again, the match with cooked leaves could also indicate the local environmental signal and the natural deterioration of plant materials.

SUMMARY AND CONCLUSION

The chitho contained both a black and brown residue, which were sampled separately. The black layer, represented by sample 6816, contained grass seed starch and starch from a starchy root, most likely *Sagittaria*, suggesting that a ground meal prepared from both grass seeds and roots was either processed and/or cooked on the granite tool “chitho”. In addition, recovery of an elevated Cheno-am frequency, accompanied by knotweed and buffaloberry pollen in the brown residue on the chitho suggests the possibility that Cheno-am seeds and/or greens, knotweed seeds and/or greens, and buffaloberries might have been processed using the chitho. It is interesting that this brown residue also contained *Sporormiella* dung fungal spores, suggesting processing herbivore intestines.

FTIR analysis of the black and brown residues recovered from the chitho revealed the presence of a strong environmental signal suggesting the residues are composed primarily of decomposed plant materials that could have originated from either natural or cultural activities. Beeweed was matched with the brown residue; however, it probably represents processing the plant with the chitho, as the match also occurred with this tool.

Nelumbo (lotus root), another wetland resource, was probably cooked in the vessel represented by sample 7810. Phytolith analysis yielded evidence that wild rice (*Zizania* sp.) also was cooked in this vessel.

Calcium carbonate spherulites observed in residue samples 7810 and 10633 suggest that some portion of the intestines of an herbivore were either cooked for subsistence, or used like a casing to cook other foods such as wild rice and/or meat. Recovery of *Sporormiella* dung fungal spores in sample 7810 further confirm processing intestines.

Protein residue analysis yielded a positive result to sturgeon on a granite tool (sample 7851) and a positive result to goat on a Knife River flint tool (sample 8762). The positive to sturgeon is most likely from exploitation of lake sturgeon (*Acipenser fulvescens*) and the positive to goat is most likely from the exploitation of pronghorn (*Antilocapra americana*) for subsistence.

The organic residues extracted from the ceramic sherds, grinder/hammer stone, and chitho exhibited complex cultural and environmental signals. Matches to stems, leaves and needles, flowers, wood, bark, humates, and deteriorated cellulose attest to the presence of an environmental signal. Evidence of probable food processing includes animals, and native, cultivated, and imported plants. Greens, fruits, nuts, seeds, and tubers from locally available plants including wild onion, saltbush, beeweed or similar plants, sunflower, pine, acorn, skunkbush, currant, snowberry, cocklebur, and wild rice were harvested, and maize and beans were obtained through trade. Animals, such as land mammals, water fowl, and fish, were probably procured locally for their meat, which might have been cooked in a variety of combinations with wild and cultivated plants. The FTIR signatures indicate the vessels and stone tools were used to prepare a variety of meat and plant products probably for consumption.

As a whole, the FTIR record for the ceramic sherds and stone tools from Levels 1 and 2 does not indicate a significant temporal change in the utilization of local and non-local foods. The majority of the foods prepared with these artifacts appear to be collected locally, and remain relatively consistent throughout the different occupation levels. Beans and maize are the only potentially non-local foods contained regularly in the vessels. The frequency of the matches with beans and maize suggests they were a regular part of the diet. Each sample's signature displayed multiple peaks in the protein portion of the spectrum with several of these peaks representing the presence of the amino acid alanine. Alanine, along with protein, is present in legumes, as well as meat, fish, nuts, and seeds; these are the foods matched with the signatures representing the sherds and tools. Matches to maize and beans also were reported for other artifacts examined from this site previously. In addition, maize pollen and phytoliths, as well as bean starch were reported in that study (Cummings 2009).

Organic residue analysis of the black and red residues recovered from the ochre bowl suggest they might be (or include) organic based pigments. The black residue could be derived from beeweed. The red residue, which was rather powdery when removed from the "ochre" bowl produced matches with a combination of greens, nuts, and blood, suggesting the possibility that ochre might have been mixed with other items, including blood. XRF analysis is consistent with the red subsistence being ochre, but this analysis does not identify organic materials. XRD analysis did not contribute to identifying the red ochre.

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM THE FORKS SITE (DlLg-33/08A), WINNIPEG, CANADA

Sample No.	Level	Unit	Provenience/ Description	Recommended Analysis
7795	1	A14	Rim sherd, earthenware	Ceramic Residue FTIR
7810			Rim sherd, earthenware	Ceramic Residue FTIR
7851			Grinder/Hammer, granite. Some evidence of polishing	Protein FTIR
7836			Biface, Selkirk Chert	Protein
24658		B16	Rim sherd, earthenware	Ceramic Residue FTIR
10633	2	A17	Rim sherd, earthenware	Ceramic Residue FTIR
6816		C10	Chitho, granite. A little residue on 1 side (black and platey brown overlying black)	FTIR (2) residue Ceramic residue (2) FTIR on chitho
8762		C11	Flake, retouched, Knife River flint	Protein
12742		D18	Ochre Bowl, limestone (look at sample of black residue under scope to assess if it is organic or mineral)	FTIR for black and red residues (2) XRD to verify ochre

FTIR = Fourier Transform Infrared Spectroscopy

TABLE 2
POLLEN TYPES OBSERVED IN SAMPLES FROM THE FORKS SITE (DlLg-33/08A), WINNIPEG, CANADA

Scientific Name	Common Name
ARBOREAL POLLEN	
Acer	Maple
Alnus	Alder
Carya	Hickory, Pecan
Juglans	Walnut
Juniperus	Juniper
Pinaceae:	Pine family
Abies	Fir
Pinus	Pine
Tsuga	Hemlock
Quercus	Oak
Salix	Willow
Ulmus	American Elm or, White Elm, Water Elm
NON-ARBOREAL POLLEN	
Asteraceae:	Sunflower family
Artemisia	Sagebrush
Low-spine	Includes ragweed, cocklebur, sumpweed
High-spine	Includes aster, rabbitbrush, snakeweed, sunflower, etc.
Liguliflorae	Chicory tribe, includes dandelion and chicory
Brassicaceae	Mustard or cabbage family
Cheno-am	Includes the goosefoot family and amaranth
Corylaceae	Hazel family
Persicaria-type	Persicaria, Smartweed, Pinkweed
Phlox	Phlox
Poaceae	Grass family
Rosaceae	Rose family

TABLE 2 (Continued)

Scientific Name	Common Name
Saxifragaceae	Saxifrage family
Shepherdia	Buffaloberry
Indeterminate	Too badly deteriorated to identify
STARCHES	
Nelumbo-type Starch	Lotus Root
Poaceae Seed Starch Cooked	Grass family Seed, Cooked
SPORES	
Monolete Smooth	Fern
Trilete Smooth	Fern
ALGAE	
Algal Spore	Algal body
Peziza	Fungus that grows on rotting food and dung
Sporormiella	Dung fungus
Total pollen concentration	Quantity of pollen per cubic centimeter (cc) of sediment

TABLE 3
FTIR PEAK SUMMARY TABLE FOR SAMPLES FROM LEVEL 1
AT THE FORKS SITE (DILg-33/08A), WINNIPEG, CANADA

Peak Range	Represents	7795 Ceramic	7810 Ceramic	7851 Grinder/ Hammer	24658 Ceramic
3600-3200	Absorbed Water	3329, 3286, 3236, 3202	3441, 3340, 3333, 3298	3510, 3385, 3278	3397, 3253
3500-3300	Amines	3329	3441, 3340, 3333	3385	3397
3371, 3342, 3334	O-H Stretch		3333		
3089, 3088, 3085, 3084, 3068, 3064, 3063, 3062, 3041, 3031, 3029, 3027	Aromatic C-H stretch			3040	
3000-2800	Aldehydes: fats, oils, lipids, waxes	2916, 2849	2953, 2916, 2870, 2848	2986, 2953, 2917, 2849	2954, 2915, 2848
2879, 2875, 2873, 2871, 2870	CH_3 Symmetric stretch		2870		
1750-1730	Saturated esters	1740, 1736	1740	1735	1740
1730-1705	Aromatic esters	1726, 1718, 1707	1718	1707	1727, 1708
1725-1705	Ketones	1718, 1707	1718	1707	1708
1700-1500	Protein, incl. 1650 protein	1686, 1676, 1655, 1648, 1638, 1618, 1577, 1572, 1561,1542, 1535,1512, 1500	1685, 1655, 1647, 1637, 1618, 1577, 1561, 1541, 1500	1655, 1649, 1631, 1571, 1561, 1545, 1512, 1502	1686, 1654, 1618, 1576, 1539
1680-1600, 1260, 955	Pectin	1676, 1655, 1648, 1638, 1618	1655, 1647, 1637, 1618	1655, 1649, 1631	1654, 1618
1660-1655	Proteins, Nucleic acids	1655	1655	1655	1654
Below 1510	Aromatic skeletal bands, Lignins, hardwood				1508
1500-1400	Protein	1491, 1465, 1438, 1431, 1421, 1413	1466, 1420	1463, 1432, 1413	1465, 1419

TABLE 3 (continued)

Peak Range	Represents	7795 Ceramic	7810 Ceramic	7851 Grinder/ Hammer	24658 Ceramic
1465-1455	Protein/lipids	1465	1466	1463	1465
1465	Alanine (amino acid) CH_2 bending	1465	1466		1465
1490-1350	Protein	1465, 1438, 1431, 1421, 1413, 1389, 1377, 1354	1466, 1420, 1379, 1377	1463, 1432, 1413, 1377	1465, 1419, 1378
1394, 1379, 1366	Split CH3 umbrella mode, 1:2 intensity		1379		1378
1377	Fats, oils, lipids, humates	1377	1377	1377	1378
1243	Amide C-N stretch		1243		1244
1188	Saturated ester C-C-O			1187	
1170-1150, 1050, 1030	Cellulose		1163	1165	
1162	Cellulose		1163		
1130-1100	Aromatic esters	1110		1109, 1100	
1110	Starch	1110			
1109	Arabinoglucuronoxylan + Galactoglucomannan			1109	
1100	Pectin			1100	
1100-1030	Saturated esters	1034, 1032	1098	1058, 1054, 1032	1049, 1032
1028-1000	Cellulose Carbohydrates	1011	1007		1023
1097	Arabinan		1098		
1059, 1033	Cellulose	1034, 1032		1032	1032
1058	Primary alcohol C-O stretch			1058	
1049	Arabinogalacto-rhamnoglycan				1049

TABLE 3 (continued)

Peak Range	Represents	7795 Ceramic	7810 Ceramic	7851 Grinder/ Hammer	24658 Ceramic
1034, 960	Galactoglucomannan	1034			
1034	+Glucomannan (9:1, w/w), Glucomannan	1034			
1022, 972	Pectin				1023
953	Pectin		953		
951, 916	Rhamnogalacturonan			950	
945	Xyloglucan	946			
934	Galactoglucomannan	935			
918	Arabinan	919			
874	Polysaccharides	875	875		874
850	Methyl β-D-glucopyranoside			850	
850	Starch			850	
837	Arabinogalacto-rhamnoglycan	838			
834	Pectin		833		
823	Rhamnogalacturonan	823			
780	Calcium oxalate			781	
750-700	Aromatic esters	744, 722	746, 721	727, 721	746, 719, 712
763, 760, 745, 737, 736	Aromatic out-of-plane C-H bend	762	746		746
719-22	CH_2 Rock (methylene)	722	721	721	719
692	Aromatic ring bend (phenyl ether)	692	693		691

TABLE 4
MATCHES SUMMARY TABLE FOR FTIR RESULTS FROM LEVEL 1
AT THE FORKS SITE (DILg-33/08A), WINNIPEG, CANADA

Match (Scientific Name)	Match (Common Name)	Part	7795 Ceramic (Range)	7810 Ceramic (Range)	7851 Grinder/ Hammer (Range)	24658 Ceramic (Range)
CULTURAL						
Allium	Wild onion	Flower		2983-2799		3000-2800
		Leaf		2983-2799		3000-2800
		Bulb (raw)	2962-2831 1127-1082	2987-2823	2962-2823 1389-1356	3000-2800
Atriplex	Saltbush	Fruit				3000-2800 1144-894
Cleome	Beeweed	Seed pod	1757-1687		1728-1691 1025-805	
		Leaf				3000-2800
		Stem	1757-1687	2983-2799		1728-1691
Helianthus	Sunflower seed	Shell	2946-2819 1556-1531		2962-2823 1728-1691 1487-1446	3000-2800 1479-1446
		Nutmeat	2958-2827 739-711	1753-1732	3000-2800 1389-1356 1025-805	3000-2800
Phaseolus	Beans	Bean	2962-2831 1757-1687 739-711	2987-2823 1005-903 735-706	1728-1691 1495-1446 1025-805	
Pinus	Pine	Nut shell (roasted)	1393-1332		1495-1446 1389-1356 1025-805	
		Nut shell	2958-2827 739-711	2987-2823 1005-903 735-706	3000-2800 1205-1144 1025-805	3000-2800
		Nut skin	2958-2827		1389-1356 1205-1144 1025-805	3000-2800 1716-1671 1479-1446

TABLE 4 (Continued)

Match (Scientific Name)	Match (Common Name)	Part	7795 Ceramic (Range)	7810 Ceramic (Range)	7851 Grinder/ Hammer (Range)	24658 Ceramic (Range)
CULTURAL						
Quercus	Acorn	Shell		2983-2799		3000-2800
		Nutmeat	1393-1332		3000-2800 1728-1691 1495-1446 1389-1356	1736-1687 1479-1446 1434-1397
Rhus	Skunkbush	Fruit (raw)		2987-2823		
Ribes	Currant	Fruit (raw)	2962-2831 1123-1086	2983-2799		3000-2800
Symphoricarpos	Snowberry	Fruit (raw)	2962-2831			
Xanthium	Cocklebur	Seed (charred)	1474-1405 1123-1086	1593-1565		
Zea mays	Maize	Kernel (raw)	2962-2831			
		Cupule (boiled)	2958-2827 1474-1441			
		Cupule (raw)				3000-2800 1479-1446
Zizania	Wild rice	Seed (raw)	2962-2831 739-711	1753-1732 735-706		3000-2800 1479-1446
Aves	Duck	Skin	1204-1143 739-711	1389-1368 1205-1136 747-706	3000-2800 1495-1446 747-702	3000-2800 1197-1144
Mammalia	Bison	Fat from bison long bone marrow	2958-2827 739-711	2983-2799 1757-1704 1389-1368 747-706		3000-2800 1197-1144
Fish		Blood			2962-2823	
ENVIRONMENTAL						
Achillea	Yarrow	Stem	2958-2827	2987-2823	1205-1144	3000-2800

TABLE 4 (Continued)

Match (Scientific Name)	Match (Common Name)	Part	7795 Ceramic (Range)	7810 Ceramic (Range)	7851 Grinder/ Hammer (Range)	24658 Ceramic (Range)
ENVIRONMENTAL						
Cicuta	Hemlock	Stem				3000-2800 1434-1397 980-948
Deteriorated Cellulose	Deteriorated cellulose		1246-894	1250-886		
Helianthus	Sunflower	Flower	2962-2831		2962-2823 1487-1446	890-584
Humates	Humates		2946-2819		2962-2823 1487-1446	
Pinus	Pine	Needle		2983-2799		
Poaceae	Grass family	Stem	2958-2827			
Populus	Aspen/ Cottonwood	Bark		2983-2799		3000-2800
Rhus	Skunkbush	Leaf	2958-2827 1760-1691			
		Wood			1495-1446	1479-1446
Schoenoplectus	Bulrush	Stem		2983-2799		3000-2800
Symphoricarpos	Snowberry	Leaf		2983-2799		

TABLE 5
LIST OF ANTISERA USED IN TESTING CERAMIC RESIDUE SAMPLES FROM THE FORKS SITE (DlLg-33/08A), WINNIPEG, CANADA

ANTISERUM	SOURCE	POSSIBLE RESULTS
Bear	ICN Pharmaceuticals, Inc.	Black bear, Brown bear, Grizzly, Polar bear
Bison	Dr. Richard Marlar at the University of Colorado Health Sciences Center	Bison, Domestic bovids
Bovine	Sigma Chemical Company	Domestic bovids, Bison
Cat	Sigma Chemical Company	Domestic cat, Mountain lion, Bobcat, Lynx
Chicken	Sigma Chemical Company	Domestic chicken, Partridge, Quail, Grouse, Ptarmigan, Pheasant
Deer	ICN Pharmaceuticals, Inc.	White tail deer, Mule deer, Elk, Moose, Caribou
Dog	Sigma Chemical Company	Domestic dog, Coyote, Wolf, Fox
Duck	Nordic Immunological Laboratories	Duck, Goose, Pigeon, Domestic turkey, Wild turkey
Goat	Sigma Chemical Company	Pronghorn, Mountain goat, Domestic goat
Guinea pig	Sigma Chemical Company	Guinea pig, Porcupine, Beaver, Squirrel family (Squirrel, Marmot, Chipmunk, etc.)
Human	ICN Pharmaceuticals, Inc.	Human
Mouse	Sigma Chemical Company	Members of New and Old World rats and mice family
Rabbit	Sigma Chemical Company	Rabbit, Jackrabbit (hare)
Rat	Sigma Chemical Company	Members of New and Old World rats and mice family.
Sheep	ICN Pharmaceuticals, Inc.	Domestic sheep, Bighorn sheep
Turkey	Sigma Chemical Company	Domestic turkey, Wild turkey, Ducks
American Eel	Robert Sargeant	American eel
Catfish	Sigma Chemical Company	Catfish, Carp
Gizzard Shad	Robert Sargeant	Gizzard shad
Sturgeon	Robert Sargeant	Acipenseridae family (Sturgeons)
Striped bass	Robert Sargeant	Perciformes order (Spiny-rayed/percoids)
Trout	Sigma Chemical Company	Salmonidae family (Trout and salmon)
Acorn	Prepared at PaleoResearch Institute	Acorn

TABLE 6
POSITIVE PROTEIN RESIDUE RESULTS FOR CERAMIC RESIDUE SAMPLES FROM
THE FORKS SITE (DlLg-33/08A), WINNIPEG, CANADA

Sample No.	Description	Positive Result (Antiserum Type)	Possible Animal(s) Represented
7851	Grinder/Hammer, granite. Some evidence of polishing	Sturgeon	Acipenseridae family (Sturgeons)
8762	Flake, retouched, Knife River flint	Goat	Pronghorn (*Antilocapra americana*)

TABLE 7
FTIR PEAK SUMMARY TABLE FOR SAMPLES FROM LEVEL 2
AT THE FORKS SITE (DILg-33/08A), WINNIPEG, CANADA

Peak Range	Represents	10633 Ceramic	6816 Chitho	6816BK Black Residue	6816BRN Brown Residue	12742B Black Residue	12742R Red Residue
3600-3200	Absorbed Water	3296	3568, 3449, 3371, 3265		3595, 3448, 3317, 3258	3568, 3554, 3326, 3318	3367, 3342, 3271
3500-3300	Amines	3309	3349, 3371		3448, 3317	3326, 3318	3367, 3342
3371, 3342, 3334	O-H Stretch		3371				
3089, 3088, 3085, 3084, 3068, 3064, 3063, 3062, 3041, 3031, 3029, 3027	Aromatic C-H stretch		3086, 3061				
3000-2800	Aldehydes: fats, oils, lipids, waxes	2918 2849	2953 2916 2848		2920 2850	2917 2849	
1750-1730	Saturated esters	1735	1736			1735	
1730-1705	Aromatic esters	1707	1710				
1725-1705	Ketones	1707	1710				
1700-1500	Protein, incl. 1650 protein	1686, 1676, 1671, 1664, 1655, 1648, 1637, 1624, 1618, 1577, 1561, 1541, 1518, 1509	1685, 1655, 1648, 1638, 1618, 1577, 1561, 1541, 1509	1686, 1676, 1671, 1664, 1655, 1648, 1638, 1629, 1624, 1618, 1578, 1571, 1561, 1550, 1546, 1535, 1523, 1518, 1509	1686, 1676, 1655, 1648, 1638, 1630, 1619, 1612, 1598, 1572, 1561, 1551, 1546, 1535, 1528, 1524, 1509	1685, 1655, 1637, 1618, 1578, 1571, 1561, 1554, 1535, 1500	1691, 1686, 1677, 1682, 1664, 1656, 1648, 1638, 1630, 1619, 1611, 1580, 1571, 1562, 1547, 1535, 1529, 1524, 1510, 1501
1680-1600, 1260, 955	Pectin	1676, 1671, 1664, 1655, 1648, 1637, 1624, 1618	1655, 1648, 1638, 1618	1676, 1671, 1664, 1655, 1648, 1638, 1629, 1624, 1618	1676, 1655, 1648, 1638, 1630, 1619, 1612	1655, 1637, 1618	1677, 1682, 1664, 1656, 1648, 1638, 1630, 1619, 1611
1660-1655	Proteins, Nucleic acids	1655	1655	1655	1655	1655	1656
1620	Calcium oxalate				1619		1619
1590, 1510	Lignin						1510

TABLE 7 (continued)

Peak Range	Represents	10633 Ceramic	6816 Chitho	6816BK Black Residue	6816BRN Brown Residue	12742B Black Residue	12742R Red Residue
Below 1510	Aromatic skeletal bands, Lignins, hardwood				1509		
1500-1400	Protein	1499, 1490, 1460, 1437, 1420, 1413	1465, 1415	1499, 1491, 1477, 1466, 1459, 1438, 1425, 1421, 1413	1499, 1492, 1476, 1467, 1459, 1438, 1425, 1421	1492, 1461, 1450, 1438, 1419	1492, 1478, 1467, 1459, 1439, 1426, 1422, 1415
1465-1455	Protein/lipids	1460	1465	1466, 1459	1459	1462	1459
1465	Alanine (amino acid) CH2 bending		1465	1466			
1450	Valine (amino acid) CH_2 Asymmetric bending					1450	
1490-1350	Protein	1490, 1460, 1437, 1420, 1413, 1377	1465, 1415, 1377	1477, 1466, 1459, 1438, 1425, 1421, 1413, 1363, 1352	1476, 1467, 1459, 1438, 1425, 1421, 1389, 1364, 1357	1462, 1450, 1438, 1419, 1377	1478, 1467, 1459, 1439' 1426, 1422, 1415, 1390
1384, 1364	Split CH3 umbrella mode, 1:1 intensity			1363	1364		
1377	Fats, oils, lipids, humates	1377	1377			1377	
1188	Saturated ester C-C-O				1187		
1170	Lipids	1170					
1170-1150, 1050, 1030	Cellulose	1170				1167	
1130-1100	Aromatic esters	1112		1101			1101
1100	Pectin			1101			1101
1100-1030	Saturated esters	1030		1095	1099		1085

TABLE 7 (continued)

Peak Range	Represents	10633 Ceramic	6816 Chitho	6816BK Black Residue	6816BRN Brown Residue	12742B Black Residue	12742R Red Residue
1028-1000	Cellulose Carbohydrates		1005			1023	
1095	Saturated ether C-O stretch			1095			
1084	GX						1085
1022, 972	Pectin				973	1023	
969	C-C-C Stretch	968					
941	Glucomannan			941			
891	Pectin	891					
879	Arabinogalac-tan (Type II)					879	878
874	Poly-saccharides	874	874	875	875		
814	Glucomannan				815		
750-700	Aromatic esters	721	720	745, 737	723, 712	719	728
763, 760, 745, 737, 736	Aromatic out-of-plane C-H bend			745, 737	762		
719-722	CH_2 Rock (methylene)	721	72			719	
699-697	Aromatic ring bend	698	696				
660, 648	O-H Out-of-plane bend			660			

TABLE 8
MATCHES SUMMARY TABLE FOR FTIR RESULTS FROM LEVEL 2
AT THE FORKS SITE (DILg-33/08A), WINNIPEG, CANADA

Match (Scientific Name)	Match (Scientific Name)	Part	10633 Ceramic (Range)	6816 Chitho (Range)	6816BK Black Residue (Range)	6816BRN Brown Residue (Range)	12742B Black Residue (Range)	12742R Red Residue (Range)
CULTURAL								
Allium	Wild onion	Bull (raw)	1393-1356	3000-2800 1487-1446 739-702				
Asteraceae	Sunflower family	Leaf (cooked)			2946-2803 1254-1156 1152-1050	1250-1152 1168-1066		2942-2811 1450-1385 1385-1250
Helianthus	Sunflower seed	Shell	3000-2800 1483-1442					
Atriplex	Saltbush	Fruit	1131-906	2970-2819 1487-1446				
Cleome	Beeweed	Flower		2970-2819		2942-2831 1168-1066	2978-2811	
Phaseolus	Beans	Bean	3000-2800					
Pinus	Pine	Nut skin	3000-2800 1487-1442 1393-1356 1205-1136					
Quercus	Acorn	Nut shell						1450-1385 1385-1250 1250-1156
		Nut meat	1552-1520 1475-1450					
Ribes	Currant	Fruit (raw)	1393-1356	3000-2800 1761-1716 1487-1446 739-702				
Zea mays	Maize	Cupule (boiled)	3000-2800 1487-1442					
Zizania	Wild rice	Seed (raw)	3000-2800 1487-1442 1393-1356 1205-1136					

TABLE 8 (continued)

Match (Scientific Name)	Match (Scientific Name)	Part	10633 Ceramic (Range)	6816 Chitho (Range)	6816BK Black Residue (Range)	6816BRN Brown Residue (Range)	12742B Black Residue (Range)	12742R Red Residue (Range)
CULTURAL								
Aves	Duck	Skin	3000-2800 1483-1442 743-706					
Mammalia	Bison	Fat from bison long bone marrow		3000-2800 1189-1140				
Mammalia	Prong-horn	Blood						2942-2811 1450-1385 1385-1250 1250-1156 1148-1078
ENVIRONMENTAL								
Achillea	Yarrow	Stem	3000-2800 1197-1140					
Deteriorated Cellulose	Deteriorated Cellulose			1246-886 813-768				
Helianthus	Sunflower	Flower	3000-2800 1487-1442 1393-1356					
Humates	Humates		3000-2800			2942-2831	1491-1336	
Populus	Aspen/ Cottonwood	Bark		3000-2800 1761-1716 1487-1446				
Rhus	Skunkbush	Bark	3000-2800 1487-1442 1205-1136					
Schoeno-plectus	Bulrush	Stem		3000-2800 1761-1716 1487-1446 739-702				

TABLE 9
XRF RESULTS FOR OCHRE BOWL FROM THE FORKS SITE (DlLg-33/08A), WINNIPEG, CANADA

Sample Location	Iron (Fe)	Potassium (K)	Calcium C)	K/C Ratio	Titanium (Ti)
Middle left ochre spot “small spot”	0.702 ± 0.035	0.591 ± 0.043	11.565 ± 0.249	0.0511	0.09 ± 0.007
Middle left ochre spot retake with “large spot”	0.818 ± 0.017	0.419 ± 0.017	14.856 ± 0.096	0.0282	0.074 ± 0.003
Lower left ochre spot	2.29 ± 0.074	0.514 ± 0.057	15.035 ± 0.322	0.0342	0.088 ± 0.01
Slightly to right of lower left ochre spot	0.458 ± 0.027	0.431 ± 0.052	18.127 ± 0.258	0.0238	0.079 ± 0.009
Parent rock (1)	1.619 ± 0.051	1.119 ± 0.07	9.29 ± 0.202	0.1205	0.186 ± 0.012
Parent rock (2)	1.349 ± 0.042	1.013 ± 0.038	10.26 ± 0.135	0.0987	0.156 ± 0.006

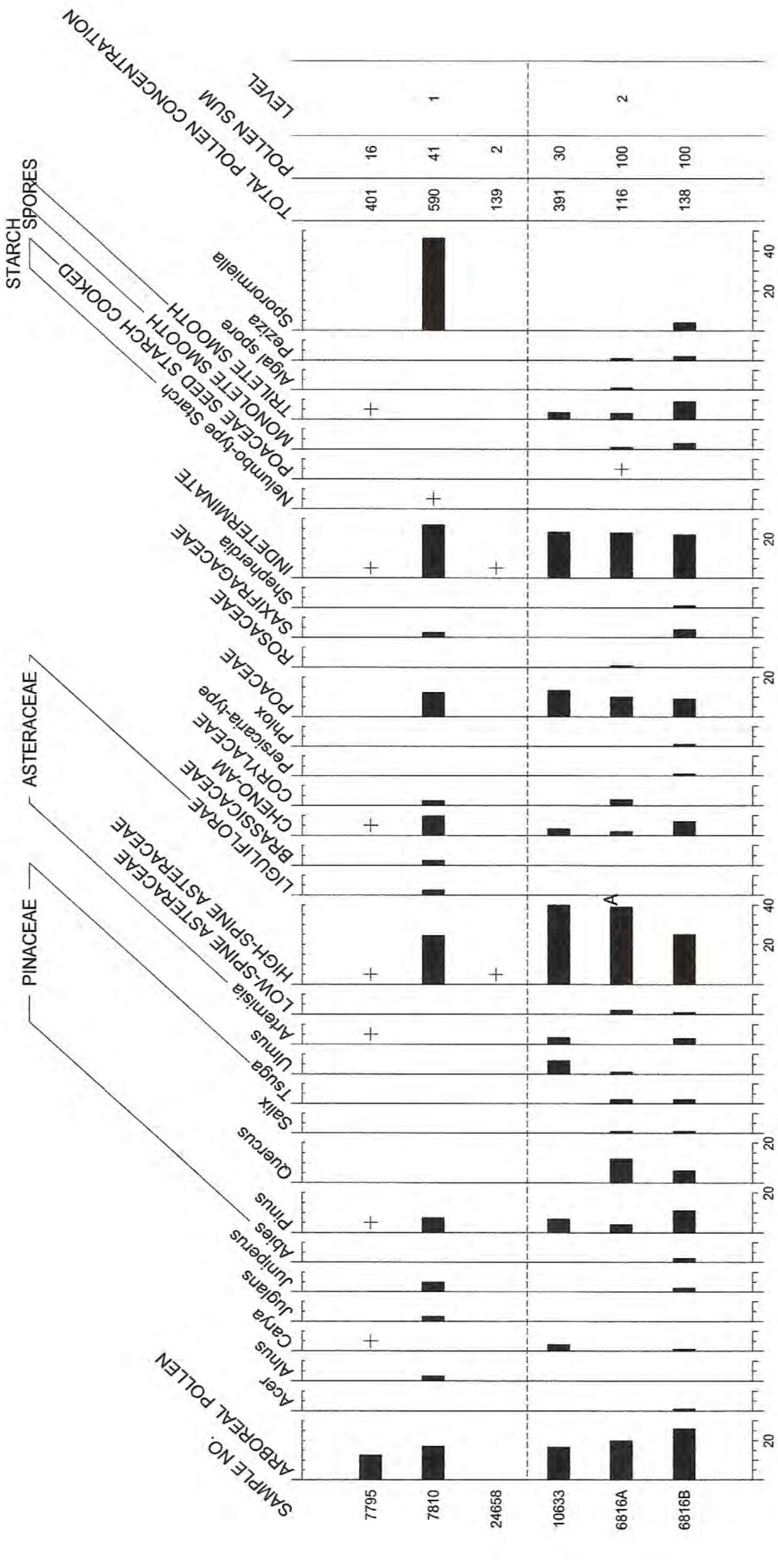

FIGURE 1. POLLEN DIAGRAM FOR SAMPLES FROM THE FORKS SITE (DLLG-33/08A)

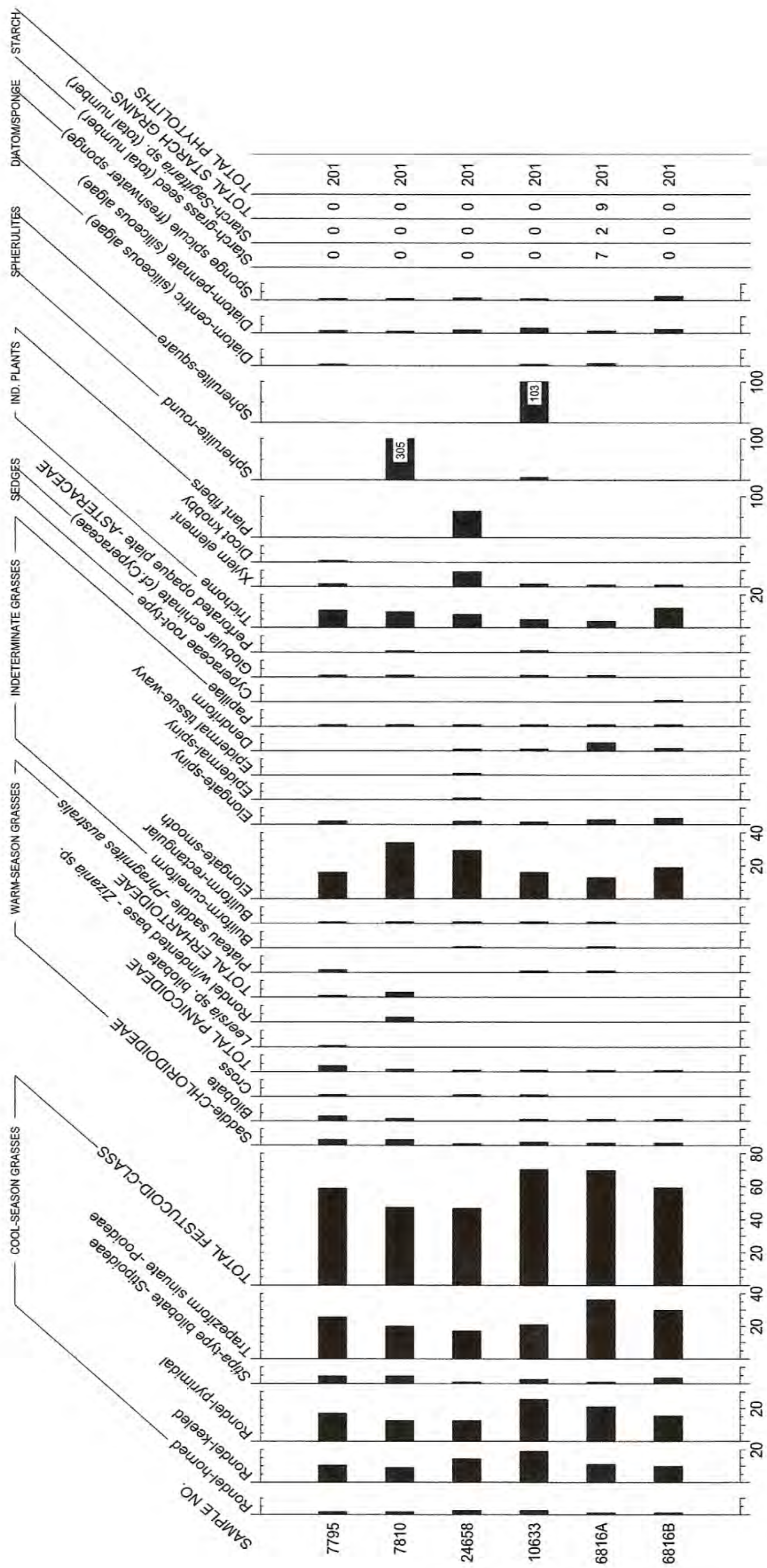

FIGURE 2. PHYTOLITH AND STARCH DIAGRAM FOR CERAMIC RESIDUE FROM THE FORKS SITE (DILG-33/08A), WINNIPEG, CANADA.

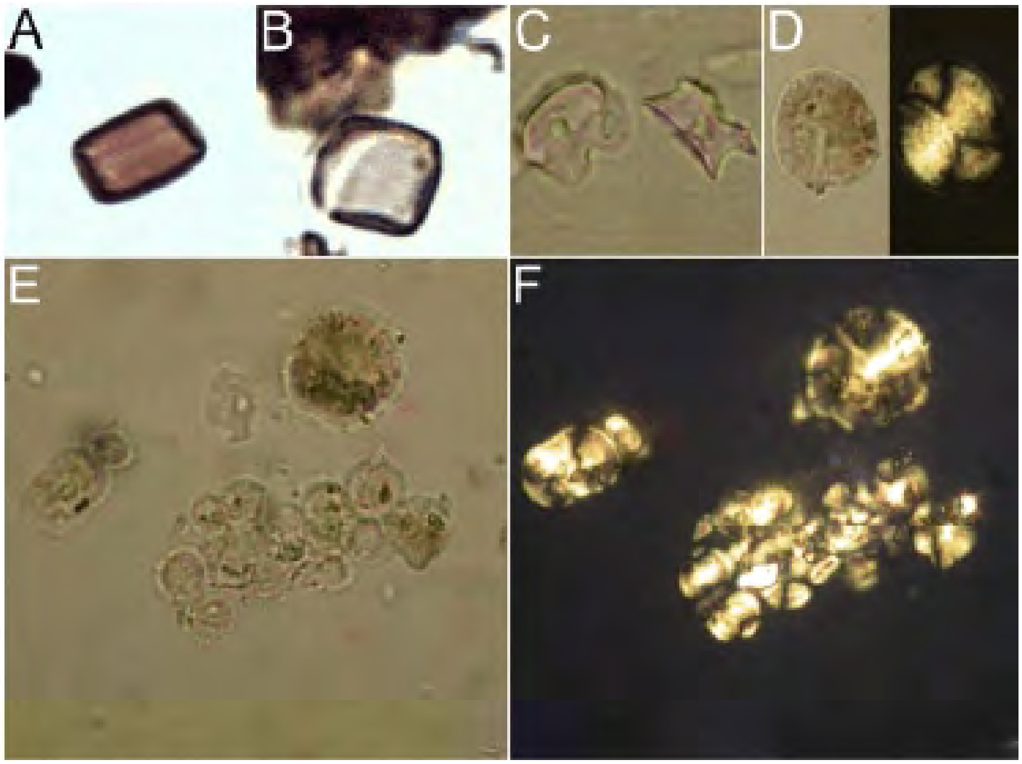

FIGURE 3. SELECTED MICROFOSSILS FROM CERAMIC RESIDUE SAMPLE 7810 FROM THE FORKS SITE (DlLg-33/08A), MANITOBA, CANADA.

A - B) Single ascospores from the coporolitic fungi *Sporormiella*. C) Wild rice (*Zizania* sp.) rondel phytolith in top view (left side) and side view. D) A single calcium carbonate spherulite viewed under normal light (left side) and cross-polarized light (right side). E) Single and aggregated spherulites under normal light, and F) cross-polarized light.

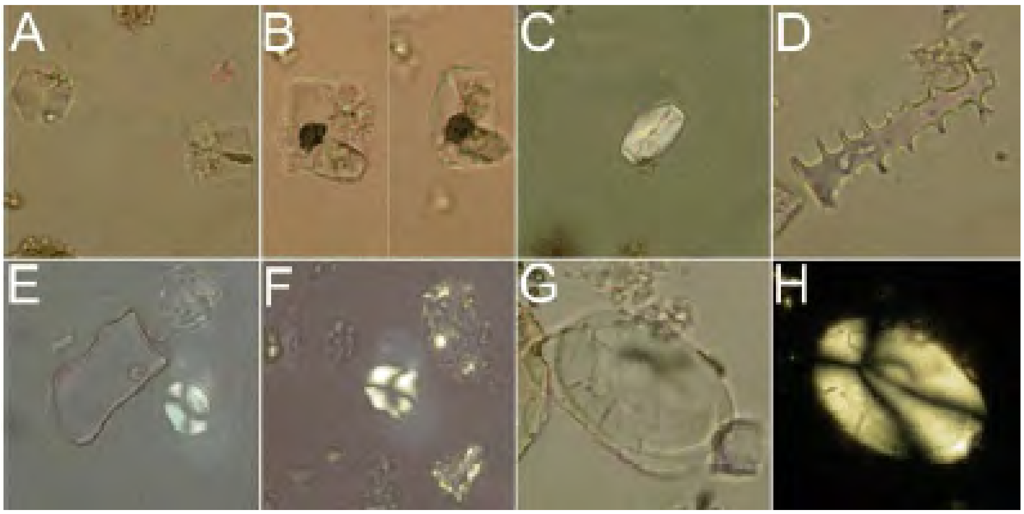

FIGURE 4. SELECTED MICROFOSSILS FROM CERAMIC RESIDUE SAMPLES 10633 AND 6816A FROM THE FORKS SITE (DlLg-33/08A), MANITOBA, CANADA.

A) Square-shaped calcium oxalate spherulites. B) A single square-shaped spherulite exhibiting the start of the formation of fibrous crystallites in the upper right corner of the crystal in top view (left side of image) and in side view (right side of image). Given enough time, these fibrous crystallites with grow out from the center, yielding an overall spherical shape for the spherulite, as seen in Figure 2 D. C) Square-shaped spherulite in side view and under cross-polarized light. D) Dendriform phytolith derived from the material that surrounds grass seed. E) Circular and F) angular grass seed starch grains viewed under coss-polarized light. G) Eccentric *Sagittaria*-type root starch under normal light and H) cross-polarized light.

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