

**Archaeological Investigations at the Cut Arm Site (FbNp-22):  
Evidence for Wanuskewin Heritage Park as an Island on the Plains**

A Thesis

Submitted to the College of Graduate Studies and Research

In Partial Fulfillment of the Requirements for the

Degree of Master of Arts in the

Department of Archaeology and Anthropology

University of Saskatchewan

Saskatoon

By Nadia C. Smith

## **Permission to Use**

In presenting this thesis in partial fulfilment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying, publication, or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

Requests for permission to copy or to make other use of material in this thesis in whole or part should be addressed to:

Head of the Department of Archaeology and Anthropology  
55 Campus Drive  
University of Saskatchewan  
Saskatoon, Saskatchewan  
S7N 5B1

## **Abstract**

The Cut Arm site (FbNp-22) is a well stratified, multi-component habitation site on the Northern Plains. The Cut Arm site lies within Wanuskewin Heritage Park near Saskatoon, Saskatchewan which is centered on the Opimihaw Creek. The site was first identified in the original survey of the Wanuskewin Heritage Park area and was excavated in 2001 and 2002 by the Department of Archaeology, University of Saskatchewan undergraduate field school.

The site contains cultural materials spanning from the Historic period to the Early Middle Precontact period and occupations from the following phases: Historic period, Contact period, Plains Side-Notched complex, Prairie Side-Notched complex, Besant complex, McKean series, Oxbow complex and the Mummy Cave series. This cultural chronology is supported by five radiocarbon dates. The occurrence of all such phases within a single site is relatively rare and presents an important opportunity for expanding upon the knowledge of human occupation on the Northern Plains.

The overarching research objective of this thesis is to further the reconstruction of prehistoric subsistence and settlement patterns within the Opimihaw Creek area. A comprehensive analysis and interpretation of the archaeological assemblage was undertaken which includes both features as well as faunal, lithic, pottery, ceramic, metal and botanical artifacts to determine how, when and why the site was occupied. The Cut Arm site contains multiple Middle Precontact period occupations which are discussed in context with other sites in the Wanuskewin Heritage Park containing components from this period. A pattern of intensive utilization of the park throughout the Middle Precontact is identified and discussed in terms of the unique character of the area. The identification of this terrestrial island on the plains contributes to an archaeological understanding of human mobility, settlement and subsistence patterns on the Northern Plains.

## Acknowledgements

First and foremost I would like to thank my supervisor Dr. Ernie Walker for all of his help and guidance throughout my Master's program and thesis research. I would also like to thank the other members of my Advisory Committee: Dr. Margaret Kennedy and Dr. Alec Aitken for their support and recommendations. I am also very grateful for Dr. Ernie Walker's help with the identification of the archaeological materials from the Cut Arm site as well as Dr. Margaret Kennedy for sharing her expertise in identifying the historic artifacts from the site and Dr. David Meyer for his assistance in identifying the pottery. All other faculty and staff in the Department of Archaeology and Anthropology have offered nothing but kindness and support and have encouraged me to grow as a responsible researcher.

I would like to thank all sources of financial support including: the Department of Archaeology and Anthropology, University of Saskatchewan for departmental scholarships and teaching assistantships; the Saskatchewan Heritage Foundation and the Saskatchewan Archaeological Society with funding from Saskatchewan Lotteries for research grants; and the University of Saskatchewan Graduate Students' Association and the Saskatoon Chapter of the Multiple Sclerosis Society for academic bursaries.

I would like to thank everyone who was a part of the Cut Arm site project prior to my taking it on. Your hard work and dedication has made my work possible.

I would like to thank all of my fellow graduate students both past and present. In particular I would like to mention my lab mates: Jody Pletz, Maria Mampe and Loni Williams. Thank you for helping me work through my questions, problems, stresses and successes. I would like to acknowledge the graduate students of my year: Alison Macintosh, Jennifer Donlevy, Adam Splawinski and Karin Steuber, whom I am lucky enough to have had not only as colleagues but close friends as well. I would like to thank Ian, Derek and Brent for the many lunch breaks and coffee runs and for keeping me company on those quiet days in the building.

I would like to thank my many family members. Your constant support throughout the course of my program has meant so much. Finally, I want to thank my loving husband Jordan and my wonderful son Gavin for more than I can say. Thank you.

# Table of Contents

<b>Permission to Use .....</b>	<b>i</b>
<b>Abstract .....</b>	<b>ii</b>
<b>Acknowledgements .....</b>	<b>iii</b>
<b>Table of Contents .....</b>	<b>iv</b>
<b>List of Tables .....</b>	<b>x</b>
<b>List of Figures .....</b>	<b>xii</b>
<b>Chapter 1 Introduction .....</b>	<b>1</b>
1.1 Research Background .....	1
1.2 Research Objectives .....	2
1.3 Organizational Summary .....	2
<b>Chapter 2 Biophysical Resources and Culture History .....</b>	<b>4</b>
2.1 Biophysical Resources .....	4
2.1.1 Biophysical Overview of the Cut Arm Site Area .....	4
2.1.2 Geomorphology and Soils .....	5
2.1.3 Floral and Faunal Resources .....	7
2.2 Culture History .....	10
2.2.1 Introduction .....	10
2.2.2 Early Precontact Period .....	12
2.2.3 Middle Precontact Period .....	15
2.2.4 Late Precontact Period .....	19
2.2.5 Contact/Historic Period .....	22
<b>Chapter 3 Research Methodology and Radiocarbon Dating .....</b>	<b>24</b>
3.1 History of Research .....	24
3.2 Survey, Excavation and Laboratory Methodology .....	24
3.3 Analytical Methodology .....	26
3.3.1 Pottery and Ceramics .....	26
3.3.2 Metal .....	27
3.3.3 Botanical Specimens .....	27
3.3.4 Faunal Specimens .....	27
3.3.5 Lithic Artifacts .....	29
3.4 Stratigraphy and Radiocarbon dates .....	32
3.4.1 Stratigraphy .....	32
3.4.2 Radiocarbon Dating .....	35

<b>Chapter 4 Cultural Level 1 .....</b>	<b>38</b>
4.1 Introduction .....	38
4.2 Pottery Assemblage .....	38
4.2.1 European Ceramics .....	38
4.2.2 Precontact Pottery .....	40
4.3 Metal Assemblage .....	40
4.4 Lithic Assemblage .....	41
4.4.1 Cores and Core Fragments .....	41
4.4.2 Debitage .....	41
4.4.3 Fire-Cracked Rock .....	42
4.5 Botanical Assemblage .....	42
4.6 Faunal Assemblage .....	42
4.6.1 Order Artiodactyla .....	43
4.6.2 Order Lagomorpha .....	44
4.6.3 Order Rodentia .....	45
4.6.4 Miscellaneous Specimens .....	45
4.7 Seasonality .....	46
4.8 Features and Artifact Distribution .....	46
4.9 Interpretation of Level 1 .....	47
<b>Chapter 5 Cultural Level 2 .....</b>	<b>51</b>
5.1 Introduction .....	51
5.2 Pottery Assemblage .....	51
5.2.1 Precontact Pottery .....	51
5.3 Lithic Assemblage .....	55
5.3.1 Projectile Points .....	55
5.3.2 Unifaces .....	55
5.3.3 Retouched Flakes .....	56
5.3.4 Debitage .....	56
5.3.5 Fire-Cracked Rock .....	57
5.4 Botanical Assemblage .....	58
5.5 Faunal Assemblage .....	58
5.5.1 Order Artiodactyla .....	58
5.5.2 Order Carnivora .....	60
5.5.3 Miscellaneous Specimens .....	60
5.6 Seasonality .....	61
5.7 Features and Artifact Distribution .....	61
5.8 Interpretation of Level 2 .....	62
<b>Chapter 6 Cultural Level 3 .....</b>	<b>66</b>
6.1 Introduction .....	66

6.2 Pottery Assemblage .....	66
6.2.1 Precontact Pottery .....	66
6.3 Lithic Assemblage .....	68
6.3.1 Projectile Points .....	68
6.3.2 Bifaces .....	69
6.3.3 Unifaces .....	70
6.3.4 Retouched Flakes .....	71
6.3.5 Cores and Core Fragments .....	72
6.3.6 Debitage .....	72
6.3.7 Fire-Cracked Rock .....	74
6.4 Botanical Assemblage .....	74
6.5 Faunal Assemblage .....	74
6.5.1 Order Artiodactyla .....	75
6.5.2 Miscellaneous Specimens .....	76
6.6 Seasonality .....	77
6.7 Features and Artifact Distribution .....	77
6.8 Interpretation of Level 3 .....	78
<b>Chapter 7 Cultural Level 4 .....</b>	<b>81</b>
7.1 Introduction .....	81
7.2 Pottery Assemblage .....	81
7.2.1 Precontact Pottery .....	81
7.3 Lithic Assemblage .....	82
7.3.1 Projectile Points .....	82
7.3.2 Bifaces .....	83
7.3.3 Unifaces .....	84
7.3.4 Retouched Flakes .....	85
7.3.5 Cores and Core Fragments .....	85
7.3.6 Debitage .....	85
7.3.7 Pecked Stone Tools .....	87
7.3.8 Fire-Cracked Rock .....	87
7.4 Botanical Assemblage .....	89
7.5 Faunal Assemblage .....	89
7.5.1 Order Artiodactyla .....	90
7.5.2 Order Carnivora .....	92
7.5.3 Miscellaneous Specimens .....	93
7.6 Seasonality .....	94
7.7 Features and Artifact Distribution .....	94
7.8 Interpretation of Level 4 .....	94
<b>Chapter 8 Cultural Level 5 .....</b>	<b>99</b>

8.1	Introduction .....	99
8.2	Pottery Assemblage .....	100
8.3	Lithic Assemblage .....	100
8.3.1	Projectile Points .....	100
8.3.2	Bifaces .....	100
8.3.3	Retouched Flakes .....	102
8.3.4	Cores and Core Fragments .....	102
8.3.5	Debitage .....	104
8.3.6	Fire-Cracked Rock .....	107
8.4	Botanical Assemblage .....	107
8.5	Faunal Assemblage .....	107
8.5.1	Order Artiodactyla .....	109
8.5.2	Order Carnivora .....	111
8.5.3	Miscellaneous Specimens .....	111
8.6	Seasonality .....	111
8.7	Features and Artifact Distribution .....	112
8.8	Interpretation of Level 5 .....	113
<b>Chapter 9</b>	<b>Cultural Level 6 .....</b>	<b>119</b>
9.1	Introduction .....	119
9.2	Lithic Assemblage .....	119
9.2.1	Projectile Points .....	119
9.2.2	Expedient Tools .....	119
9.2.3	Debitage .....	121
9.2.4	Fire-Cracked Rock .....	122
9.3	Faunal Assemblage .....	122
9.3.1	Order Artiodactyla .....	124
9.3.2	Miscellaneous Specimens .....	126
9.4	Seasonality .....	126
9.5	Features and Artifact Distribution .....	127
9.6	Interpretation of Level 6 .....	128
<b>Chapter 10</b>	<b>Cultural Level 7 .....</b>	<b>133</b>
10.1	Introduction .....	133
10.2	Lithic Assemblage .....	133
10.2.1	Unifaces .....	133
10.2.2	Abrader .....	133
10.2.3	Debitage .....	135
10.2.4	Fire-Cracked Rock .....	136
10.3	Faunal Assemblage .....	136
10.3.1	Order Artiodactyla .....	137

10.3.2	Miscellaneous Specimens .....	138
10.4	Seasonality .....	139
10.5	Features and Artifact Distribution .....	139
10.6	Interpretation of Level 7 .....	139
<b>Chapter 11</b>	<b>Cultural Level 8 .....</b>	<b>143</b>
11.1	Introduction .....	143
11.2	Lithic Assemblage .....	143
11.2.1	Projectile Points .....	143
11.2.2	Unifaces .....	143
11.2.3	Debitage .....	145
11.2.4	Fire-Cracked Rock .....	146
11.3	Botanical Assemblage .....	147
11.4	Faunal Assemblage .....	147
11.4.1	Order Artiodactyla .....	148
11.4.2	Miscellaneous Specimens .....	150
11.5	Seasonality .....	151
11.6	Features and Artifact Distribution .....	151
11.7	Interpretation of Level 8 .....	154
<b>Chapter 12</b>	<b>Cultural Level 9 .....</b>	<b>158</b>
12.1	Introduction .....	158
12.2	Lithic Assemblage .....	158
12.2.1	Projectile Points .....	158
12.2.2	Debitage .....	158
12.2.3	Fire-Cracked Rock .....	160
12.3	Faunal Assemblage .....	160
12.3.1	Order Artiodactyla .....	161
12.3.2	Miscellaneous Specimens .....	163
12.4	Seasonality .....	163
12.5	Features and Artifact Distribution .....	164
12.6	Interpretation of Level 9 .....	165
<b>Chapter 13</b>	<b>Cultural Level 10 .....</b>	<b>169</b>
13.1	Introduction .....	169
13.2	Lithic Assemblage .....	169
13.2.1	Projectile Points .....	169
13.2.2	Retouched Flakes .....	169
13.2.3	Cores and Core Fragments .....	170
13.2.4	Debitage .....	170
13.2.5	Fire-Cracked Rock .....	171

13.3 Botanical Assemblage .....	172
13.4 Faunal Assemblage .....	172
13.4.1 Order Artiodactyla .....	173
13.4.2 Order Carnivora .....	173
13.4.3 Miscellaneous Specimens .....	175
13.5 Seasonality .....	175
13.6 Features and Artifact Distribution .....	175
13.7 Interpretation of Level 10 .....	176
<b>Chapter 14 Cultural Level 11 .....</b>	<b>180</b>
14.1 Introduction .....	180
14.2 Lithic Assemblage .....	180
14.2.1 Debitage .....	180
14.2.2 Fire-Cracked Rock .....	181
14.3 Faunal Assemblage .....	182
14.3.1 Order Artiodactyla .....	182
14.3.2 Miscellaneous Specimens .....	183
14.4 Seasonality .....	183
14.5 Features and Artifact Distribution .....	183
14.6 Interpretation of Level 11 .....	183
<b>Chapter 15 Wanuskewin Heritage Park: A Terrestrial Island on the Plains .....</b>	<b>187</b>
15.1 Terrestrial Islands on the Plains: Theoretical Background .....	187
15.2 Middle Precontact Period Occupation of the Opimihaw Creek Valley .....	189
15.2.1 The Amisk Site .....	192
15.2.2 The Newo Asiniak Site .....	195
15.2.3 The Dog Child Site .....	197
15.2.4 The Thundercloud Site .....	198
15.2.5 The Redtail Site .....	200
15.2.6 The Meewasin Creek Site .....	201
15.2.7 The Wolf Willow Site .....	203
15.2.8 The Cut Arm Site .....	204
15.3 The Opimihaw Creek Valley as an Island on the Plains .....	205
15.4 Chapter Conclusion .....	211
<b>Chapter 16 Summary and Conclusions .....</b>	<b>212</b>
16.1 Summary of the Cut Arm site .....	212
16.2 Future Research .....	215
<b>References Cited .....</b>	<b>216</b>

## List of Tables

Table 2.1: Cultural Chronology of the Northern Plains .....	12
Table 3.1: Mammal size classes .....	28
Table 3.2: Cultural Level depth ranges and average thicknesses .....	33
Table 3.3: Radiocarbon ages for the Cut Arm site .....	36
Table 4.1: Historic ceramics for Level 1 .....	39
Table 4.2: Precontact pottery for Level 1 .....	40
Table 4.3: Lithic debitage from Level 1 .....	42
Table 4.4: Faunal counts for Level 1 .....	43
Table 4.5: Faunal taxa for Level 1 .....	44
Table 4.6: Adult <i>Bison bison</i> quantification by element for Level 1 .....	44
Table 5.1: Precontact pottery for Level 2 .....	52
Table 5.2: Quantification of complete sherds for Level 2 .....	53
Table 5.3: Analysis of Level 2 complete sherds by type .....	54
Table 5.4: Lithic debitage from Level 2 .....	57
Table 5.5: Faunal counts for Level 2 .....	59
Table 5.6: Faunal taxa for Level 2 .....	59
Table 5.7: Adult <i>Bison bison</i> quantification by element for Level 2 .....	61
Table 6.1: Precontact pottery for Level 3 .....	67
Table 6.2: Quantification of complete sherds for Level 3 .....	67
Table 6.3: Analysis of Level 3 complete sherds by type .....	68
Table 6.4: Lithic debitage from Level 3 .....	73
Table 6.5: Fire-cracked rock from Level 3 .....	74
Table 6.6: Faunal counts for Level 3 .....	75
Table 6.7: Faunal taxa for Level 3 .....	75
Table 6.8: Adult <i>Bison bison</i> quantification by element for Level 3 .....	76
Table 7.1: Precontact pottery for Level 4 .....	81
Table 7.2: Lithic debitage from Level 4 .....	88
Table 7.3: Fire-cracked rock from Level 4 .....	89
Table 7.4: Faunal counts for Level 4 .....	90
Table 7.5: Faunal taxa for Level 4 .....	90
Table 7.6: Adult <i>Bison bison</i> quantification by element for Level 4 .....	92
Table 8.1: Lithic debitage from Level 5 .....	104
Table 8.2: Lithic debitage from Level 5a .....	105
Table 8.3: Lithic debitage from Level 5b .....	106
Table 8.4: Lithic debitage from Level 5c .....	106
Table 8.5: Faunal counts for Level 5, 5a, 5b and 5c .....	108
Table 8.6: Faunal taxa for Level 5, 5a, 5b, 5c .....	109
Table 8.7: Adult <i>Bison bison</i> quantification by element for Level 5, 5a, 5b and 5c .....	110

## List of Tables Continued

Table 9.1: Lithic debitage from Level 6 .....	121
Table 9.2: Faunal counts for Level 6 .....	122
Table 9.3: Faunal taxa for Level 6 .....	122
Table 9.4: Adult <i>Bison bison</i> quantification by element for Level 6 .....	123
Table 9.5: Lithic types in artifact-dense units .....	127
Table 10.1: Lithic debitage from Level 7 .....	136
Table 10.2: Faunal counts for Level 7 .....	137
Table 10.3: Faunal taxa for Level 7 .....	137
Table 10.4: Adult <i>Bison bison</i> quantification by element for Level 7 .....	138
Table 10.5: Lithic types in artifact-dense units .....	140
Table 11.1: Lithic debitage from Level 8 .....	146
Table 11.2: Fire-cracked rock from Level 8 .....	146
Table 11.3: Faunal counts for Level 8 .....	148
Table 11.4: Faunal taxa for Level 8 .....	148
Table 11.5: Adult <i>Bison bison</i> quantification by element for Level 8 .....	149
Table 11.6: Highest concentrations of FCR by unit in Level 8 .....	151
Table 11.7: Lithic types in artifact-dense units .....	152
Table 12.1: Lithic debitage from Level 9 .....	159
Table 12.2: Faunal counts for Level 9 .....	160
Table 12.3: Faunal taxa for Level 9 .....	160
Table 12.4: Adult <i>Bison bison</i> quantification by element for Level 9 .....	162
Table 12.5: Immature <i>Bison bison</i> quantification by element for Level 9 .....	163
Table 12.6: Lithic types by unit .....	164
Table 13.1: Lithic debitage from Level 10 .....	171
Table 13.2: Faunal counts for Level 10 .....	172
Table 13.3: Faunal taxa for Level 10 .....	173
Table 13.4: Adult <i>Bison bison</i> quantification by element for Level 10 .....	173
Table 13.5: Adult <i>Canis sp.</i> quantification by element for Level 10 .....	175
Table 13.6: Lithic types in artifact-dense units .....	176
Table 14.1: Lithic debitage from Level 11 .....	181
Table 14.2: Faunal counts for Level 11 .....	182
Table 14.3: Faunal taxa for Level 11 .....	182
Table 15.1: Radiocarbon ages for sites containing Middle Precontact period occupations in the Opimihaw Creek valley area .....	193
Table 16.1: Cultural chronology of the Cut Arm site with radiocarbon dates and diagnostic artifacts .....	213

## List of Figures

Figure 2.1: Location of the Cut Arm site .....	5
Figure 2.2: Location of Wanuskewin Heritage Park within the Prairie Ecozone on the edge of the Moist Mixed Grassland and Aspen Parkland Ecozones in Saskatchewan .....	7
Figure 2.3: Location of Saskatoon, Saskatchewan within the Aspen Parkland vegetation type ...	7
Figure 3.1: Cut Arm site coulee .....	25
Figure 3.2: Cut Arm site map .....	25
Figure 3.3: Wall profile showing slope of the surface and stratigraphy .....	32
Figure 3.4: West wall profile of unit 70S78E and unit 69S78E .....	34
Figure 3.5: West wall profile of unit 59S71E .....	35
Figure 4.1: Relief-molded vitrified whitewear vessel .....	39
Figure 4.2: Vitrified whitewear handle .....	39
Figure 4.3: Vitrified whitewear stamped saucer .....	39
Figure 4.4: Metal projectile point .....	41
Figure 4.5: <i>Lepus americanus</i> mandible and teeth fragments .....	45
Figure 4.6: Artifact and feature distribution map of Level 1, 1 of 2 .....	49
Figure 4.7: Artifact and feature distribution map of Level 1, 2 of 2 .....	50
Figure 5.1: Interior exfoliation with brushmarks and limestone inclusions .....	52
Figure 5.2: Mortlach rim sherds .....	53
Figure 5.3: Mortlach basal sherds .....	54
Figure 5.4: Level 2 projectile points .....	55
Figure 5.5: Level 2 flaked stone tools .....	56
Figure 5.6: Pathological <i>Bison bison</i> molars .....	59
Figure 5.7: Artifact and feature distribution map of Level 2, 1 of 2 .....	64
Figure 5.8: Artifact and feature distribution map of Level 2, 2 of 2 .....	65
Figure 6.1: Level 3 Prairie Side-Notched projectile points .....	69
Figure 6.2: Basalt biface .....	70
Figure 6.3: Silicified peat biface .....	70
Figure 6.4: Level 3 endscrapers .....	71
Figure 6.5: Basalt uniface .....	72
Figure 6.6: Artifact and feature distribution map of Level 3, 1 of 2 .....	79
Figure 6.7: Artifact and feature distribution map of Level 3, 2 of 2 .....	80
Figure 7.1: Prairie Side-Notched projectile point from Level 4 .....	82
Figure 7.2: Bifacial drill .....	83
Figure 7.3: Level 4 bifaces .....	84
Figure 7.4: Endscrapers .....	84
Figure 7.5: Swan River Chert core .....	86

## List of Figures Continued

Figure 7.6: Cultural pebble of chert precipitated in limestone (CPL) .....	86
Figure 7.7: Hammerstones in Level 4 .....	87
Figure 7.8: Adult <i>Bison bison</i> mandibular fragment containing P4 and M1 .....	91
Figure 7.9: Lithic fragment imbedded in Very Large Mammal rib fragment .....	93
Figure 7.10: Artifact and feature distribution map of Level 4, 1 of 2 .....	97
Figure 7.11: Artifact and feature distribution map of Level 4, 2 of 2 .....	98
Figure 8.1: Level 5a projectile points .....	101
Figure 8.2: Broken white chert biface, separate and reconstructed .....	101
Figure 8.3: Retouched flake from Level 5 .....	102
Figure 8.4: Retouched flakes from Level 5a .....	103
Figure 8.5: Red quartzite core from Level 5a .....	103
Figure 8.6: Feature 5b-1 from unit 71S81E .....	112
Figure 8.7: Artifact and feature distribution map of Level 5 .....	115
Figure 8.8: Artifact and feature distribution map of Level 5a .....	116
Figure 8.9: Artifact and feature distribution map of Level 5b .....	117
Figure 8.10: Artifact and feature distribution map of Level 5c .....	118
Figure 9.1: Knife River Flint projectile point fragment .....	120
Figure 9.2: Quartzite cobble tool .....	120
Figure 9.3: <i>Bison bison</i> fragmented left mandible .....	125
Figure 9.4: <i>Bison bison</i> fragmented right mandible .....	125
Figure 9.5: <i>Bison bison</i> incomplete right mandible .....	126
Figure 9.6: Artifact and feature distribution map for Level 6, 1 of 2 .....	130
Figure 9.7: Artifact and feature distribution map for Level 6, 2 of 2 .....	131
Figure 9.8: Faunal and lithic concentrations in Level 6 .....	132
Figure 10.1: White chert endscraper .....	134
Figure 10.2: Grey chert uniface .....	134
Figure 10.3: Granite cobble abrader .....	135
Figure 10.4: Artifact and feature distribution map for Level 7 .....	141
Figure 10.5: Units of artifact concentration for Level 7 .....	142
Figure 11.1: McKean Lanceolate projectile point .....	144
Figure 11.2: Level 8 unifacial tools .....	144
Figure 11.3: Chert cobble .....	145
Figure 11.4: <i>Bison bison</i> right mandible with P4, M1, M2 and M3 .....	150
Figure 11.5: Feature 8-1 bone bed in unit 70S81E at 125 cm dbs .....	153
Figure 11.6: Feature 8-2 charcoal stain in east quadrants of unit 70S81E .....	153
Figure 11.7: Artifact and feature distribution map for Level 8 .....	156
Figure 11.8: Units of artifact concentration for Level 8 .....	157
Figure 12.1: Oxbow projectile point .....	159
Figure 12.2: <i>Bison bison</i> right maxilla with mixed dentition .....	162

## List of Figures Continued

Figure 12.3: Stratigraphic profile of west wall of units 69S78E and 70S78E .....	165
Figure 12.4: Artifact and feature distribution map for Level 9 .....	167
Figure 12.5: Units of artifact concentration for Level 9 .....	168
Figure 13.1: Early Side-Notched projectile point .....	170
Figure 13.2: <i>Canis sp.</i> partial forelimb .....	174
Figure 13.3: Artifact and feature distribution map for Level 10 .....	178
Figure 13.4: Units of artifact concentration for Level 10 .....	179
Figure 14.1: Orthoquartzite pebble .....	181
Figure 14.2: Artifact and feature distribution map for Level 11 .....	185
Figure 14.3: Units of artifact concentration for Level 11 .....	186
Figure 15.1: Sites with Middle Precontact period occupations in the Wanuskewin Heritage Park .....	191
Figure 15.2: Proposed boundaries of Opimihaw Creek valley terrestrial island .....	207

# Chapter 1

## Introduction

### 1.1 Research Background

The Cut Arm site (FbNp-22) is a well stratified, multi-component habitation site on the Northern Plains. The site contains cultural materials spanning from the Historic period to the Early Middle Precontact period and occupations from the following phases: Historic period, Contact period, Plains Side-Notched complex, Prairie Side-Notched complex, Besant complex, McKean series, Oxbow complex and the Mummy Cave series. The occurrence of all such phases within a single site is relatively rare and presents an important opportunity for expanding upon the knowledge of human occupation on the Northern Plains.

The Cut Arm site lies within Wanuskewin Heritage Park roughly 2.5 km north of Saskatoon, Saskatchewan. The park is centered on the Opimihaw Creek which is a tributary to the north of the South Saskatchewan River. The area first received attention from the archaeological community in the early 1930s. Several small-scale surveys and test excavations were undertaken over the next 40 years led by professional and avocational researchers including Thad C. Hecker, Thomas K. Kehoe, Z. S. Pohorecky and members of the Saskatoon Archaeological Society (Walker 1983; Walker 1988).

In 1982 and 1983 a comprehensive survey of the Opimihaw Creek area was conducted by E.G. Walker on behalf of the Meewasin Valley Authority (Walker 1983). The survey identified 21 archaeological sites including two historic and nineteen precontact sites. Of the precontact sites ten have undergone excavation including: FbNp-1 (Harty 2005), the Sunburn Tipi Ring site (FbNp-7) (Walker 1988), the Meewasin Creek site (FbNp-9) (Frery 2009), the Redtail site (FbNp-10) (Ramsay 1993), the Newo Asiniak site (FbNp-16) (Kelly 1986), the Amisk site (FbNp-17) (Amundson 1986), the Cut Arm site (FbNp-22), the Dog Child site (FbNp-24) (Cyr 2006; Pletz 2010), the Thundercloud site (FbNp-25) (Mack 2000; Webster 1999) and the Wolf Willow site (FbNp-26) (Maria Mampe, personal communication 2012). The majority of the

precontact sites are multi-component in nature and represent an unusually high concentration of occupation in a relatively small area on the Northern Plains. This unique archaeological resource has been acknowledged and protected through the establishment of the Wanuskewin Heritage Park in 1990 and its designation as both a Provincial Heritage Site in 1984 and a National Historic Site in 1986.

## **1.2 Research Objectives**

The overarching research objective of this thesis is to further the reconstruction of prehistoric subsistence and settlement patterns within the Opimihaw Creek area as part of the archaeological research of Dr. E. G. Walker at the Wanuskewin Heritage Park. More specifically, this objective includes:

- 1) Reconstruct the culture historical sequence of occupation at the Cut Arm site
- 2) Determine resource utilization patterns by occupants of the Cut Arm site and identify seasonal and long-term fluctuations in these patterns
- 3) Examine consistencies and discontinuities between the archaeological record at the Cut Arm site and the overall trends on the Northern Plains
- 4) Investigate the phenomenon of concentration of Middle Precontact period occupations within the Opimihaw Creek area to better understand Middle Precontact period settlement and subsistence patterns across the Northern Plains

## **1.3 Organizational Summary**

There are sixteen chapters in this thesis including this introductory chapter. Chapter 2 describes the biophysical location and resources of the Cut Arm site area. Also within this chapter is a review of culture history on the Northern Plains and the cultural chronology utilized. Chapter 3 is a discussion of the methodologies employed throughout the archaeological investigations at the Cut Arm site including survey, excavation, laboratory and analysis. Also in Chapter 3 is a discussion of the site stratigraphy as well as the radiocarbon ages for the Cut Arm site. Chapters 4 to 14 are a presentation of the archaeological data from each cultural level in the Cut Arm site. The artifacts and features from each level are described, the results of any analyses are presented, and patterns in spatial distribution are discussed followed by interpretations based on this data. Chapter 15 is an examination of the Wanuskewin Heritage

Park as an island on the plains and the evidence for this determination including a review of the Middle Precontact period occupations in the Opimihaw Creek area. It is argued that identification of the Opimihaw Creek area as a terrestrial island is an important step in explaining the unique concentration of occupations seen in the area and elucidating past patterns of mobility and resource utilization on the Northern Plains. Chapter 16 summarizes findings from the Cut Arm site and presents recommendations for future research.

## **Chapter 2**

### **Biophysical Resources and Culture History**

#### **2.1 Biophysical Resources**

##### **2.1.1 Biophysical Overview of the Cut Arm Site Area**

Wanuskewin Heritage Park is located roughly 2.5 km north of the city of Saskatoon. The park's boundaries encompass 150 acres including the Opimihaw Creek valley, its surrounding uplands, and portions of the west bank of the adjoining South Saskatchewan River. The Cut Arm site is one of 19 precontact archaeological sites identified within the Wanuskewin Heritage Park (Walker 1983). The site is situated within a drainage swale on the west bank of the South Saskatchewan River. It is located at 52° 13' 10" Northern Latitude and 106° 34' 52" Western Longitude, in the SW ¼ of the SW ¼ of Section 36 Township 37 Range 5 West of the 3<sup>rd</sup> Meridian (Walker 1982a) (Figure 2.1).

Wanuskewin Heritage Park lies within the semi-arid Prairie climatic region of Canada (Maybank and Bergsteinsson 1970). This region extends from southeastern Manitoba, west to the Rocky Mountains in southern Alberta and north to the edge of the boreal forest (Longley 1972). The climate is continental with short warm summers and dominating cold winters. The mean temperature is 18°C in July and -18.9°C in January although winter lows of below -40°C and summer highs of above 38°C have been recorded (Acton and Ellis 1978; Hare and Thomas 1979). The area averages 106 frost-free days per year and has a mean annual precipitation of 420 mm (Acton et al. 1998). Roughly 25% of all precipitation is in the form of snow. The majority of the region's precipitation falls in the summer months of June, July and August, with the least occurring over the winter and fall. Extreme weather includes blizzards in the winter, thunderstorms in the spring and summer as well as less frequent hailstorms and tornados in the summer. The region has a high number of sunny, cloud-free days (Hare and Thomas 1979). Moderate winds from the northwest dominate, however, lighter winds do occur from the south, southwest, and northeast (Maybank and Bergsteinsson 1970).



**Figure 2.1:** Location of the Cut Arm site (Adapted from *GoogleEarth*<sup>TM</sup> 2006).

### 2.1.2 Geomorphology and Soils

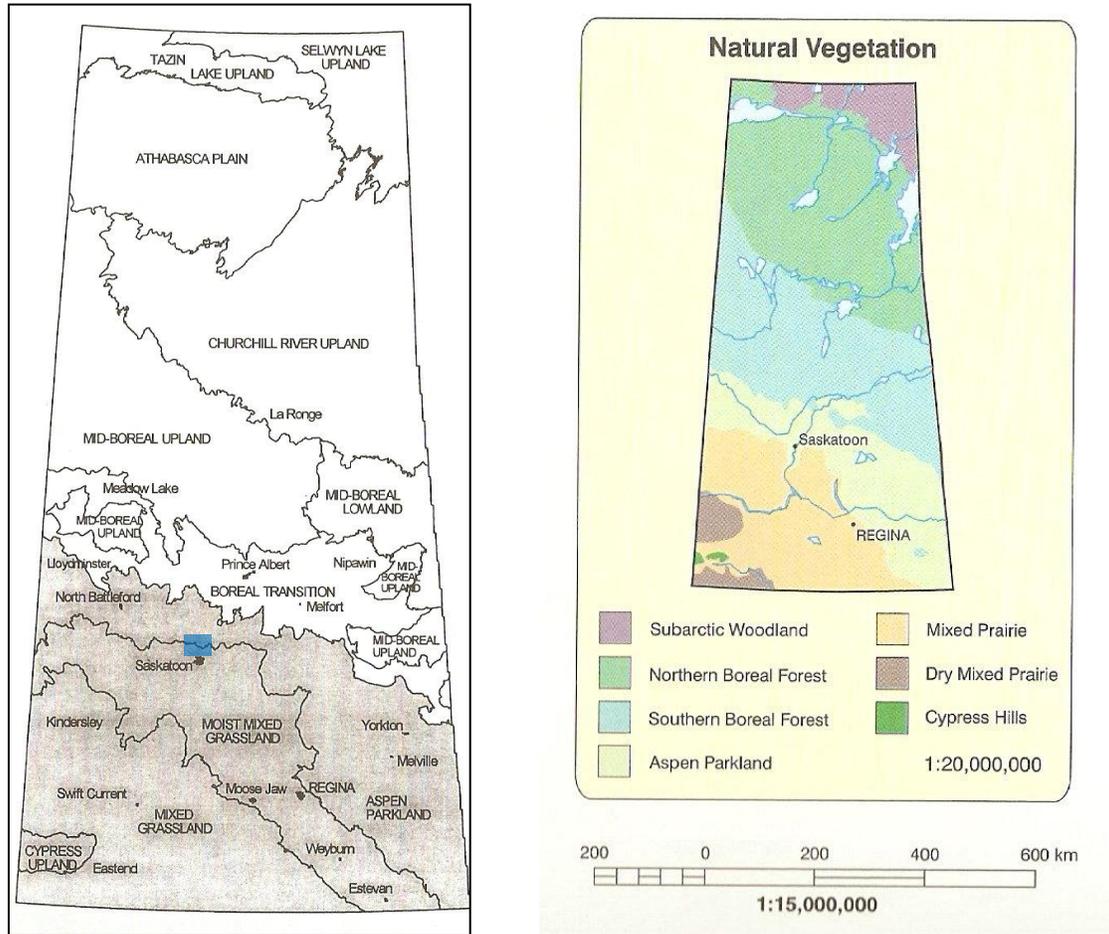
The Wanuskewin area has experienced multiple glaciations the most recent of which was the Wisconsinan glaciation. This event began with the advance of the Laurentide Ice Sheet roughly 20,000 years ago. By 12,000 years ago the glacier was retreating from the Saskatoon area leaving behind deposits known as the Battleford Formation. As the Laurentide Ice Sheet retreated, Glacial Lake Saskatoon formed from proglacial runoff and meltwater covering the Saskatoon area. As the glacier continued to recede, Glacial Lake Saskatoon was able to drain north via channels such as the South Saskatchewan River valley leaving behind glacio-lacustrine deposits (Christiansen and Sauer 1998). By roughly 11,500 B.P, the South Saskatchewan River was becoming a part of Saskatchewan's drainage system as its water level dropped and it incised itself into the landscape (Christiansen and Sauer 1998). During deglaciation the Opimihaw Creek valley began to form as a part of the area's braided drainage system. As the base level of the South Saskatchewan fell, incision of the Opimihaw Creek channel occurred. The Opimihaw Creek is currently an underfit meandering stream that extends north off of the South Saskatchewan River (Burt 1997).

Acton and Ellis (1978) categorize the Saskatoon area as being part of the Saskatchewan River Plain in the Saskatchewan Plains physiographic region of the Great Plains Province. The

Saskatchewan River Plain is sloped toward the northeast and drains externally into Hudson Bay via the Saskatchewan River. The specific physiographic sub-section of the study area is the Warman Plain (Acton and Ellis 1978). The landscape is shaped by its glacial history. The majority of the surface is covered with glacial till, glacio-fluvial and glacio-lacustrine sediments resulting in a gently rolling plain with an average elevation of 500-600 meters above sea level (Acton et al. 1998).

The soils of the Saskatoon area have developed from glacial till, glacio-fluvial, glacio-lacustrine, aeolian and more recent alluvial sediments (Ellis and Stonehouse 1970). Glacial till deposits are characterized by a wide range in particle size from clays to boulders. These sediments commonly result in a knob and kettle or till plain topography. Glacio-fluvial and glacio-lacustrine deposits are better sorted. Their sediments are a mix of fluvial gravels, sands, lacustrine silts and clays. The glacial deposits on the Warman Plain range anywhere from 50 – 150 meters thick. Colluvial and alluvial deposits occur in valleys and coulees as the result of erosional processes (Acton and Ellis 1978).

The dominant soil type is a Dark Brown Chernozemic soil. Chernozemic soils typically have a dark colored A horizon that are at least 8 cm thick and are well to imperfectly drained. Beneath this the B and C horizons have high calcium content (Acton and Ellis 1978). The chernozemic soils are different on the west and east sides of the Opimihaw Creek. To the west they are of the Bradwell Association and to the east they are of the Weyburn Association. The Bradwell Association soils formed under grassland vegetation from sandy glacio-lacustrine deposits. The Weyburn Association also formed under grasslands, but from moderately fine, unsorted till deposits. These soils are predominantly loamy in texture and contain sands and stones that are not found in the Bradwell Association (Acton and Ellis 1978). Besides dark chernozemic soils, those of the Hillwash Complex are also important in the area. These soils are found on the valley slopes of the Opimihaw and South Saskatchewan River. They are characterized by their occurrence on steeply sloping landscapes and very high surface drainage and can be chernozemic, regosolic or podzolic. Hillwash soils develop from colluvial or eroded sediments of glacial to more recent origins (Acton and Ellis 1978).



**Figure 2.2:** (left) Location of Wanuskewin Heritage Park (indicated by highlighting) within the Prairie Ecozone on the edge of the Moist Mixed Grassland and Aspen Parkland Ecoregions in Saskatchewan (Adapted from Acton et al. 1998:119).

**Figure 2.3:** (right) Location of Saskatoon, Saskatchewan within the Aspen Parkland vegetation type (Fung 1999:155).

### 2.1.3 Floral and Faunal Resources

Wanuskewin Heritage Park is located near the southern margin of the Aspen Parkland ecotone, immediately north of the Mixed Moist Grassland ecotone. The area therefore possesses characteristics of both ecoregions (Acton et al. 1998) (Figure 2.2).

Description of modern flora and fauna is meant for baseline data for palaeoenvironmental reconstruction. The floral resources of the area are dominated by the Aspen Parkland vegetation

type (Thorpe 1999) (Figure 2.3). The region consists of open grasslands interspersed with patches of aspen groves. The primary flora in the wooded areas is trembling aspen. Secondary are Balsam poplar and shrubs including prairie rose, western snowberry, thorny buffaloberry and wolf-willow. Plains rough fescue is the main flora in the grassland areas. This is supplemented by porcupine grass, June grass as well as a variety of sedges and forbes (Acton et al. 1998).

Wanuskewin Heritage Park consists of three vegetative zones as a result of the local topography and soils. These zones are characterized by the flora that are best suited to the unique characteristics of each zone within the Aspen Parkland vegetative zone. The Upland Prairie Zone is dominated by native grasses with thickets of shrubs occurring on the uplands east of Opimihaw Creek. The Cut Arm site is located in the Valley Slope Zone. This zone is affected by the nearby South Saskatchewan River and Opimihaw Creek resulting in an overstory of trees and an understory of bushes complimented by herbs and sedges. The unstable portions of the Valley Slope Zone that are undergoing erosion are dominated by grasses. The third vegetative zone in the park is the Lowland Zone. It is shaped by flooding of the river and creek and is most notable for riverine plant species that are not supported in the other zones (Landplan Collaborative Ltd. 1983).

The faunal resources of the Wanuskewin Heritage Park area have changed in number and distribution since the appearance of European traders and settlers. Prior to European contact the dominant animal species on the North American plains was bison. The bison population at this time has been estimated to be between 40 – 60 million (Banfield 1974). Bison are grazers with an adaptation to open grassland environments. Their primary food source are grasses though they supplement this with plant foliage and shrubs (McDonald 1981). As migratory animals, bison traveled in herds and used landscape features such as the Opimihaw Creek valley for protection during the winter (Banfield 1974). Bison played a pivotal role in the lives of the precontact occupants of the plains. These people were expert hunters of their large prey which provided not only a food source, but also hide for shelter and clothing, bone for tools and dung for fuel (Epp 1991). Hunting, trapping, trading and agricultural development during the Contact and Historic periods resulted in the near extermination of the plains bison.

Other than bison, several other ungulates are important in the list of faunal species on the plains. Pronghorn antelope are small, slender and agile. Prior to European contact pronghorn numbers and distribution were comparable to that of bison. Their numbers have since been

greatly reduced. Mule deer and elk were also common to the area, while moose were present in fewer numbers. Today, mule deer are still widespread along with white-tailed deer (Banfield 1974).

Carnivores are an important portion of the fauna inhabiting the Saskatoon area. As with herbivores they have been affected considerably by European arrival and development. Grizzly bears, mountain lions, wolves, swift foxes, wolverines, river otters, black-footed ferrets, American marten and fishers are all species that previously had a regular presence in the area. They have since been greatly reduced in number, extirpated, or exterminated. Coyotes have remained common as well as ermine, weasels, mink, striped skunk, raccoons and to a lesser degree badgers and red foxes (Banfield 1974).

A range of rodent species inhabit the Wanuskewin Heritage Park area. These include beaver, porcupine, northern pocket gophers, squirrels, voles and mice. Other mammals include shrews, smooth-faced bats, snowshoe hares and white-tailed jackrabbits (Banfield 1974).

Amphibians, reptiles, fish and birds round out the list of faunal resources. The most common fish species are walleye, northern pike, yellow perch, lake sturgeon and burbot. Amphibians include tiger salamanders, painted turtles, five species of snakes and six species of frogs and toads (Acton et al. 1998). The species of birds that have been identified in the area include primarily migratory songbirds, waterfowl and birds of prey (Smith 1999).

## 2.2 Culture History

### 2.2.1 Introduction

All discussions of culture history must begin with a brief review of the relevant terminology as well as the development of chronology in archaeology and such systems on the plains. The basic terminology to be used in this thesis will be presented in order to ensure consistency and prevent misunderstanding.

The basic taxonomic unit within archaeology is the *phase*. This term is equivalent to McKern's (1939:308) term *focus* and is defined by Phillips and Willey (1953:620) as

A space-time-cultural unit possessing traits sufficiently characteristic to distinguish it from all other cultural units similarly conceived, whether of the same or other cultural traditions, geographically limited to a relatively brief span of time (Phillip and Willey 1953:620)

Essentially, it is a suite of traits seen at a site that can also be identified in the same combination at other sites. This suite of traits, when seen at a single location such as an occupational layer within a site, is called a *component* (McKern 1939:308). A phase is therefore made up of one or more similar components. The ethnographic equivalent of a phase is the society, while that of a component is the community. When phases can be linked by their assemblages sharing a common economic adaptation they are referred to as an *archaeological culture* (Willey and Phillips 1958). Dyck (1983) replaces archaeological culture with *complex* because it removes the assumption that the entity being represented by the archaeological record is a culture as it is understood in ethnography. Dyck defines a complex as “a large composite archaeological unit. It consists of interconnected sites, features, and artifacts, tied together by similarities in function, style, technology, and subsistence-settlement system.” (Dyck 1983:69). Other important terminology includes *horizon* and *tradition*. These terms connect the primarily cultural term phase to temporal and spatial dimensions as well as having implications for the diffusion and spread of cultural traits (Phillips and Willey 1953). Dyck defines a tradition as “an element of a complex, often diagnostic which occurs in sequential complexes, passed down as it were from one to the other” (Dyck 1983:69). While a tradition is temporally expansive, a horizon is spatially broad with limited chronological depth. Lehmer and Caldwell (1966) define a horizon

as “a cultural stratum... characterized by enough common traits, or variants of the same trait, to appear as manifestations of the same basic culture complex” (Lehmer and Caldwell 1966:515). Within precontact plains archaeology a horizon can be identified by a horizon marker. These markers are highly specialized, temporally limited and widely traded artifacts, representing the rapid diffusion of ideas over a large area (Phillip and Willey 1953; Willey and Phillips 1967).

Arranging archaeological complexes into sequences, or chronologies, is essential to understanding the archaeological record beyond the scale of the phase. Chronologies can be created at the site level up to that of a region, ecological zone or continent (Dyck 1983). These chronologies are based on trends in the archaeological record combined with relative and chronometric dating. Projectile points are the best temporally diagnostic artifacts because they change morphologically and functionally through time and space. There are projectile points representing the entire occupational history of the Plains and as such they can be utilized in analyzing, separating and comparing archaeological assemblages. Pottery can also be very useful but is not present until roughly 2000 years ago and as such its usefulness is limited to the Late Precontact and Contact periods (Frison 1991).

The first archaeological sequence for Saskatchewan was created by Boyd Wettlaufer in 1955 based on data from the Mortlach site (Dyck 1983). This was later expanded upon by Wettlaufer and Meyer-Oakes (1960) resulting in a chronology applicable to much of the Northern Plains. Around the same time Mulloy (1958) produced a chronology for the Northwestern Plains. This chronology has largely remained unchanged; however, a number of important alterations to this chronology have been made due to new data that were not available (Frison 1991). An important adjustment was made by Frison (1978) with the removal of Mulloy’s Hiatus period to coincide with a better understanding of cultural activity on the plains during the Altithermal and the expansion of the Plains Archaic period to include this time span from 7,500-5,000 years ago. Walker’s (1992) chronology modified Frison’s (1978), replacing the term Archaic with the Middle Prehistoric but maintains the division of the Middle period into Early, Middle and Late. While a range of alternative chronologies have also been presented by various researchers (Peck 2011), this thesis will use a cultural chronology from Kennedy (personal communication 2012) which modifies that of Walker (1992). The term Prehistoric will be replaced with the more culturally sensitive term Precontact. The term Contact will be used to differentiate the specific period of European arrival and influence between roughly 200 – 300

years before present. The term Historic will be maintained to refer to the period after Contact and extending until roughly 50 years before present.

**Table 2.1:** Cultural Chronology of the Northern Plains (Kennedy 2012; Modified from Walker 1992:120).

Years (B.P)	Mulloy 1958		Frison 1978		Walker 1992		Kennedy 2012	
200	Historic		Historic		Historic		Historic	
300	Late Prehistoric		Late Prehistoric		Late Prehistoric		Contact	
2,000							Late Precontact	
3,000	Middle	Late	Plains Archaic	Late	Middle Prehistoric	Late	Middle Precontact	Late
5,000	Prehistoric	Middle		Middle		Middle		Middle
7,500	Hiatus			Early		Early		Early
12,000	Early Prehistoric		Palaeo-Indian		Palaeo-Indian		Early Precontact (Paleo-Indian)	

### 2.2.2 Early Precontact Period

One of the research goals of this thesis is to understand how the activities at the Cut Arm site fit into the general trends of the area over time. This can only be done after a review of the culture history for Saskatchewan and the Northern Plains.

The Early Precontact or Palaeo-Indian period spans roughly 11,500 – 7,500 radiocarbon years B.P and is characterized by large lithic spear points (Walker 1999). Over the course of this period the climate ameliorated (Meyer 1999) and by 11,500 years B.P. the glacial ice that had covered the majority of the Canadian plains had receded, allowing the return of flora, fauna and human habitation (Christiansen and Sauer 1998; Haynes 2005).

It is still under debate as to exactly how and when people first migrated to North America. There are three main theories of which there are many variations. The first is that during the Wisconsin glaciation people migrated across Beringia from eastern Asia into northern

North America and south via an ice-free corridor between the Laurentide and Cordilleran ice sheets (Haynes 1964). The second theory is of a Pacific coastal migration. Rather than travelling inland it is proposed that people skirted along the southern edge of Beringia and down the Pacific Coast of North America. Once below the southern margin of the Cordilleran glacier, migration would have expanded throughout the continent (Fladmark 1979; Mandryk et al. 2001). The third theory is that of a cross-Atlantic migration. In this case, the colonizers' most likely progenitors are coastally adapted groups from the Solutrean Culture in Western Europe. The theory suggests these groups followed marine resources across the northern Atlantic into North America during the last glacial maximum (Bradley and Stanford 2004).

Regardless of how humans arrived in North America, the first undisputed occupants of the Northern Plains are the Clovis people. The Clovis complex is radiocarbon dated to 11,500 – 11,000 years B.P. These Late Pleistocene hunters focused their subsistence on megafauna including mammoth (*Mammuthus sp.*) and extinct forms of bison (*Bison sp.*) (Frison 1993). The complex is characterized by large fluted spear points of high quality lithic materials manufactured with primarily percussion flaking. The Clovis tool-kit was highly adaptive and efficient, allowing for the exploitation of a wide range of ecological settings (Bradley 2010). Archaeological evidence of Clovis has been found throughout North America, but only as surface finds within Saskatchewan (Walker 1999).

The Goshen complex temporally overlaps with Clovis and is radiocarbon dated to 11,300 – 11,000 years B.P. (Walker 1999). Goshen projectile points were first found at the Hell Gap site (Irwin and Brew 1968) where they were labeled as a variant of Clovis. Excavations at the Mill Iron site resulted in the reassignment of Goshen to an independent cultural complex. It is characterized by slightly smaller, un-fluted spear points manufactured using pressure flaking and distinct basal thinning. Goshen's relationship with Clovis and Folsom remains unclear although it shares technological similarities with both. Like Clovis, Goshen people appear to have been hunters of large game including megafauna (Kornfeld et al. 2010; Frison 1993). As of yet only surface collections have been recorded in Saskatchewan (Walker 1999).

Radiocarbon dating to 11,000 – 10,500 years B.P. is the Folsom-Midland complex. Sites from this time lack the megafauna present in Clovis and Goshen occupations, indicating that these large Pleistocene fauna had become extinct and a shift to a bison-focused subsistence strategy had occurred (Walker 1999). Both Folsom and Midland projectile points are

characterized by their excellent quality of manufacture. The two point types are commonly found together. Midland projectile points are similar to Folsom points that have not been fluted, however, analysis by Bradley (2010) has shown that the manufacture technology is not identical. Folsom points have a concave base, sharp taper to the tip and slight lateral flaring of the basal projections is common. Fluted almost the entire length of the blade, these lanceolate points were made of high quality raw materials (Frison and Bradley 1980). Why Folsom flintknappers chose to produce spear points that were extremely difficult to manufacture with a high chance of breakage during fluting is not clear. It has been suggested that the long flutes made the points easier to haft and increased their effectiveness against their prey. More ritualistic explanations have also been proposed, suggesting that the fluting process played a role in pre-hunt rituals (Kornfeld et al. 2010). There have only been surface finds of this complex within Saskatchewan (Walker 1999).

The Agate Basin complex appears roughly 10,500 until 9,500 radiocarbon years B.P. The Agate Basin spear point is long and narrow with straight margins and a thick transverse cross-section that makes it one of the most effective Palaeo-Indian points for hunting. Broken segments were easily and commonly reworked into new points. The method of basal constriction to create the subtle stem and shoulders is first seen on the plains in this complex (Frison and Stanford 1982). The manufacture technology utilized percussion flaking and some pressure shaping finishing flakes. It is notably different from that found in the Folsom complex and suggests an origin in the Great Basin (Bradley 2010). A large surface collection was recovered from near the Parkhill site near Moose Jaw (Ebell 1980), and other surface finds have been made in Saskatchewan. No in situ, excavated components have been found within the province (Walker 1999).

The Hell Gap complex expands on the manufacture technology utilized by the Agate Basin complex. The spear points are wider, with a more distinct shoulder and date to 10,000 – 9,500 radiocarbon years B.P. (Walker 1999). As with the Agate Basin cultural complex, Hell Gap peoples had a bison-focused subsistence strategy (Frison 1975). All finds within Saskatchewan have been surface collections.

The Cody complex dates to 9,500 – 8,400 radiocarbon years B.P. This complex includes several distinct lithic tool types including Alberta points, Scottsbluff I, II and III points, Eden points and Cody knives. All of the Cody complex points are basally constricted for hafting and

employ the manufacture technology first seen in Agate Basin. The Alberta points date to 9,500 – 9,000 radiocarbon years B.P. They typically have a broad stem, abrupt shoulders and are medium-sized. Eden, Scottsbluff points and Cody knives date to 8,800 – 8,400 radiocarbon years B.P. Cody knives have a transverse cutting edge and their stems vary in width. Eden and Scottsbluff I and II points are narrow and have straight lateral blade margins compared to the broad blade and gradual taper to the tip seen in Scottsbluff III. The latter is thinner than the Eden or Scottsbluff I and II, although all of these points have short stems compared to Alberta points (Frison and Todd 1987; Kooyman 2000). Cody is the earliest complex to have in situ components within Saskatchewan as well as a wide distribution of surface finds. These sites include the Heron-Eden site (Corbeil 1995) and the Niska site (Meyer 1985).

The final complex within the Early Precontact period is the Terminal/Late Paleo-Indian Lanceolate complex dating to 8,800 – 7,500 radiocarbon years B.P. It is characterized by a series of stemmed, lanceolate spear points with concave bases and parallel oblique flaking. These points include James Allen, Lusk, Frederick, Angostura and Lovell Constricted. The relationship between these many points is not well understood, but appears to have a connection to the foothills/mountain region west of the plains. This complex is represented solely by surface finds within Saskatchewan (Kooyman 2000; Walker 1999).

### **2.2.3 Middle Precontact Period**

The Middle Precontact period spans 7,500 to 2,000 radiocarbon years B.P., and is divided into the Early, Middle and Late Middle Precontact. These divisions reflect changes in the culture, technology and size of population on the plains. The atlatl is a major technological innovation made at the start of this Early Middle Precontact period. The atlatl was a spear-thrower that used smaller projectile points hafted to darts which could be propelled with greater force and accuracy than spears alone. The size of the dart points in comparison to the much larger spear points from the Early Precontact period and the much smaller arrow points of the Late Precontact makes them diagnostic (Wilson 1983). Side and sometimes corner notching is also diagnostic of point manufacture technology on the plains post-Paleoindian times (Kooyman 2000).

The Early Middle Precontact period is marked by a warmer and drier climate known as the Altithermal. This climatic period was time-transgressive and episodic (Vance et al. 1995;

Walker 1992). When this climatic period was first identified by Antevs (1955) it was quickly adopted as an explanation for the lack of sites on the northern plains from 7,500-5,000 radiocarbon years ago. This theory was developed by Mulloy (1958) and argued that the changing climate caused the plains to become less hospitable to bison and humans and resulted in abandonment of the area. This has since been found to be inaccurate as sites have been found on the plains that date to within this period. The number of known sites, however, is still less during the Early Middle Precontact than before or after.

The nature of the continued occupation has been debated. Hurt (1966), Buchner (1980) and Yansa (2007) have argued that inhabitants who remained on the plains would have been forced to utilize refugia around permanent water sources, while Frison (1975) and others (Jennings 1957; Stephenson 1965) have argued that a shift to a foraging-focused subsistence strategy spurred by influences from the Great Basin would have been required. While this is plausible in certain areas, Reeves (1973) has argued that the northern plains remained occupied by cultural groups with a bison-focused subsistence strategy throughout the Altithermal. He explains that the low number of sites could be due to poor archaeological visibility from high erosion and deep burial of sites formed during this time and that this should be taken into consideration.

It appears that while the northern plains remained occupied during the Altithermal, the number of inhabitants on the plains was reduced. Inhabitants adapted to the warmer and drier conditions of the Altithermal while maintaining a bison-focused subsistence strategy and utilized areas around permanent water sources and more mild areas on the peripheries of the plains as oases during the period's warmest and driest episodes (Walker 1992).

The Early Middle Precontact period is characterized by a variety of small side-notched dart tips belonging to the Mummy Cave complex. These points likely represent occupation of the plains by multiple cultural groups; however this cultural variability is not currently well understood. The two projectile point types most common on the Northern Plains are Bitterroot and Gowen. Gowen points are characterized by rounded shoulders and basal margins with broad corner notches, while Bitterroot points have distinctively high side notches (Kooyman 2000; Walker 1992). These points are similar to later side-notched forms in basic morphology and although larger can be confused as such. This has further complicated the issue of visibility of Early Middle period sites in the archaeological record (Reeves 1973). Gowen and Bitterroot

points have been recovered from excavated sites within Saskatchewan including Gowen I and Gowen II (Walker 1992), the Norby site (Zurburg 1991) and the Dog Child site (Pletz 2010; Cyr 2006). Other styles of Early Middle period points have been recovered as surface finds. The Cut Arm site's deepest identifiable cultural occupation is associated with the Early Middle Precontact period.

The Middle Middle Precontact period spans roughly 5,000 – 3,000 radiocarbon years B.P. and coincides with a climatic shift to cooler, moister conditions (Vance et al. 1995). The amelioration of the climate after the Altithermal allowed for a population increase of both bison and humans (Frison 1975). During this time the Northern Plains was occupied by two distinct groups: Oxbow and McKean.

The Oxbow cultural complex is radiocarbon dated from 4,700 – 3,800 years B.P. and sites are found throughout the Northern Plains, with their greatest concentration being in south-central Saskatchewan (Kornfeld et al. 2010). The Oxbow complex developed in situ on the plains from the Mummy Cave complex (Walker 1992). Oxbow points are manufactured using similar techniques as those employed by Mummy Cave complex flintknappers. Oxbow projectile points have lateral corners with a diagnostic eared appearance formed by a combination of side-notches and a broad, deep basal concavity (Kooyman 2000). Beyond projectile points there are other diagnostic characteristics of the Oxbow complex including the earliest appearance of burial sites in Saskatchewan, bison-dominated faunal assemblages, the use of dogs, ceremonial use of red ochre and the presence of trade/specialty items including rolled copper and shell pendants (Dyck 1970; Nero and McCorquodale 1958; Millar et al. 1971; Morlan 1994). Oxbow burials are typically isolated bundle-burials with associated red ochre. An important exception to this trend is the Gray Burial site which is a unique precontact burial ground that was used repeatedly over many years. The specific bison hunting techniques employed are not yet well understood as there have been no Oxbow bison kill sites excavated to date (Walker 1999). Excavated sites within Saskatchewan include the Oxbow Dam site (Nero and McCorquodale 1958), Amisk (Amundson 1986), Harder (Dyck 1970; Morlan 1994) and the Gray site (Millar et al. 1971). Cultural Level 9 at the Cut Arm site is associated with the Oxbow complex and dates to  $4,270 \pm 55$  cal B.P.

The McKean series dates between 4,100 – 3,100 radiocarbon years B.P. The series is contemporaneous with the Oxbow culture and represents an intrusion into the plains from the

southwest (Walker 1999). In the southern portion of the Northern Plains McKean sites show an increase in exploitation of plant and small-mammals from evidence including manos, metates and food preparation pits. This is not the case in the north, where a bison-focused subsistence strategy appears to have been maintained (Mulloy 1954; Frison 1975; Webster 2009). McKean burials are of a very different style from Oxbow, typically being located underneath living floors at occupation sites. The Graham site in south-central Saskatchewan is a unique example of a McKean cremation burial (Walker 1984).

Diagnostic lithic artifacts for the McKean series include three distinct projectile point types: McKean, Duncan and Hanna. McKean points are lanceolate, have a deep basal notch and convex lateral margins without side-notching. Duncan points are characterized by their distinct stem and sloping shoulders with convex lateral blade margins and a basal concavity. Hanna points also have a basal concavity but are easily identifiable because of their shoulders, stem and straight lateral margins (Kooyman 2000). A comparative analysis of sites containing McKean series levels on the Northern Plains done by Webster (2009) revealed that McKean lanceolate points consistently occur stratigraphically below Duncan and Hanna. Whether the explanation for this is functional, technological or cultural is as of yet unclear, although McKean assemblages as a whole are similar enough to continue to classify them as a single series (Webster 2009).

Occupational layers 6 to 8 at the Cut Arm site are associated with the McKean series, with radiocarbon dates ranging from  $3,550 \pm 50$  cal B.P. to  $3,770 \pm 60$  cal B.P. (Table 3.3). Other sites in Saskatchewan containing McKean components include Wolf Willow (Maria Mampe, personal communication 2012), Redtail (Ramsay 1993), Dog Child (Pletz 2010; Cyr 2006), Amisk (Amundson 1986), Thundercloud (Mack 2000; Webster 1999) and the Graham site (Walker 1984).

The Late Middle Precontact period dates from roughly 3,000 to 2,000 radiocarbon years B.P. and is marked by the appearance of corner-notched dart tips. The dominant cultural complexes of the Middle Middle Precontact, Oxbow and McKean, are replaced by the Pelican Lake complex which has dates ranging from 3,300 – 1,800 radiocarbon years B.P (Walker 1999). Pelican Lake points are small, triangular and have sharply-barbed corner-notches. The basal and lateral edges are typically straight but range from slightly concave to slightly convex. The manufacture technology is a continuation of that in the McKean series. A variety of Pelican

Lake points that are particularly small have been identified as arrowheads and represent the first appearance of this technology on the plains (Kooyman 2000).

Pelican Lake people buried their dead in isolated, scenic locations usually at a high elevation relative to the surrounding landscape. Burials are also typically secondary bundle burials in shallow, filled pits and commonly have associated grave goods (Brink and Baldwin 1988). Some of the most notable Pelican Lake sites excavated within Saskatchewan include the complex's type site the Mortlach site (Wettlaufer 1955), the Walter Felt site (Kehoe 1973), the Sjevold site (Dyck and Morlan 1995) and the human burial at the Bracken Cairn site (King 1961; Walker 1982b). There is no Pelican Lake occupation at the Cut Arm site.

Contemporaneous with Pelican Lake is the Side-Notched Projectile Point complex of the Late Middle Precontact period. This includes multiple un-named point types as well as Sandy Creek projectile points. Points from this complex have been identified at several excavated sites within the province (Kehoe 1974; Wettlaufer 1955; Dyck and Morlan 1995) but their technological and cultural importance are not yet well understood (Kehoe 1974; Walker 1999).

#### **2.2.4 Late Precontact Period**

The Late Precontact period spans roughly 2,000 to 200 radiocarbon years B.P. The period is characterized by the advent of pottery, the widespread use of bow and arrow technology and continued reduction in the size of points with side and corner notching. The cultural complexes of the Late Precontact include Besant, Avonlea and Late Side-Notched (Kooyman 2000).

The Besant complex dates from 2,000 to 1,200 radiocarbon years B.P and occupied the entirety of the Northern Plains (Walde et al. 1995). A Besant projectile point was recovered in situ from Cultural Level 5a at the Cut Arm site; however no radiocarbon date has been obtained for the component. Besant projectile points are characterized by broad, shallow side-notches placed very close to the basal margin. The base itself is typically straight. The points are constructed using biface percussion thinning with a general trend towards high quality lithic materials and excellent workmanship. Samantha points appear during the same time as Besant and are morphologically very similar albeit smaller in size. It is possible that these smaller points were used as arrow tips with the larger Besant style having been intended as dart tips

(Kooyman 2000). Besant peoples were expert pedestrian bison hunters skillfully executing large communal hunts using jumps, man-made corrals and natural traps (Walker 1999).

More is known about Besant habitation structures than for earlier groups. Evidence from the Mortlach site (Wettlaufer 1955) suggests huts made of wooden frames and covered in bark or mats were used. Other sites such as Elma Thompson (Finnigan and Johnson 1984) indicate that hide covered tipis or conical lodges were utilized based on the presence of tipi rings.

The Besant culture was the first to use pottery on the Northern Plains. Besant pottery is typically constructed with paddle and anvil, has grit temper and is conoidal in shape. The exterior surface is either cord-marked, smoothed or plain and a single row of punctates is sometimes seen parallel to the rim (Meyer and Rollans 1990).

To the south, in North and South Dakota, is a variant of Besant called Sonota. Sonota components have produced Besant-style projectile points as well as pottery and are therefore closely linked to the Besant complex. Sonota is characterized by elaborate burial customs including building burial mounds (Meyer and Rollans 1990; Walde et al. 1995). These mounds, in combination with the presence of pottery and mat-covered dwellings, suggest a connection between Besant and Eastern Woodland cultural groups. Additional outside contact is indicated by a large amount of Knife River Flint in Besant lithic assemblages, an exotic material only obtainable through long-distance trade with occupants of North Dakota (Walker 1999).

The Avonlea horizon has radiocarbon dates overlapping those of Besant, ranging from 1,750 to 1,150 radiocarbon years B.P (Dyck 1983). Despite the apparent contemporaneity of the two cultures Avonlea is consistently found stratigraphically above Besant and is therefore subsequent to the latter on the Northern Plains (Cloutier 2004). Avonlea projectile points are small, triangular, finely-worked side-notched arrow points (Kehoe and McCorquodale 1961). Pressure thinning was a highly efficient manufacture technology that allowed flintknappers to create these extremely thin and high quality points. The side-notches are shallow and placed low on the blade which would have fit into a shallow haft that was quick and easy to produce (Kooyman 2000). The Avonlea lithic toolkit is further characterized by primarily local lithic materials (Walde et al. 1995)

The Avonlea horizon is associated with four pottery wares including 1) Rock Lake Net/Fabric-Imprinted ware, 2) Ethridge Cord-Roughened ware, 3) Truman Parallel-Grooved ware and 4) Plain ware with smooth exterior (Meyer and Walde 2009).

Meyer and Walde (2009) have identified four Avonlea phases based on patterns in site distribution and artifact assemblages. The Lebret Phase and the Sjovold Phase are present within Saskatchewan, the former having been associated with Rock Lake ware and the latter with Truman ware. The Morkin Phase and the Upper Kill Phase are associated with Rock Lake ware and Ethridge ware respectively and occur in Alberta and northern Montana (Meyer and Walde 2009). The pottery of the Lebret, Morkin and Sjovold phases are very similar to that on the Manitoba and Minnesota plains during the early Late Precontact period. It is therefore likely that Avonlea occupations in Saskatchewan resulted from population movements from southern Manitoba where they occurred as an extension and regional expression of an Eastern Woodlands origin (Meyer and Walde 2009).

Avonlea people as a whole were bison hunters that employed classic communal hunting techniques (Walker 1999). Evidence from the Lebret site indicates that these plains people followed the bison on a seasonal round, but supplemented their diet with fish, small mammals and waterfowl (Smith 1986). Significant Avonlea sites within Saskatchewan include the Gull Lake site (Kehoe 1973), Walter Felt (Kehoe and McCorquodale 1961), Sjovold (Dyck and Morlan 1995) and the Bethune site (Dawson and Walker 1988). No Avonlea projectile points were recovered at the Cut Arm site, however pottery wares possibly associated with the horizon were found in Cultural Levels 3 and 4.

The Late Side-Notched series succeeds Avonlea on the Northern Plains. The series includes the Prairie Side-Notched complex dating 1200 - 550 radiocarbon years B.P as well as the Plains Side-Notched complex dating 550 - 170 radiocarbon years B.P. (Walker 1999). Occupants of the Northern Plains remained bison hunters throughout the Late Side-Notched series, although there was an increase in the range of resources utilized towards the end of this period. These skilled hunters used pounds, traps and jumps. They followed the bison on their seasonal round, taking shelter in valleys during the winter and open plains during the summer (Walde et al.1995). A close relationship with Middle Missouri villages is evident from pottery gaming pieces and Knife River Flint tools. The creation of rock art became more common through the Late Precontact period as well as medicine wheels, effigies and boulder alignments. (Walde et al 1995; Walker 1999). Several important examples include the Moose Bay Burial Mound (Hanna 1976) and the Minton Turtle Effigy.

The Prairie Side-Notched complex is associated with Old Women`s pottery and Prairie Side-Notched projectile points. Characterized by local lithics, Prairie points are triangular, have side notches placed very low on the lateral margins and are basally notched (Dyck 1983; Kooyman 2000). Early Old Women`s pottery, or Ethridge Ware, typically has complex exterior profiles and is thick-walled. The exterior surfaces of the vessels are marked with fabric or cord impressions. Vessels are globular in shape with angled shoulders, straight to out-flaring rim and a constricted neck. If decorated they are impressed with a cord-wrapped tool or have incisions or punctates adjacent to the rim (Peck and Ives 2001; Walker 1999). Based on similarities between pottery, lithic manufacture and use, the Prairie Side-Notched complex appears to have developed directly out of the Avonlea series (Walde et al 1995).

The Plains Side-Notched complex is similarly associated with Old Women`s pottery in addition to Mortlach pottery and Plains Side-Notched projectile points. Mortlach pottery was strongly influenced by both Selkirk and Middle Missouri cultures. A consistent set of core traits can be identified in Mortlach pottery. The vessels are typically thin-walled earthen-ware with compact paste and exhibit a range of techniques in manufacture and decoration (Walde et al. 1995). Plains Side-Notched projectile points are characterized by a straight triangular outline with side-notches placed high on the lateral margins (Kooyman 2000). Higher quality lithic materials are more prevalent in the Plains Side-Notched complex including petrified wood and obsidian (Walde et al. 1995).

Both the Prairie and Plains Side-Notched complexes are represented at the Cut Arm site. Four Prairie Side-Notched projectile points were recovered from Cultural Level 3 and another was found in Cultural Level 4. Cultural Level 2 contains a Plains Side-Notched projectile point and has been radiocarbon dated to  $650 \pm 40$  cal B.P. (Table 3.3).

### **2.2.5 Contact/Historic Period**

The end of the Late Precontact period and the start of the Contact period are signalled by the arrival of Europeans and their influence roughly 300 years ago. Life on the Northern Plains changed drastically with European contact. By the early 1700`s European goods were being acquired through native trade networks by groups inland (Russell and Meyer 1999). Metal projectile points, made from traded European metal, are a diagnostic of this period (Kooyman 2000). With European goods and subsequent direct interactions starting in the late 1700`s came

disease. Epidemics of smallpox, measles, tuberculosis and others decimated the native groups of North America (Dyck 1983; Russell 1999). The introduction of the horse and gun revolutionized the way bison were hunted and shifted the balance between cultural groups (Dyck 1983). By the late 1800's widespread European settlement of the plains had begun. This drastically changed the landscape and reduced the number and types of animal and plant species occupying the plains (Lemmen and Dale-Burnett 1999). Large-scale hunting of bison brought the once great herds to near extermination. This, combined with signing of the treaties and the establishment of reserves forced the Native plains groups to abandon their traditional way of life on the Northern Plains.

## **Chapter 3**

### **Research Methodology and Radiocarbon Dating**

#### **3.1 History of Research**

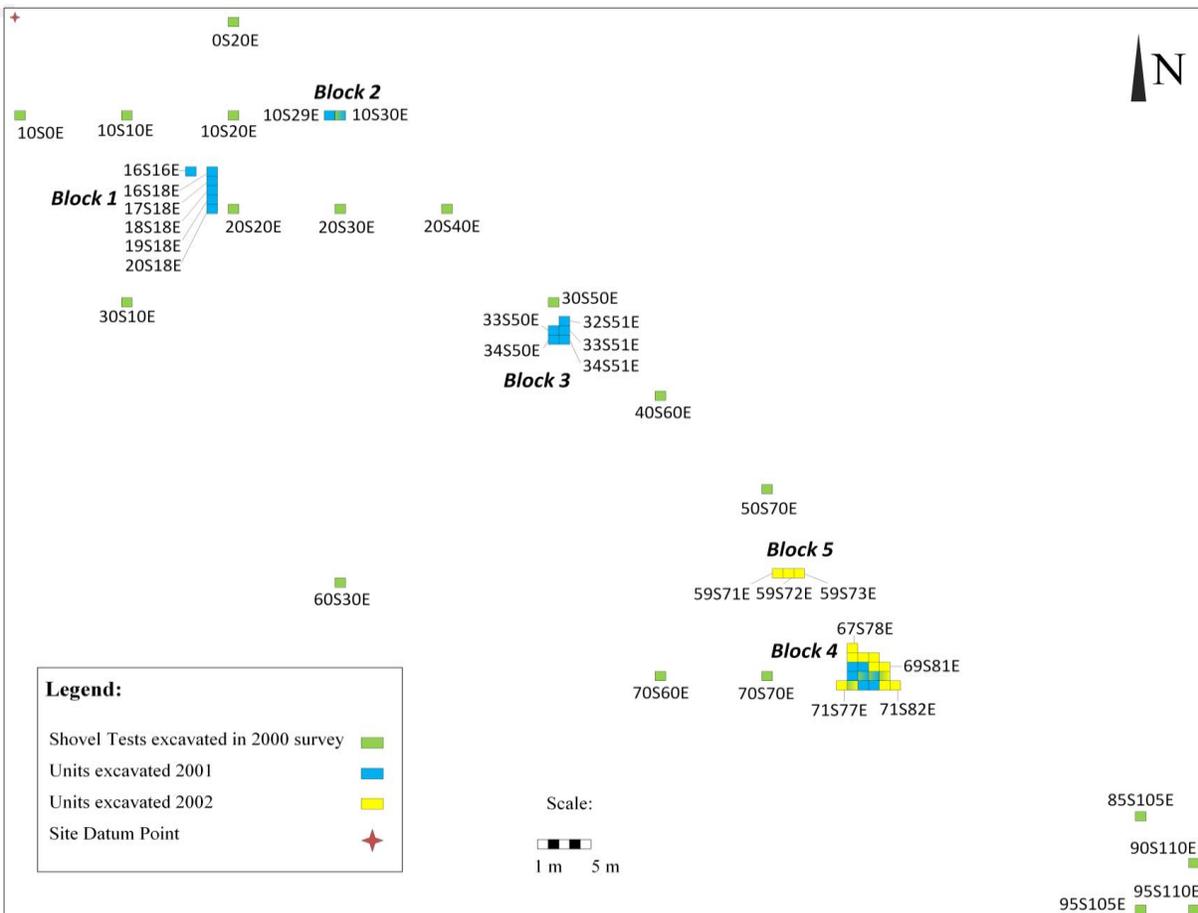
The Cut Arm site was first identified in the original survey of the Wanuskewin Heritage Park area conducted by Dr. E. G. Walker in 1982 and 1983 (Figure 2.1, Figure 3.1). The full depth of the site was not recognized at that time; however, it was recorded as a multi-component precontact site. In the spring of 2000 the swale the Cut Arm site is located in was re-examined in preparation for excavation. Shovel test pits measuring 50 cm x 50 cm were placed every 10 meters to identify the optimal areas to excavate. Productive test pits were chosen to be expanded upon with full units the following year (Figure 3.2). The Cut Arm site was excavated by the University of Saskatchewan Department of Archaeology and Anthropology field school under the supervision of Dr. E. G. Walker in 2001 and 2002.

#### **3.2 Survey, Excavation and Laboratory Methodology**

Standard excavation methodology was utilized at the Cut Arm site. Units were setup in reference to the site datum located in the northwestern corner of the site area (Figure 3.1). Units were 1 m<sup>2</sup> and divided into four quadrants measuring 50 cm x 50 cm. Excavation began in arbitrary 5.0 cm levels, a system that was utilized for the first field season in order to uncover and understand the natural stratigraphy. Once this was done, excavation was guided by the cultural and natural stratigraphic deposits of the site. The majority of excavation utilized trowels and brushes although a small amount of shovel shaving was used for large non-cultural deposits. All soil from the excavated units was run through a 6 mm mesh screen to avoid missing smaller artifacts. The soil from the Cultural Level 5b hearth feature (Feature 5b-2) in unit 71S81E was bagged separately and sorted using water flotation in order to maximize recovery of small floral and faunal remains. All artifacts were separated by the specific level and quadrant from which



**Figure 3.1:** Cut Arm site coulee. Looking south towards the South Saskatchewan River.



**Figure 3.2:** Cut Arm site map.

they were recovered. The precise provenience of artifacts found in situ was recorded for items larger than the size of a quarter. In these cases, depth below the surface, distance south within the unit and distance east within the unit were all measured. Depth measurements were taken from the northwest corner of each unit using a level on a string attached to the unit's corner pin. Each three-point provenienced artifact was drawn into a level planview map. These maps were later utilized in the creation of the artifact and feature distribution maps seen in this thesis. These maps were designed in OpenOffice.org Draw 3.

All aspects of the excavation were carefully recorded. Information pertaining to each artifact was recorded on index cards stored with the artifacts as well as on unit catalogue sheets. Every field school student recorded their progress and thoughts from each day on level record and daily log forms. Once excavations were complete, drawings of the stratigraphic profiles in the excavation blocks were made. These drawings were invaluable in understanding the stratigraphy of the site.

All artifacts were cleaned, identified, weighed, catalogued by the field school students and curated by the Department of Archaeology and Anthropology, University of Saskatchewan. Bone, enamel, stone and ceramic artifacts were carefully washed and dried before being weighed. Pottery, botanicals, specimens to be radiocarbon dated and particularly fragile artifacts were cleaned with dry brushing only. The artifacts were separated for cataloguing using broad material types of lithic, faunal, pottery/ceramic, metal and botanicals. These categories were then subdivided according to a variety of material-specific criteria. After the initial work of the field school students the unit artifact catalogues had to be checked for consistency and synthesized into a single catalogue for the entire site. This was done using a specialized computer catalogue created by the author in Microsoft® Access™ 2007.

### **3.3 Analytical Methodology**

#### **3.3.1 Pottery and Ceramics**

The Cut Arm site contains both Historic period ceramics and Precontact period pottery. Identification of the Historic period ceramics was performed with the aid of Dr. M. Kennedy. Pictures of the reconstructed vessels were also sent to the Western Development Museum for further identification. Characteristics examined for ceramic sherds include sherd type, ceramic

type (earthenware, hotel wear, whitewear) and surface decoration (relief molding, hand painting, stamping).

Identification of the Precontact pottery assemblage was done with the assistance of Dr. D. Meyer. The pottery was categorized by fragment type (complete sherd, exterior exfoliation, interior exfoliation, unidentifiable fragment), sherd type (rim, neck, shoulder, body, base, indeterminate), surface characteristics (exterior, interior, rim), temper, comparative thickness and pottery type (Old Women's tradition, Mortlach tradition, Avonlea tradition, indeterminate).

### **3.3.2 Metal**

Metal artifacts in the Cut Arm site assemblage were catalogued based on the specific type of metal they were constructed of as well as by item description. The type of metal was determined macroscopically without the use of any chemical techniques. The condition of each artifact was recorded including the completeness and alterations from use as well as from exposure to the environment.

### **3.3.3 Botanical Specimens**

This category was used to classify all floral remains. The botanicals recovered are limited to charcoal and a plant seed; none of which could be identified to taxon. As such, further analysis for the purposes of palaeoenvironmental reconstruction was not undertaken. There was an insufficient amount of charcoal recovered from any one level to use for radiocarbon dating. Accelerator mass spectrometer dating is possible but was unnecessary because of the availability of well-preserved faunal remains with good stratigraphic context.

### **3.3.4 Faunal Specimens**

Specimens included in the faunal material category include all bone and tooth/enamel. The faunal assemblage was identified with the assistance of Dr. E. G. Walker and the Department of Archaeology and Anthropology's Comparative Zooarchaeological Collection. Each artifact was given a specimen description. For the purposes of this thesis, the term *specimen* is defined as "a bone or tooth, or fragment thereof" (Lyman 1994:39). This varies from the less inclusive term *element* defined as "a single complete bone or tooth in the skeleton of an animal" (Lyman 1994:39). In describing a specimen the element being represented is also

inherently identified if possible along with the portion of the element present (proximal, shaft, distal) and any anatomical landmarks. Those specimens that could not be identified to element were “unidentifiable” and described as “fragment(s)”. Identifiable specimens are those that can be identified to the represented element as well as size class or taxon. A system of size classes (Table 3.1) based on that presented in Dyck and Morlan (1995:140) was used to categorize specimens that could not be identified to family, genus or species and was useful in understanding the nature of the faunal assemblage in each level.

Table 3.1: Mammal size classes.

Size Class	Weight	Description	Examples
SC6	200 - 700 kg	Very Large Mammal	<i>Bison bison</i> , <i>Alces alces</i> , <i>Cervus elaphus</i>
SC5	25 - 200 kg	Large Mammal	<i>Odocoileus sp.</i> , <i>Antilocapra americana</i> , <i>Canis lupus</i>
SC4	700 - 5000 g	Medium Mammal	<i>Canis latrans</i> , <i>Taxidea taxus</i>
SC3	5 - 25 kg	Small-Medium Mammal	<i>Vulpes sp.</i> , <i>Lepus americanus</i> , <i>Mephitis mephitis</i>
SC2	100 - 700 g	Small Mammal	<i>Spermophilus richardsonii</i>
SC1	< 100 g	Micro Mammal	<i>Peromyscus maniculatus</i> , <i>Microtus pennsylvanicus</i>

Specimens were examined for a list of characteristics. The fragment size of the specimen was recorded as either < 2.5 cm, 2.5 – 5.0 cm or > 5.0 cm. If the specimen was a complete element it was recorded as “N/A” to indicate the specimen was not a fragment. Any alterations due to heating/cooking were noted as either “unburned” in the case of unaltered bone, “burned” when discernible blackening was present on at least part of the specimen, or “calcined” when the specimen exhibited grey to white discoloration from intensive burning. Other indicators of human activity were noted including staining from red ochre and cut marks.

Taphonomic alterations are changes to specimens that occur after their deposition and prior to their recovery during archaeological excavation. Examples of such alterations include root etching, rodent gnawing, bleaching and mineralization. These various alterations were all present in the assemblage and were noted when observed. Damage incurred to specimens during

excavation from trowels and shovels was identified based on the fresh, clean appearance of the marks and was recorded as trowel trauma.

Quantitative analysis utilizes the data from an archaeological assemblage to illuminate past human subsistence practices. A quantitative analysis of the Cut Arm site faunal remains was undertaken to determine the elements present, the species present, the number of individuals present and an explanation for the nature of the faunal assemblage.

The first and most basic quantitative unit calculated was Number of Identified Specimens (NISP). NISP determines the abundance of each taxon and size class represented by the faunal assemblage within each level. Determining NISP consists of totalling all specimens within each taxon or size class. This method produces a basic quantitative measure of taxonomic abundance but does not take into consideration the affects of taphonomy on the assemblage. This problem is countered in two additional calculations: Minimum Number of Individuals (MNI) and Minimum Number of Elements (MNE). Each MNI or MNE value is calculated based on either a mature or immature sample. As such, if there are sufficient specimens each quantification must be done twice for each taxon; once for mature specimens as well as once for immature specimens. The number of immature remains throughout the Cut Arm site assemblage is small and any MNI or MNE values are in reference to mature remains unless otherwise specified. In order to calculate the MNI it is necessary to “separate the most abundant element of the species found into right and left components and use the greater number as the unit of calculation” (White 1953a:397). The result is an estimate of the minimum number of each taxon needed to account for the assemblage. This count can be useful in identifying the preferential selection by past hunters of elements by their side. MNE was employed to determine the number of the skeletal portions present in the archaeological assemblage in consideration of their quantity within a complete skeleton. This is done by taking the total number of each skeletal portion represented and dividing it by the number of times it occurs in the body (Lyman 1994). MNE values allow for a focused comparison of the portions of a carcass present and assume that this is representative of differential butchering and transport.

### **3.3.5 Lithic Artifacts**

Identification of the lithic assemblage was done using Kooyman (2000), Johnson (1998) and the Department of Archaeology and Anthropology’s comparative lithic collection. Basic

separation of the lithic assemblage was made into tools, debitage and fire-cracked rock (FCR). Fire-cracked rock (FCR) is rock that has been altered, cracked or broken by cultural exposure to heat. FCR is typically associated with and indicative of hearths, rock heating pits and other cooking features. Tools were subdivided into unifacial, bifacial, fabricators, expedient and retouched flakes. Basic measurements of tools were made including weight, maximum length, maximum width and maximum thickness. Projectile points received slightly more attention due to their importance as horizon markers and were measured for maximum length, maximum width, width at the notches and maximum thickness. Alteration of materials by intentional heating to improve their flaking quality was recorded when present.

Unifacial tools are those that exhibit flaking on one surface. Unifacial tools include endscrapers, sidescrapers, choppers, uniface, and spokeshaves. Bifacial tools are flaked stone tools manufactured by flaking on two connected surfaces. These tools include projectile points, drills, cutting tools, bifaces and choppers. Fabricators are those tools used in the manufacture of other tools but may also have additional functions. Fabricators include hammerstones, abraders and anvils. Abraders are used to smooth a lithic surface by grinding away unwanted portions. Hammerstones can be identified by pecking or battering on one or both ends and can be used in lithic tool manufacture as well as food processing tasks. Expedient tools are those made for immediate use with no long-term curation intended and as such a minimal amount of time and effort are expended in making the tool. Expedient tools recovered were limited to a crude cobble tool. Retouched flakes are also somewhat expedient in nature and are flakes that have been worked on one or both edges. Retouched flakes can be unifacial or bifacial (Kooyman 2000).

The Cut Arm site debitage was divided into flakes, shatter, cores and core fragments. Those pieces of debitage that exhibit flake characteristics were recorded in one of three categories: primary decortification flakes, secondary decortification flakes or secondary flakes. A primary decortification flake is one of the first flakes removed from a certain area of a core and has a dorsal surface entirely covered in cortex. A secondary decortification flake is from slightly later in the process of tool manufacture and exhibits some cortex on the dorsal surface but also at least one flake scar. A secondary flake has no cortex on its dorsal surface (Kooyman 2000:18). Secondary flakes can be subdivided into shaping flakes, thinning/reduction flakes, bifacial reduction flakes, finishing flakes and resharpening flakes (Kooyman 2000:51); however, this degree of separation was not undertaken as part of the analysis. Shatter was identified as

irregular pieces of debitage not exhibiting flake characteristics. Shatter is common because it is an uncontrolled by-product of the flintknapping process (Kooyman 2000:14). A core is “a large piece of lithic material from which a flake or flakes have been removed” (Kooyman 200:14) and exhibits a striking platform, negative flake scars, arris and compression rings. Cores and core fragments were found in several levels at the Cut Arm site.

After separation of the lithic assemblage into tools, debitage and FCR the material types were identified. Identification of lithic materials was done macroscopically based on descriptions in Johnson (1998) and Kooyman (2000) with the assistance of Dr. E. G. Walker. Lithic material types at the Cut Arm site are primarily those known to have local sources in glacial till. Several non-local materials were also recovered including Knife River Flint, jasper and obsidian.

Miscellaneous cherts represent a substantial portion of the site assemblage. Cherts are a microcrystalline sedimentary mineral. They were identified based on their dull to waxy lustre, opaqueness and were found in a range of colors. Chert precipitated in limestone (CPL) is also opaque with a waxy lustre but was identified as small chert nodules with a limestone cortex. All CPL recovered from the Cut Arm site is grey chert (Kooyman 2000:28).

Swan River chert is ubiquitous in sites on the Northern Plains and in the lithic assemblage at the Cut Arm site. The material ranges in quality from coarse and crystalline with a large number of vugs to quite homogenous and fine-grained containing minimal vugs. Alteration by heat, or heat-treatment, can increase the quality of Swan River Chert and was recognized based on a combination of characteristics including a homogenous, waxy texture and pink to reddish color change (Kooyman 2000:28-29).

Jasper is generally defined as a variety of high quality chert containing additional minerals resulting in colors atypical of chert. Jasper is entirely opaque and has a dull lustre. Typical colors include dark red, brown and yellow (Kooyman 2000:30).

Knife River Flint is a type of chalcedony with a non-fibrous internal structure. Knife River Flint was identified based on its translucency, waxy lustre and high quality with little to no inclusions (Kooyman 2000:29). Silicified peat is a lithic material local to south-central Saskatchewan that is most commonly confused with Knife River Flint. The two can be differentiated between based on the high number of inclusion present in silicified peat and lower overall quality.

Obsidian is a translucent volcanic glass with a shiny lustre. Obsidian is most typically black but can also be red, dark green or contain banding. The fine, even, crystalline structure of obsidian makes it an excellent tool stone that can be flaked to create an extremely sharp cutting edge.

### 3.4 Stratigraphy and Radiocarbon Dates

#### 3.4.1 Stratigraphy

The Cut Arm site is located within a drainage swale on the north bank of the South Saskatchewan River. The presence of an archaeological site in a location such as this is unusual. The surface of the site area has a considerable slope (Figure 3.1) that is mirrored in the subsurface deposits (Figure 3.3). There is roughly a 20 meter drop in elevation from the prairie surface to the bottom of the swale (Rutherford 2004: Figure 5.1). With the degree of slope present, there are units that contain levels where the uppermost and lowermost measurements of the level are the same. The result is occupational layers with a deceptively large depth range, when in fact each level is roughly only 5 to 7 cm thick (Table 3.2).



**Figure 3.3:** Wall profile showing slope of the surface and stratigraphy.

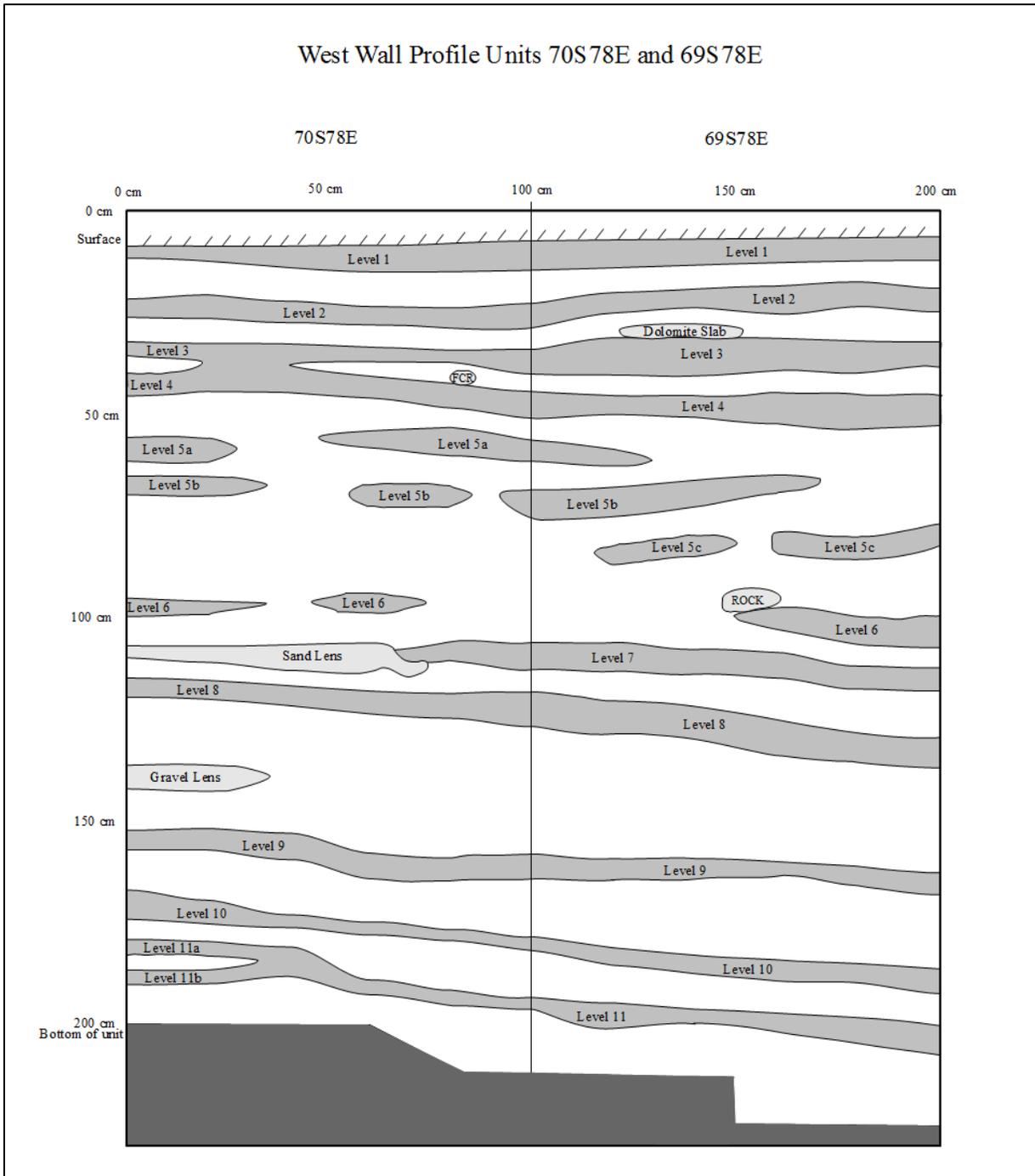
There are 11 cultural occupations at the Cut Arm site. The maximum depth ranges of each level as well as the average thickness of each can be found in Table 3.2. The values are based on measurements recorded in the stratigraphic profiles and three-point provenienced artifacts. The occupational layers are well separated by non-cultural deposits resulting in a layer-cake appearance (Figure 3.3). The bands of dark soil are representative of periods of slope stability with increased soil development and vegetation growth. These are separated by bands of light-colored sediments representative of periods of greater slope instability. In 2004, Rutherford performed an analysis of the sediments from the Cut Arm site and found that the cultural occupations are separated by layers resulting from hillslope processes, both overland flows and debris flows (Rutherford 2004). The bottom of the site is marked by glacial deposits in the northwest and by debris flow sediments overlying glacial deposits in the southeast (Rutherford 2004).

**Table 3.2:** Cultural Level depth ranges and average thicknesses.

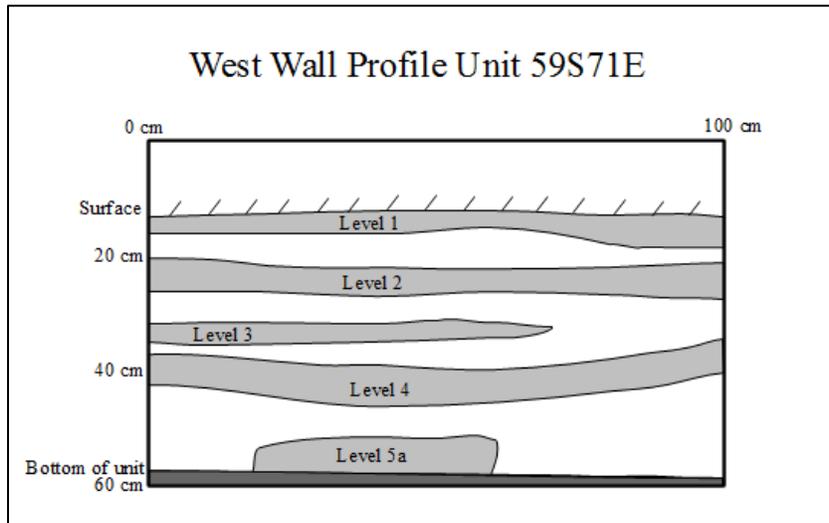
<b>Cultural Level</b>	<b>Minimum Depth (cm DBS)</b>	<b>Maximum Depth (cm DBS)</b>	<b>Average Thickness (cm)</b>
1	0	18	5.0
2	8	27	5.5
3	18	34	5.0
4	26	50	7.0
5	51	65	7.0
5a	36	61	4.5
5b	55	78	5.0
5c	68	78	6.0
6	68	100	5.5
7	80	113	6.0
8	103	136	7.5
9	123	179	6.0
10	147	198	7.0
11	175	225	5.5

There is a general trend throughout the cultural occupations of the site from younger to older of a decrease in the horizontal extent of the deposits. Cultural Levels 1, 2, 3, 4, 5 and 6 were observed in all five excavation blocks. Cultural Level 7 has only a minimal presence in one

unit in Blocks 1, 2 and 3 and was not observed in Block 5. The majority of the assemblage at this depth was recovered from Block 4. Level 8 is not present in any part of Blocks 1, 2, 3 or 5; however, a large number of artifacts were still recovered from within Block 4. Similarly, Cultural Levels 9 and 10 are present throughout Block 4. Cultural Level 11 has the smallest horizontal dimensions and is present in just under half of the units in Block 4.



**Figure 3.4:** West wall profile of unit 70S78E and unit 69S78E.



**Figure 3.5:** West wall profile unit 59S71E.

Not all of the cultural occupations are present across the entire site area. Several of the levels are discontinuous at one or more points. This is a reflection of natural hillslope processes, differential erosion/deposition and the original extent of each cultural deposit. This contrast between the two areas of the site further exacerbates the issue of large level depth ranges. The units in the southeast portion of the site have deep stratigraphic profiles with levels separated by substantial non-cultural deposits (Figure 3.4). The units in the northwest portion of the site underwent less deposition and more erosion and therefore have shallower and somewhat compressed stratigraphic profiles (Figure 3.5). The difference between the two areas of the site is clearest in the case of Cultural Level 5. In the northwest units Level 5 is visible as a single component. In the southeastern portion of the site this single level was observed as three distinct components labeled “Level 5a”, “Level 5b” and “Level 5c” (Figure 3.4).

### 3.4.2 Radiocarbon Dating

A total of five radiocarbon dates from four cultural levels were obtained (Table 3.3). The samples dated were all *Bison bison* bone recovered from good stratigraphic context. The dating was done by Brock University Earth Sciences Laboratory in July of 2002.

Sample BGS 2381 was taken from two *Bison bison* left astragalus fragments and 2 distal humerus fragments. The sample was recovered from units 68S80E and 67S78E at a depth of 33

cm in Cultural Level 2. The bone was in good stratigraphic context, well preserved and weighed 275.0 g. The calculated age of the sample is  $524 \pm 40$  yrs B.P. and  $664 \pm 40$  yrs B.P. with  $^{13}\text{C}$  isotope correction. The calibrated age of the sample after applying  $^{13}\text{C}$  correction is  $650 \pm 40$  yrs B.P. (Table 3.3).

Sample BGS 2382 was a *B. bison* left metatarsal. The sample was taken from unit 71S80E at a depth of 78 cm below the surface in Cultural Level 6. The bone had good stratigraphic context, was well preserved and had a weight of 220.0 g. The calculated age of the sample is  $3178 \pm 50$  yrs B.P. and  $3318 \pm 50$  yrs B.P. with  $^{13}\text{C}$  isotope correction. The calibrated age after applying  $^{13}\text{C}$  correction is  $3550 \pm 50$  yrs B.P. (Table 3.3).

Sample BGS 2383 was from a *B. bison* right scapula in Cultural Level 8. The sample was recovered from 121 cm below the surface in unit 69S80E. The specimen was well preserved, had good stratigraphic control and weighed 171 g. The calculated age of the sample is  $3387 \pm 50$  yrs B.P. and  $3441 \pm 50$  yrs B.P. with  $^{13}\text{C}$  isotope correction. The calibrated age after applying  $^{13}\text{C}$  correction is  $3690 \pm 50$  yrs B.P. (Table 3.3).

**Table 3.3:** Radiocarbon ages for the Cut Arm site.

Sample Number	Sample Type	Cultural Level	Calculated Age (Years B.P.)	Calculated Age with $^{13}\text{C}$ Isotope Correction (Years B.P.)	Calibrated Age after $^{13}\text{C}$ Correction*
BGS 2381	Bone	2	$524 \pm 40$	$664 \pm 40$	$650 \pm 40$ cal B.P.
BGS 2382	Bone	6	$3178 \pm 50$	$3318 \pm 50$	$3550 \pm 50$ cal B.P.
BGS 2383	Bone	8	$3387 \pm 50$	$3441 \pm 50$	$3690 \pm 50$ cal B.P.
BGS 2384	Bone	8	$3448 \pm 60$	$3520 \pm 60$	$3770 \pm 60$ cal B.P.
BGS 2385	Bone	9	$3802 \pm 55$	$3864 \pm 55$	$4270 \pm 55$ cal B.P.

\*Calibrated ages are based on Stuiver et al. 1998.

Sample BGS 2384 consisted of three *B. bison* lumbar vertebrae from Cultural Level 8. The bone was taken from unit 71S77E, 118 cm below the surface. The sample weighed 223.0 g, was well preserved and had good stratigraphic control. The calculated age of the sample is  $3448 \pm 60$  yrs B.P. and  $3520 \pm 60$  yrs B.P. with  $^{13}\text{C}$  isotope correction. The calibrated age after applying  $^{13}\text{C}$  correction is  $3770 \pm 60$  yrs B.P. (Table 3.3).

Sample BGS 2385 consisted of three *B. bison* cervical vertebrae. The bone was recovered from unit 69S79E at 160 cm db in Cultural Level 9. The sample was well preserved

with a weight of 277.0 g and was recovered from good stratigraphic context. The calculated age is  $3802 \pm 55$  yrs B.P. and  $3864 \pm 55$  yrs B.P. with  $^{13}\text{C}$  isotope correction. The calibrated age after applying  $^{13}\text{C}$  correction is  $4270 \pm 55$  yrs B.P. (Table 3.3).

## **Chapter 4**

### **Cultural Level 1**

#### **4.1 Introduction**

Level 1 is the uppermost cultural occupation at the Cut Arm site. It ranges from 0 cm dbss to 18 cm dbss with an average thickness of 5 cm. The level was present in all units except for units 18S18E, 20S20E and 70S78E. The level is both Historic/Contact in nature and consists of two inseparable components. The attribution of the level to the Historic period as well as the Contact/Late Precontact period is based on the presence of a metal projectile point (Cat. #70S79E-147), a 20<sup>th</sup> century .22 calibre bullet (Cat. #68S80E-6a), 39 sherds of vitrified whitewear and 18 pieces of precontact pottery.

#### **4.2 Pottery Assemblage**

##### **4.2.1 European Ceramics**

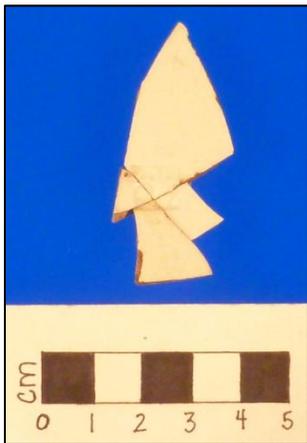
A total of 38 ceramic sherds that can be identified to the Historic period were recovered from Level 1 (Table 4.1). Unidentifiable sherds of vitrified whitewear represent 68.42% of the sample. Four of these sherds are from the same vessel (Cat. #10S30E-1c, 3e, 5e; Figure 4.1). The sherds fit together and are relief-molded. The molding includes the letters “PATEN” and part of a small, unidentifiable image. A handle (Cat. #10S30E-10) that was found broken in two represents another 7.89% of the ceramic assemblage and are a softer earthenware than the other vitrified whitewear fragments (Figure 4.2). The handle has a hand-painted blue line running vertically along its outside surface. Two horizontal blue lines are painted on the interior surface of the handle where it would have connected to the body of the vessel.

The remaining 23.68% of the Historic ceramic assemblage is hotelwear, also vitrified whitewear, which has been reconstructed. All eight sherds fit together and are from the same

plate/saucer (Cat. #10S30E-2, 1d, 5d, 3b; Figure 4.3). The superior surface of the dish has a blue stamped design with the letters “SASKATOO”. The letters are placed within a circular border that overlaps a single line running in an arch presumably circling the plate’s brim. The letters are most probably part of the word Saskatoon, indicating the dish was part of a set for one of the city’s hotels during the early 20<sup>th</sup> century. More specific identification as to the origin of the ware was not possible.

**Table 4.1:** Historic ceramics for Level 1.

Ceramic	Sherd Type	Mass (g)	Count	Percent
Hotelware Vitrified Whitewear	Saucer/plate	28.0	9	23.68%
Vitrified Whitewear (Earthenware)	Handle	48.5	3	7.89%
Vitrified Whitewear	Unidentifiable	15.8	26	68.42%
	Total	92.3	38	100%



**Figure 4.1:** Relief-molded vitrified whitewear vessel base (Cat. #10S30E-1c, 10S30E-3c, 10S30E-5e).



**Figure 4.2:** Vitrified whitewear handle (Cat. #10S30E-10).



**Figure 4.3:** Vitrified whitewear stamped saucer (Cat. #10S30E-2, 10S30E-1d, 10S30E-5d, 10S30E-3b).

### 4.2.2 Precontact Pottery

Level 1 contains a total of 18 pieces of precontact pottery. The assemblage is 27.78% unidentifiable fragments, 5.56% exterior exfoliations and 66.67% complete sherds (Table 4.2). No surface or internal characteristics were distinguishable on the unidentifiable fragments. The exterior exfoliations and the complete sherds all have grit temper. Two of the complete sherds (Cat. #33S50E-22, #32S51E-12) have heavily smoothed, fabric impressed exterior surfaces. They are both of average thickness and are likely from the same vessel. Cat #33S50E-22 also has charred food residue encrusted on the interior surface of the sherd. All of the sherds are likely body sherds; however, none of them are of sufficient size to make such an identification with certainty. Additionally, the cultural affiliation of the precontact pottery in Level 1 cannot be determined.

**Table 4.2:** Precontact pottery for Level 1.

<b>Fragment Description</b>	<b>Mass (g)</b>	<b>Count</b>	<b>Percentage</b>
Complete sherd	16.0	12	66.67%
Exterior Exfoliation	0.3	1	5.56%
Unidentifiable fragments	1.0	5	27.78%
Total	17.3	18	100%

### 4.3 Metal Assemblage

One .22 calibre bullet (Cat. #68S80E-6a) was recovered from Level 1 in unit 68S80E at 13 cm dbs. The bullet is deformed from having been used and likely dates to the 20<sup>th</sup> century. A metal projectile point (Cat. #70S79E-147) was recovered from unit 70S79E at 10 cm dbs. The small point is slightly asymmetrical, made of a rusted ferrous metal with a triangular body and narrow stem (Figure 4.4). The length of the point from the base of the stem to the tip of the blade is 1.34 cm. The length of the blade is 1.01 cm and the stem length is 0.33 cm. The maximum width of the blade is 1.23 cm at the distal end, while the stem is 0.44 cm wide. The point has a thickness of 0.09 cm. A single, unidentifiable piece of lead with linear striations (Cat. #69S78E-3b) was recovered from unit 69S78E at a depth of 8 cm. A total of 21 tin fragments were recovered from Level 1, two of which are seam fragments and 9 are rim fragments. The total weight of the tin fragments is 101.5 g.



**Figure 4.4:** Metal projectile point (Cat. #70S79E-147).

#### **4.4 Lithic Assemblage**

##### **4.4.1 Cores and Core Fragments**

A single exhausted core (Cat. #19S18E-12) was recovered from Level 1 in unit 19S18E at a depth of 15 cm. It is 2.32 cm long, 2.16 cm wide and has a maximum thickness of 1.39 cm. The core is composed of grey chert.

##### **4.4.2 Debitage**

A total of 71 pieces of debitage were recovered in Level 1 (Table 4.3). Secondary flakes are the most common type of debitage recovered, representing 49.32% of the total. Shatter is the next highest at 30.14%, followed by secondary decortification flakes at 15.07%. Primary decortification flakes are only 5.48% of the sample, indicating that early stages of tool manufacture were not the dominant activity at the Cut Arm site in Level 1.

Grey chert is the most common lithic material in the assemblage at 35.62%. Various cherts are the second most common and represent 16.44%, while Swan River Chert represents another 14.1% of the level's debitage. Fifty percent of the Swan River Chert debitage shows signs of heat-treating. Twelve other material types make up the remaining 35.2% of the Level 1 debitage. The majority of the lithic materials utilized in this level are local in origin (Johnson 1998). A single obsidian secondary flake and a piece of jasper shatter are the only exotics present.

**Table 4.3:** Lithic debitage from Level 1.

Material Type	Primary Decortification Flakes	Secondary Decortification Flakes	Secondary Flakes	Shatter	Total	Percent
Basalt	-	-	-	2	2	2.74%
Chalcedony	-	1	-	1	2	2.74%
Chert	-	1	8	3	12	16.44%
Chert Precipitated in Limestone (CPL)	1	-	-	-	1	1.37%
Dolomite	-	-	-	1	1	1.37%
Grey Chert	1	3	15	7	26	35.62%
Jasper	-	-	-	1	1	1.37%
Obsidian	-	-	1	-	1	1.37%
Quartz	-	-	2	1	3	4.11%
Quartzite	-	1	-	1	2	2.74%
Sandstone	-	2	5	-	7	9.59%
Silicified Peat	-	-	1	-	1	1.37%
Silicified Siltstone	-	-	1	-	1	1.37%
Siltstone	-	1	-	-	1	1.37%
Swan River Chert	2 (H/T: n=2)	2 (H/T: n=2)	3	3 (H/T: n=1)	10	13.70%
White Chert	-	-	-	2	2	2.74%
Total	4	11	36	22	73	100%
Percent	5.48%	15.07%	49.32%	30.14%	100%	

#### 4.4.3 Fire-Cracked Rock

Level 1 contains 13 pieces of fire-cracked rock (FCR) with a total mass of 110.8 g. Granite is clearly the dominant material type, consisting of 12 pieces and 99.0% of the FCR for the level. The remaining 1.0% consists of one piece of FCR of an indeterminate material type.

#### 4.5 Botanical Assemblage

Six pieces of charcoal with a mass of 0.6 g were recovered from unit 71S80E in Level 1.

#### 4.6 Faunal Assemblage

Level 1 contains a total of 1218 faunal fragments with a total mass of 1715.0 g (Table 4.4). Of the assemblage, only 7.80% is identifiable all of which is unburned. The other 92.20%

is unidentifiable and has a mass of 850.7 g. The majority of the unidentifiable faunal fragments for Level 1 are unburned bone at 88.12% by mass (749.6 g), followed by unburned tooth enamel at 9.74% by mass (82.9 g). When examining the assemblage by degree of burning, 87.03% is unburned, 10.92% is calcined and 2.05% is burned.

Three taxa were identified in the Level 1 faunal assemblage (Table 4.5). Two size classes, Very Large Mammal (SC6) and Large Mammal (SC5), were used to classify specimens lacking sufficient information to be identified to taxon. It is highly likely that all of the specimens identified to a size class are in fact *Bison bison* as the majority of the identified specimens are *B. bison* and there is no evidence to suspect the presence of other large or very large mammals in Level 1.

**Table 4.4:** Faunal counts for Level 1.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	25	3.7	-	-
Calcined Bone	132	14.4	-	-
Unburned Bone	841	749.6	49	816.1
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	1	0.1	-	-
Unburned Tooth Enamel	124	82.9	46	48.2
Total	1123	850.7	95	864.3

#### 4.6.1 Order Artiodactyla

##### *Bison bison*

The total Number of Identified Specimens (NISP) for *B. bison* in Level 1 is 24 including immature specimens (Table 4.5). This represents 25.26% of the identified faunal remains for the level. The Minimum Number of Individuals (MNI) is two and the Minimum Number of Elements (MNE) is 1.5, the specific break-down and calculation by element can be found in Table 4.6.

Based on the analysis performed, a minimum of two adult bison are present in the Level 1 faunal assemblage. Several deciduous tooth fragments of *B. bison* also indicate the presence of at least one immature individual. Roughly 17% of the specimens identified to *B. bison* exhibit root etching and another 17% exhibit trowel trauma from excavation.

**Table 4.5:** Faunal taxa for Level 1.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	24	2	1.5
<i>Lepus americanus</i>	1	1	1
Family Sciuridae	1	1	1
Very Large Mammal	25	N/A	N/A
Very Large or Large Mammal	44	N/A	N/A

**Table 4.6:** Adult *Bison bison* quantification by element for Level 1.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	1	1	1	0.1
1st tarsal	-	2	-	1	3	2	1.5
2nd Metatarsal	-	-	-	1	1	1	0.5
2nd phalanx	-	-	-	2	2	1	0.3
2nd thoracic vertebra	-	-	1	-	1	1	1.0
Fused 2nd & 3rd carpal	2	-	-	-	2	2	1.0
Fused central & 4th tarsal	1	-	-	-	1	1	0.5
Internal carpal	1	-	-	-	1	1	0.5
Patella	-	1	-	-	1	1	0.5
Proximal metacarpal fragment	1	-	-	-	1	1	0.5
Proximal metatarsal fragment	1	-	-	-	1	1	0.5
Ulnar carpal	1	1	-	-	2	1	1.0

#### 4.6.2 Order Lagomorpha

##### *Lepus americanus*

The total NISP is 1 (Table 4.5) and consists of a body fragment of a left dentary (Cat. #17S18E-1a). The specimen was identified to *Lepus americanus* using the Department of Archaeology and Anthropology's comparative collection. Based on the limited nature of the

remains, the specimen appears to be from a mature individual and has no natural or human modifications (Figure 4.5).



**Figure 4.5:** *Lepus americanus* mandible and teeth fragments (Cat. #17S18E-1a).

### 4.6.3 Order Rodentia

#### Family Sciuridae

The total NISP is 1 (Table 4.5), consisting of a right mandibular fragment, one premolar and three molars all found in articulation within the mandibular fragment (Cat. #32S51E-5b). The teeth are very worn and indicate that the remains are from a mature individual. The specimen was identified to family; however, a more specific taxonomic designation was not possible.

### 4.6.4 Miscellaneous Specimens

The miscellaneous specimens for Level 1 are broken into those identifiable to Very Large Mammal (SC6) and those identifiable to Very Large or Large Mammal (SC6-5) and have a combined NISP of 69 (Table 4.5). The majority of the specimens in SC6-5 are enamel fragments. The specimens identified to SC6 are primarily long bone and petrous temporal fragments. SC6 represents 36.23% of the miscellaneous specimens for the level. The SC6-5 accounts for the remaining 63.77%. The distribution pattern is reversed when the miscellaneous specimens are examined by mass instead of number of items. By mass, SC6 accounts for 84.58% and SC6-5 only 15.42%.

Taphonomic alterations to the miscellaneous specimens are fairly limited. All of the specimens are unburned bone or tooth enamel. Only one specimen has signs of trowel trauma. Root etching is evident on one Very Large Mammal specimen and one Very Large or Large Mammal.

#### **4.7 Seasonality**

The only immature faunal remains recovered are fragmented deciduous teeth and not sufficiently identifiable to aid in determination of seasonality. As a result, seasonality cannot be determined for Level 1.

#### **4.8 Features and Artifact Distribution**

A single feature was present in Level 1 at the Cut Arm site. Feature 1-1 (Figure 4.7) is a clay-lined, bowl shaped ash lens. The clay underlying the ash lens was red and appeared burnt. The feature was within units 67S78E and 68S78E. The feature was recorded in the west wall profiles of both units. Based on this, the maximum horizontal extent of the feature was 45 cm north to south. The top of the feature was 5 cm db, with the bottom extending down to a maximum depth of 17 cm. The feature was not deep enough to disturb the Level 2 deposits below. A right patella identified as *B. bison* was found on the surface of the ash lens feature, but showed no signs of burning or human modification.

Level 1 is a relatively small assemblage compared to the other levels in the site. Based on the distribution of mapped artifacts in Figures 4.6 and 4.7 several areas of artifact concentration can be identified. Block 1 has very few specimens at all. Faunal remains appear to be clustered in unit 33S50E in Block 3 with the concentration extending into adjacent units. Almost all specimens in the cluster were fragmented or incomplete. Very Large Mammal (SC6) fragments identifiable as petrous temporal and cranial fragments were present as well as a *B. bison* complete 2<sup>nd</sup> phalanx and 2<sup>nd</sup> thoracic vertebra fragment. A second area of faunal concentration is in units 71S78E and 71S79E in Block 4. The majority of the specimens in unit 71S78E were unidentifiable and none were complete elements. Unit 71S79E, however, contained three carpals, two tarsals, a metatarsal fragment and a fragment of a femoral head.

The pottery and ceramics in Level 1 have limited distribution. All of the Historic ceramic sherds were recovered from Block 2. The level's Precontact pottery was scattered through four

of the five units in Block 3 and overlaps with the concentration of faunal remains in that area. In regards to lithics, 58% of secondary flakes are from 10S30E although none had their exact provenience recorded.

#### **4.9 Interpretation of Level 1**

The ash lens feature in Level 1 (Feature 1-1) is not associated with any artifact concentrations and there is very little fire-cracked rock and burned/calcined bone anywhere in the level. The feature does not appear to have been a major activity area within the site. Based on the lens's burned clay lining, the feature was likely a hearth. The lack of burned rock and bone further supports this conclusion and not the alternative interpretation of it having served as a roasting or boiling pit. Hearths are a common feature within most types of sites, particularly habitation sites.

The Cut Arm site's Level 1 assemblage is relatively conservative. This is especially evident with the faunal portion of the assemblage. The small amount of bone and tooth enamel is consistent with a short-term occupation and is clearly not indicative of a major kill or processing site. The faunal assemblage consists primarily of thoroughly fragmented specimens. This would be expected in a habitation site, where increased fragmentation can occur due to processing, cooking and trampling. The 7.8% of the faunal remains that are identifiable to taxon indicate the presence of *B. bison*, *Lepus americanus* and Family Sciuridae.

Analyzing the bison portion of the identified remains revealed that the assemblage consists of at least two adult and one immature bison. The immature individual was recognized based on deciduous enamel fragments. It is unfortunate that the fragments are insufficient to determine the sex or specific age of the individual. The majority of the adult *B. bison* specimens are complete or near complete limb elements, including carpals, tarsals, phalanges and metapodials. The presence of these elements indicate that the site's occupants did not remove low-utility items from the prey's carcasses before carrying them to the Cut Arm site. With total minimum number of two adult individuals, substantial initial processing at the kill site may not have been necessary. It can also be concluded that when Level 1 was occupied it was not a period of extreme dietary stress as the occupants were not maximizing the nutritional value of all elements at their disposal. The femoral head fragment recovered suggests that higher-utility

items were present as well but may have been too processed and fragmented for many to be identified.

Other than bison, only two species were identified. A snowshoe hare (*Lepus americanus*) and a small rodent (Family Sciuridae) are each represented by a mandible fragment and exhibit no evidence of having been processed for consumption. It is possible that butchering activities would not have affected the heads of these animals, however they could also be intrusive to the site and have died of natural causes. Neither of these scenarios can be confirmed or eliminated with the limited remains present.

The lithic assemblage in Level 1 includes no formed or expedient tools, consisting of an expedient core and debitage dominated by secondary flakes and shatter. Such an assemblage would be expected at a campsite, where a range of activities including tool repair and manufacture take place (Kooyman 2000). The fact that over half of the secondary flakes are concentrated within one unit indicates that tool maintenance activities were focused in this area. The small number of primary decortification flakes and one exhausted core are indicative of limited tool manufacture having taken place.

The lithic material types utilized at the site in Level 1 are almost entirely local cherts. This is to be expected as site assemblages on the Canadian prairies are typically dominated by local, easily available materials (Kooyman 2000:143). The exception is an obsidian secondary flake. The closest obsidian source is Yellowstone National Park in Wyoming and would have been obtained through long-distance trade networks (Park 2010).

The age and cultural affiliation of Level 1 can be inferred from the ceramic and metal artifacts. The level contains a Contact period component based on the metal projectile point from unit 70S79E as well as the precontact pottery fragments throughout the level. The pottery fragments have exterior surfaces that were fabric-impressed and heavily smoothed. Unfortunately, this is not enough information to assign them to a pottery type or cultural group. A Historic period component is also present based on the sherds from three whitewear vessels, particularly the ones identified as a saucer or plate having come from a 20<sup>th</sup> century hotel in Saskatoon. A Historic period component is further supported by the used .22 calibre bullet and scattered tin can fragments. Based on this evidence Level 1 represents a Historic period component directly overlying or intermixed with a temporally distinct Contact period component.



# Cut Arm Site (FbNp-22) - Level 1

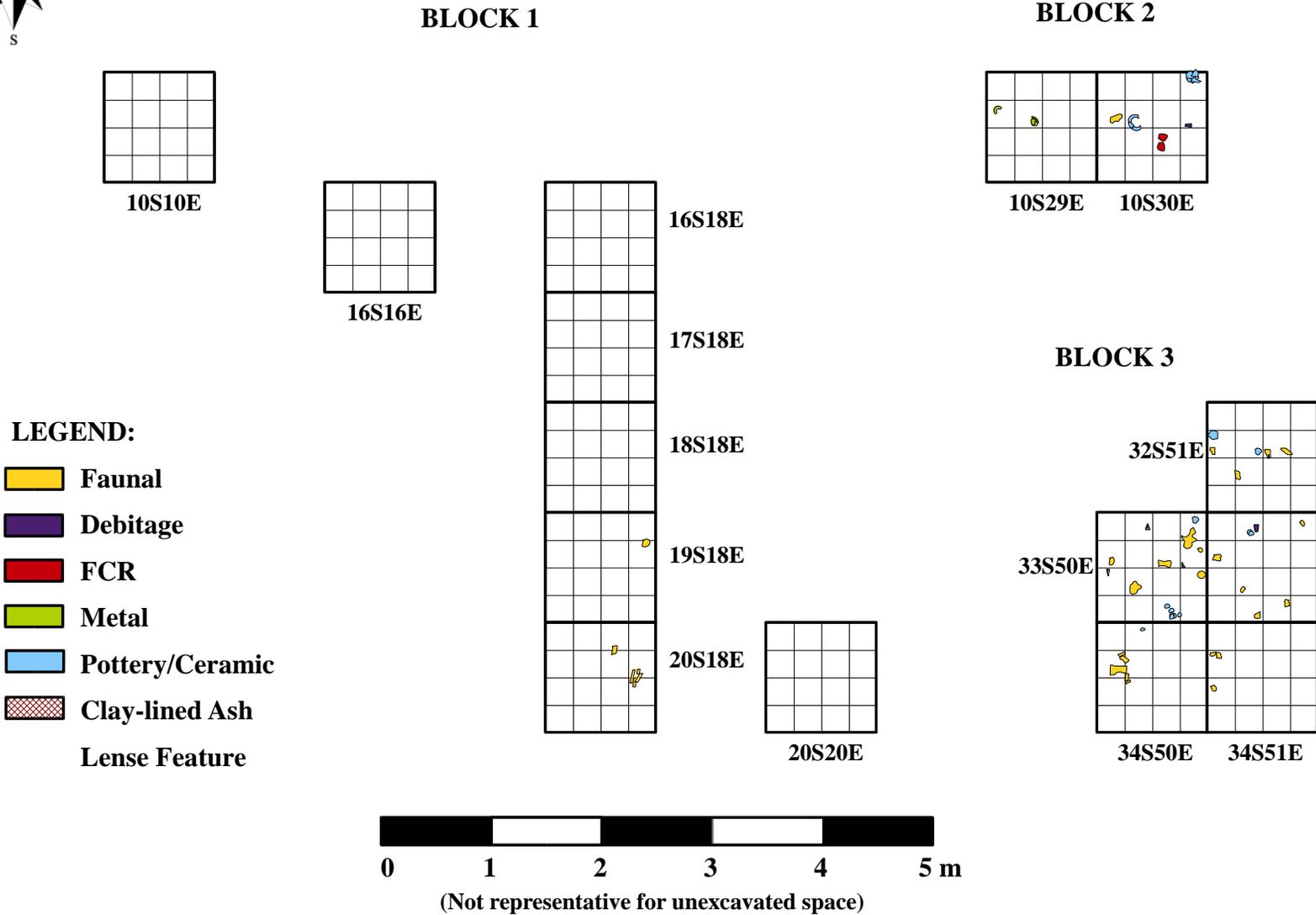


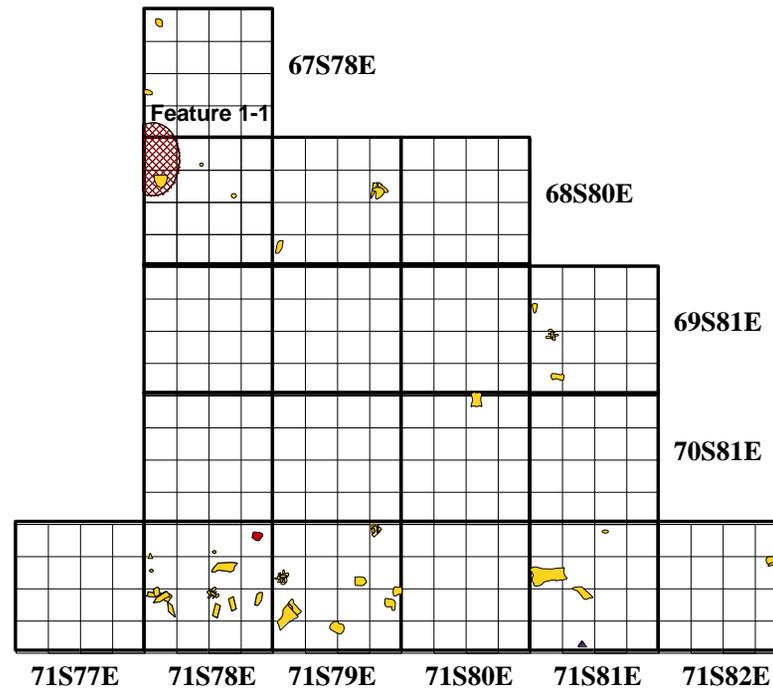
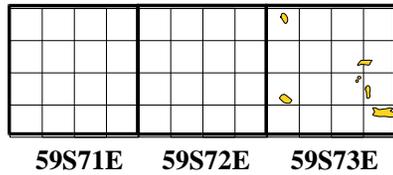
Figure 4.6: Artifact and feature distribution map of Level 1, 1 of 2.



# Cut Arm Site (FbNp-22) - Level 1

BLOCK 5

BLOCK 4



## LEGEND:

-  Faunal
-  Debitage
-  FCR
-  Metal
-  Pottery/Ceramic
-  Clay-lined Ash
-  Lense Feature



(Not representative for unexcavated space)

Figure 4.7: Artifact and feature distribution map of Level 1, 2 of 2.

## **Chapter 5**

### **Cultural Level 2**

#### **5.1 Introduction**

Cultural Level 2 at the Cut Arm site is present in all units except unit 71S78E. The level ranges in depth from a minimum of 8 cm dbs to a maximum of 27 cm dbs. This large depth range is misleading and is the result of the substantial slope of both the surface and the underlying deposits of the site. The average thickness of the level is only 5.5 cm and is a much more accurate representation of the nature of the cultural deposits. The cultural affiliation of the level is Plains Side-Notched complex based on the presence of a Plains Side-Notched projectile point (Cat. #67S78E-5b) and 18 sherds of Mortlach phase precontact pottery. This is supported by a radiocarbon date of  $650 \pm 40$  cal B.P (Table 3.3).

#### **5.2 Pottery Assemblage**

##### **5.2.1 Precontact Pottery**

A total of 1095 pottery fragments were recovered from Level 2 with a total mass of 751.8 g. All pottery that has identifiable temper is grit with one exception (Cat. #68S78E-17). A total of 73.70% of the pottery assemblage is unidentifiable. Roughly 75% of these unidentifiable fragments have smoothing on an indeterminate surface. Interior exfoliations make up only 1.10% of the level's pottery and exterior exfoliations a minimal 0.64%. Two of the exterior exfoliations have been heavily smoothed and one other has heavily smoothed fabric-impressions. Four interior exfoliations have noteworthy characteristics. Two of these have charred food residue burned onto their interior surface (Cat. #68S78E-17). Two others (Cat. #68S78E-17) have an accidental inclusion of limestone in their paste as well as fine animal-hair brush marks on their interior surfaces (Figure 5.1).

Complete sherds constitute 24.57% of the Level 2 pottery assemblage (Table 5.2, Table 5.3). Four complete body sherds are identifiable as from the same vessel based on their

consistent thickness as well as having exterior surfaces exhibiting heavy smoothing over net impressions (Cat. #34S51E-9a). All rim sherds are identifiable as Mortlach phase pottery. Eight of these sherds have heavily-smoothed, cord-roughened exteriors with finger-nail impressions on the rim surface. Three of these also exhibit horizontal markings on their interior surfaces and have a layered internal structure (Figure 5.2 C; Cat. #68S78E-21). The other two rim sherds are both from the same vessel and have a wedge profile with rounded impressions placed perpendicular to the rim (Figure 5.2 A; Cat. #68S80E-18a,b,c) (Figure 5.2 B; Cat. #68S78E-19). Based on comparison to pottery fragments with dentate and bead impressions, these impressions were made with a bulky animal-hair yarn.



**Figure 5.1:** Interior exfoliation with brushmarks and limestone inclusions (Cat. #68S78E-17).

**Table 5.1:** Precontact pottery for Level 2.

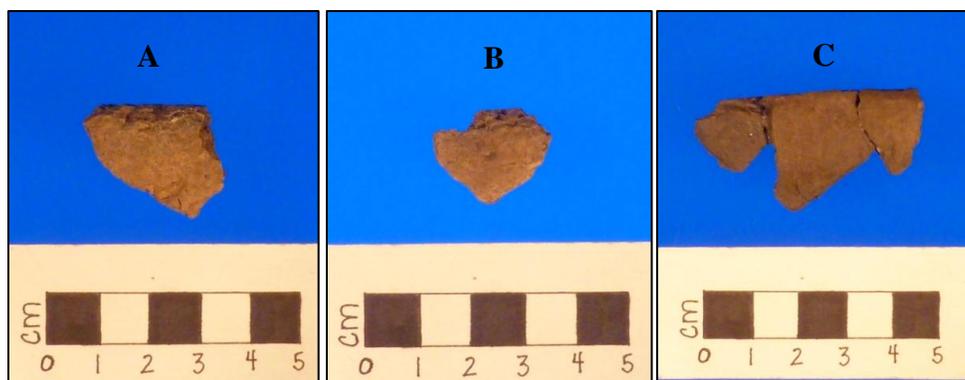
<b>Fragment Description</b>	<b>Mass (grams)</b>	<b>Count</b>	<b>Percentage</b>
Complete sherd	436.7	269	24.57%
Exterior Exfoliation	6.1	7	0.64%
Interior Exfoliation	16.1	12	1.10%
Unidentifiable fragments	292.9	807	73.70%
Total	751.8	1095	100%

**Table 5.2:** Quantification of complete sherds for Level 2.

Sherd Type	Count	Percentage
Rim	11	4.09%
Neck	2	0.74%
Body	95	35.32%
Body/Base	5	1.86%
Base	2	0.74%
Indeterminate	154	57.25%
Total	269	100%

Only two neck sherds were identified, both of which were cord-roughened and heavily smoothed. A total of 91 body sherds were recovered. The majority of the sherds exhibit exterior surfaces that have been heavily smoothed with no underlying impressions. The other eight body sherds were impressed with a fabric that had a twisted cord weft and finer thread woof and had been smoothed with a pebble before fully dry. As with some of the rim sherds recovered, these eight body sherds were also layered internally.

The basal sherds from Level 2 were roughened with a cord-wrapped paddle and subsequently smoothed until burnished. This indicates they are from a Mortlach vessel, however, the comparative thickness of the sherds could suggest otherwise. Five basal/body sherds are identifiable as all being from the same vessel (Figure 5.3; Cat. #68S80E-17). As with other sherds from throughout the level, the exterior surfaces were roughened with a cord-wrapped paddle.



**Figure 5.2:** Mortlach rim sherds. A- Cat. #68S80E-18a,b, c, B- Cat. #68S78E-19, C- Cat. #68S78E-21.



**Figure 5.3:** Mortlach basal sherds (Cat. #68S80E-17).

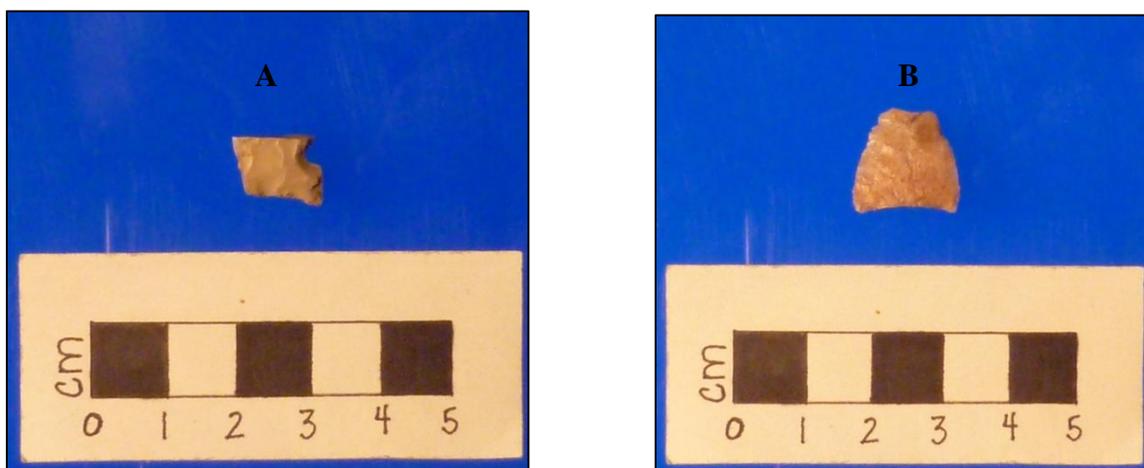
**Table 5.3:** Analysis of Level 2 complete sherds by type.

# of Items	Exterior Surface	Interior Surface	Rim Surface	Pottery Type
<i>RIM</i>				
1	N/A	N/A	Wedge profile. Woven fabric-impressed.	Mortlach Phase
1	Partial fingernail impression	N/A	Wedge profile. Woven fabric-impressed.	Mortlach Phase
5	Heavily smoothed, cord-roughened	N/A	Finger-nail impressed	Mortlach Phase
3	Heavily smoothed, cord-roughened	Horizontally brushed	Finger-nail impressed	Mortlach Phase
1	Cord-roughened	N/A	Finger-nail impressed	Mortlach Phase
<i>NECK</i>				
2	Heavily smoothed, cord-roughened	N/A	N/A	Indeterminate
<i>BODY</i>				
8	Heavily smoothed, fabric-impressed	N/A	N/A	Indeterminate
83	Very heavily smoothed	N/A	N/A	Indeterminate
<i>BASAL/BODY</i>				
5	Very heavily smoothed, cord-roughened	N/A	N/A	Indeterminate
<i>BASE</i>				
2	Cord-roughened, highly burnished	N/A	N/A	Mortlach Phase

### 5.3 Lithic Assemblage

#### 5.3.1 Projectile Points

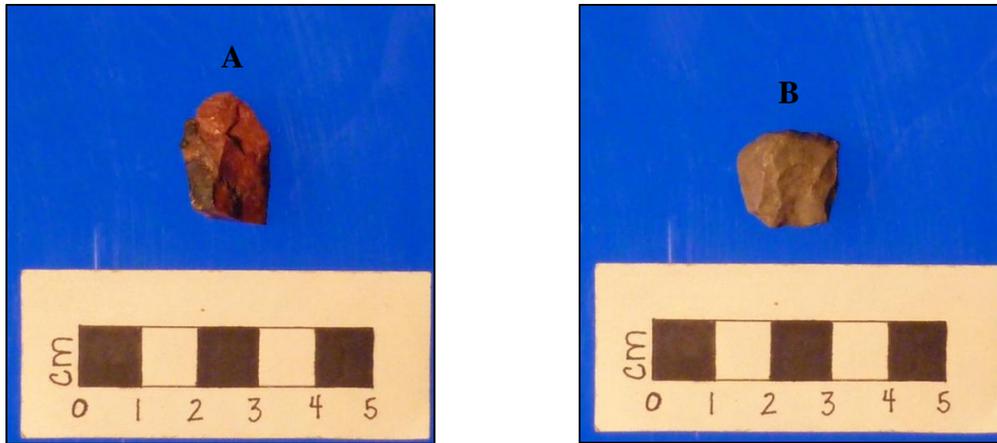
Two projectile points were recovered from Level 2 at the Cut Arm site. A side-notched projectile point body fragment (Cat. #33S51E-29) was found in unit 33S51E at a depth of 24 cm below the surface. The point is made from Swan River Chert and has been heat-treated. The point's tip and base are both broken off and missing, making more specific identification impossible (Figure 5.4 B). The fragment is 1.59 cm long, 0.31 cm thick and has a maximum width of 1.57 cm. The partial base of another side-notched projectile point (67S78E-5b) was recovered from unit 67S78E. The point was found at 17 cm dbb and is made of grey chert. The point was broken perpendicular to its length near the top of the side notches and the body/ tip are missing. Also missing is everything lateral of one side notch. The fragment is 1.00 cm long, 0.36 cm thick, has a maximum width of 1.15 cm. Based on morphology the fragment is from a Plains Side-Notched projectile point (Figure 5.4 A).



**Figure 5.4:** Level 2 projectile points. A – Cat. #67S78E-5b, B - Cat. #33S51E-29

#### 5.3.2 Unifaces

An endscraper (Cat. #10S30E-25; Figure 5.5 B) made of grey chert was recovered from unit 10S30E at a depth of 25 cm dbb. The scraper is unifacially flaked on the distal portion of the dorsal surface. The tool is 1.68 cm long, 1.79 cm wide, 0.68 cm thick and weighs 2.3 g.



**Figure 5.5:** Level 2 flaked stone tools. A - Cat. #57S71E-5d, B – Cat. #10S30E-25.

### 5.3.3 Retouched Flakes

A single retouched flake (Cat.# 59S71E-5d; Figure 5.5 A) was recovered from Level 2. The flake was found in unit 59S71E at a depth of 25 cm. It is a secondary decortification flake and is made of an unidentifiable chert. Bifacial retouch is present along the distal margin and the length of one lateral margin. The flake has a mass of 2.8 g and is 1.56 cm long, 2.36 cm wide and 0.76 cm thick.

### 5.3.4 Debitage

A total of 205 pieces of debitage were recovered from Level 2 (Table 5.4). Secondary flakes are by far the most common type of debitage and consist of 58.54% of the assemblage. Shatter was the second most common form at 30.24%, followed by primary (5.84%) and secondary (5.37%) decortification flakes. This pattern indicates that while some tool manufacture took place in Level 2, finishing and resharpening of tools was the dominant lithic activity during this period.

The most common lithic material type in Level 2 is Swan River Chert representing 38.05%. Evidence of heat-treating is present on roughly 42% of all Swan River Chert debitage. Grey chert is the second most abundant lithic material representing 14.15%, followed by white chert with 11.71% and various unidentifiable cherts representing 9.27% of the Level 2 debitage. The remaining 26.82% of the assemblage consists of fourteen different lithic materials. Several specimens are of exotic materials including agate shatter as well as secondary flakes of Knife River Flint and jasper. It is likely that these materials would likely have been obtained through

trade. In the case of Knife River Flint the nearest source would have been quarries in western North Dakota. Testing of the quality and availability of local lithic materials is evident from a Swan River Chert cobble recovered in unit 70S81E. The material was discarded after minimal flaking, most likely due to its poor quality and the easy availability of other samples.

**Table 5.4:** Lithic debitage from Level 2.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Agate	-	-	-	1	1	0.49%
Basalt	-	-	3	1	4	1.95%
Chert	-	1	10	8	19	9.27%
				(H/T: n=1)		
Granite	-	-	1	-	1	0.49%
Grey Chert	1	2	17	9	29	14.15%
Gronlid Siltstone	-	-	-	1	1	0.49%
Indeterminate	-	-	1	-	1	0.49%
Jasper	-	-	1	-	1	0.49%
Other	-	-	-	1	1	0.49%
Knife River Flint	-	-	2	-	2	0.98%
Quartz	-	-	11	3	14	6.83%
Quartzite	1	-	4	3	8	3.90%
Silicified Peat	-	-	9	3	12	5.85%
Silicified Siltstone	-	-	-	3	3	1.46%
Silicified Wood	1	-	1	3	5	2.44%
Siltstone	-	-	1	-	1	0.49%
Swan River Chert	9	7	41	21	78	38.05%
	(H/T: n=4)	(H/T: n=4)	(H/T: n=15)	(H/T: n=10)		
White Chert	-	1	18	5	24	11.71%
			(H/T: n=1)	(H/T: n=1)		
<b>Total</b>	<b>12</b>	<b>11</b>	<b>120</b>	<b>62</b>	<b>205</b>	<b>100%</b>
<b>Percent</b>	<b>5.85%</b>	<b>5.37%</b>	<b>58.54%</b>	<b>30.24%</b>	<b>100%</b>	

### 5.3.5 Fire-Cracked Rock

A total of 148 pieces of fire-cracked rock were recovered from Level 2 with a mass of 3792.1 g. Granite comprises 99.32% of the FCR and has a mass of 3752.4 g. One piece (0.68%) of schist was the only other fire-cracked lithic material and weighed 39.7 g.

## 5.4 Botanical Assemblage

Charcoal was present in Block 3, Block 4 and Block 5. Thirty-seven pieces were recovered weighing 2.7 g.

## 5.5 Faunal Assemblage

There are 3888 items in the Level 2 faunal assemblage with a total mass of 5669.0 g (Table 5.5). Unidentified faunal fragments represent 89.97% and 2180.9 g of this assemblage. The majority of the unidentifiable items are unburned bone (95.74% by mass). There is also a small amount of unburned tooth enamel (2.77% by mass) and less than 1% by mass of each burned and calcined bone.

The identifiable faunal remains represent 10.03% of the level's faunal assemblage. All of the identifiable items are unburned and do not exhibit any signs of human modification. Specimens that could not be confidently assigned to a taxon were placed within a size class whenever possible. Two taxa and three size classes were identified, including specimens belonging to *B. bison* and *Canis sp.* The three size classes present in Level 2 are Large Mammal (SC5), Large or Very Large Mammal (SC5-6) and Very Large Mammal (SC6). As with Level 1, the majority of the SC6 and SC5-6 specimens are most likely *B. bison*.

### 5.5.1 Order Artiodactyla

#### *Bison bison*

The number of specimens identified to *B. bison* in Level 2 is 128 (Table 5.6). This includes both mature and immature specimens and is 32.82% of the level's identified specimens. The Minimum Number of Individuals (MNI) is four and the Minimum Number of Elements (MNE) is 2.0. A detailed quantification by element of the adult *B. bison* remains is presented in Table 5.7. Based on this analysis, at least four adult individuals are represented by the assemblage. At least one juvenile *B. bison* under 4.5 years of age is also present based on an unfused epiphyseal fragment from a distal tibia (Cat. #67S78E-31).

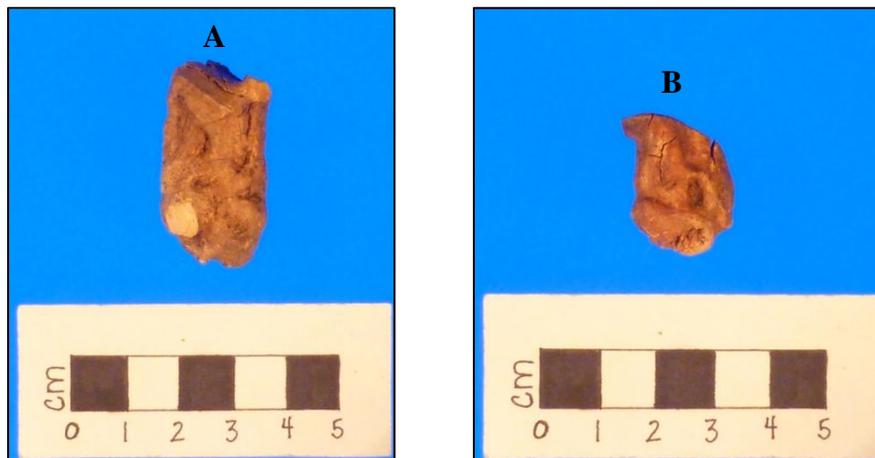
Roughly 21% of the bison remains in Level 2 exhibit signs of trowel trauma and only 3% have been damaged by root etching. This is understandable since the occupational layer was located below modern soil development and the majority of roots.

**Table 5.5:** Faunal counts for Level 2.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	62	21.7	-	-
Calcined Bone	48	10.8	-	-
Unburned Bone	3228	2088.0	317	2979.5
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	160	60.4	73	508.6
Total	3498	2180.9	390	3488.1

**Table 5.6:** Faunal taxa for Level 2.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	128	4	2.0
<i>Canis sp.</i>	10	N/A	N/A
Large Mammal	2	N/A	N/A
Very Large Mammal	204	N/A	N/A
Very Large or Large Mammal	46	N/A	N/A



**Figure 5.6:** Pathological *Bison bison* molars. A- Cat. #67S78E-21, B- Cat. #67S78E-13e.

Two unusual faunal specimens were recovered in Level 2 at the Cut Arm site. Artifact #67S78E-13e and #67S78E-21 are both molars from adult bison (Figure 5.6). The occlusal surfaces of these teeth are heavily worn, indicating that the animals they are from were quite old at the time of death. The roots of both molars have a puffy appearance. This was the result of hypercementosis, where reactive growth of the cementum was caused by chronic infection and subsequent inflammation. Based on the close proximity of the specimens to one another within the site and the unusual condition seen in both molars, it is likely that the teeth are from a single individual.

### **5.5.2 Order Carnivora**

#### ***Canis sp.***

The NISP in Level 2 for *Canis sp.* is 10 (Table 5.6). A cluster of fragmented teeth (Cat. #20S20E-3) was found in the southeast quadrant of unit 20S20E. Two canines of indeterminate side as well as a premolar were identifiable. The premolar is too fragmented to determine whether it is maxillary or mandibular but is either a second or third. The cluster was located adjacent to a small piece of red ochre (Cat. #20S20E-2); however, there was no staining directly on the specimens and no comments in the field notes of soil change around the remains.

### **5.5.3 Miscellaneous Specimens**

The size classes identified for miscellaneous specimens in Level 2 were Large Mammal (SC5), Large to Very Large Mammal (SC5-6) and Very Large Mammal (SC6) (Table 5.6). The NISP for SC5 is 2. The NISP for SC5-6 is 46 and consists primarily of rib fragments. The NISP for SC6 is 204 of which 52% is vertebral fragments. Rib fragments account for 18% and long bone fragments another 16% of the SC6 miscellaneous specimens.

The taphonomic alterations present include root etching, trowel trauma and a tooth puncture. Root etching is visible on 23% of the miscellaneous specimens and trowel trauma was present on only 2% of the fragments. A Large to Very Large Mammal vertebral fragment has a puncture mark from a tooth which was most likely the result of scavenger activity.

**Table 5.7:** Adult *Bison bison* quantification by element for Level 2.

Element	Left	Right	Axial	Indeterminant	Total Number	MNI	MNE
1st phalanx	-	-	-	1	1	1	0.1
Radial carpal	1	-	-	-	1	1	0.5
Unciform carpal	-	1	-	-	1	1	0.5
Astragalus	1	1	-	1	3	1	1.5
Calcaneous	1	-	-	-	1	1	0.5
Fused 2nd & 3rd tarsal	-	3	-	-	3	3	1.5
Fused central & 4th tarsal	-	1	-	-	1	1	0.5
Lateral maleolus	1	1	-	-	2	1	1.0
Proximal metatarsal fragment	1	2	-	1	4	2	2.0
Distal humerus	-	1	-	-	1	1	0.5
Proximal ulna	-	2	-	-	2	2	1.0
Ulnar carpal	1	-	-	-	1	1	0.5
Maxillary 4th premolar	-	1	-	-	1	1	0.5
Maxillary 3rd premolar	-	4	-	-	4	4	2.0
Maxillary 1st molar	-	1	-	-	1	1	0.5
Maxillary 2nd molar	-	1	-	-	1	1	0.5
Maxillary 3rd molar	-	1	-	-	1	1	0.5
Mandibular 3rd premolar fragment	-	1	-	-	1	1	0.5

## 5.6 Seasonality

A distal tibia fragment was the only immature specimen recovered. The age of the individual cannot be narrowed sufficiently to be used to determine seasonality for Level 2 at the Cut Arm site.

## 5.7 Features and Artifact Distribution

A single feature was present in Level 2 of the Cut Arm site. The feature (Feature 2-1, Figure 5.7) is a black stain containing small pieces of charcoal in units 17S18E and 18S18E of excavation Block 1. Feature 2-1 has a minimum depth of 10 cm and a maximum depth of 15 cm below the surface. The feature extends across the southwest quad of unit 17S18E and into the northwest, southwest and northeast quads of unit 18S18E.

There are three pottery concentrations in Level 2. The largest of these is in excavation Block 4 and covers the majority of units 68S79E and 68S80E (Figure 5.8). The smaller two concentrations are in Block 3 in unit 33S51E and the southern portion of unit 32S51E (Figure 5.8). There was very little precontact pottery recovered from outside of these areas, suggesting these locations are where the vessels were originally broken and that limited scattering of the sherds occurred.

Faunal remains were primarily recovered from Block 4. Two areas of artifact concentration in this block are visible in Figures 5.7 and 5.8. The first is in the eastern portion of the block and spans units 67S78E to 70S78E and extends west into the middle of units 69S79E and 70S79E. The second faunal concentration is in the western portion of the block. It extends from unit 69S81E southeast to unit 71S80E.

Lithic materials were found scattered throughout the site. The highest concentration was in unit 10S30E, where 17% of the lithic assemblage was located. Within this concentration was a range of types of debitage as well as the grey chert endscraper (Cat. #10S30E-25). The other lithic tools in Level 2 were also from areas of general artifact concentration. The Plains Side-Notched projectile point was found in association with the faunal remains in the western portion of Block 4. The unidentifiable projectile point was found next to the pottery concentration in unit 33S51E. The only exception is the retouched flake from unit 59S71E where there was little else found.

## **5.8 Interpretation of Level 2**

Level 2 in the Cut Arm site contains a considerable amount of precontact pottery. Two general types appear to be present. The first shares the same characteristics with the sherds found in Level 1. These sherds have exterior surfaces that are fabric-impressed and heavily smoothed; however, the sherds recovered were not large enough to make a more specific identification. The second pottery type has smoothed, cord-roughened exteriors with wedge-shaped rim profiles and finger-nail impressions. This pottery is characteristic of the Mortlach phase and would be expected in Plains Side-Notched complex components.

As in Level 1, the lithic assemblage is dominated by local material. The two projectile points in Level 2 are both side-notched and were found broken in areas of general artifact concentration. Only Cat. #67S78E-5b was identifiable as a Plains Side-Notched point. Based on

the presence of this point and the identification of numerous pottery sherds in Level 2 as Mortlach, the cultural affiliation of the occupation can be determined to be Plains Side-Notched complex.

The faunal remains of Level 2 are more substantial than in Level 1 but are still not the massive deposits indicative of a kill or primary processing site. A minimum of four adult and one immature *B. bison* were represented by the assemblage. At least one of these mature individuals was old and infirm based on the heavily worn teeth altered by hypercementosis. The only non-bison remains were those of a canid.

When the excavation area is examined as a whole, a pattern in the area's use is visible. Little appears to have occurred in excavation Block 5. Block 2 was likely a small lithic workshop area where tool reduction and resharpening took place. This is based on the presence of a small grey endscraper as well as an abundance of flakes and shatter. Additionally, there is a distinct lack of any cores or core fragments as well as very little evidence for early stage lithic reduction such as decortification flakes.

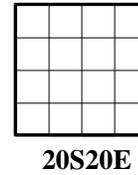
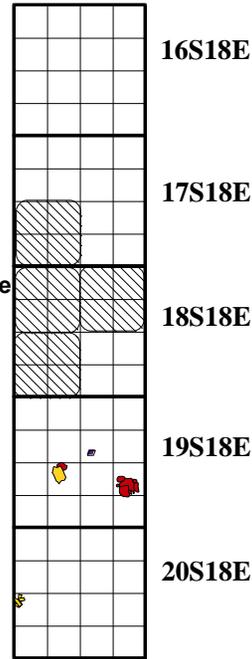
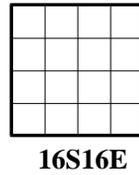
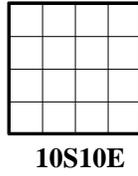
Excavation Blocks 3 and 4 are multi-purpose activity areas, containing concentrations of faunal remains, pottery and lithics. The largest pottery concentration is between the two faunal scatters in Block 4, although how these sherds fit into the activities at the site is unclear. One of the activities that occurred in Blocks 3 and 4 appears to have been the secondary processing of animals. This is based on the high frequency of distal limb bones such as carpals, tarsals and sesmoids with more highly fragmented elements including vertebra, ribs and long bones. The higher utility portions were more thoroughly processed than the lower-utility distal limb elements.

Block 1 appears to have been the edge of the site, marked by Feature 2-1 and the *Canis sp.* remains. Feature 2-1 lacks associated fire-cracked rock, burned bone and pottery that would be expected for a hearth that was part of a major activity area. Instead, it may be an ash dump at the edge of the site area. This conclusion is supported by the fact that there were no artifacts mapped in the units west of Feature 2-1. The *Canis sp.* remains are very limited in nature, however, based on the associated red ochre and lack of evidence of human modification the remains may have been intentionally disposed of. The presence of the canid remains nearby the potential ash dump further supports the conclusion that the western site boundary in Level 2 coincides with Block 1.

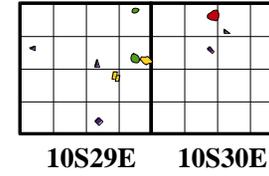


# Cut Arm Site (FbNp-22) - Level 2

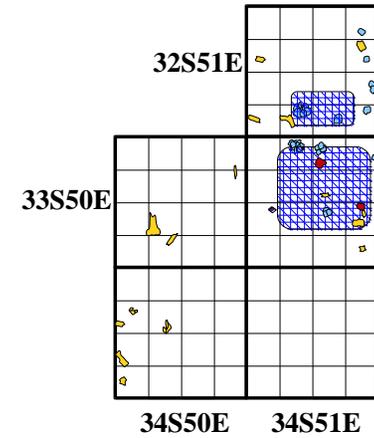
## BLOCK 1



## BLOCK 2



## BLOCK 3



### LEGEND:

- Faunal
- Debitage
- FCR
- Pottery/Ceramic
- Pottery Concentration
- Black Soil Stain with Charcoal Concentration
- Rock



(Not representative for unexcavated space)

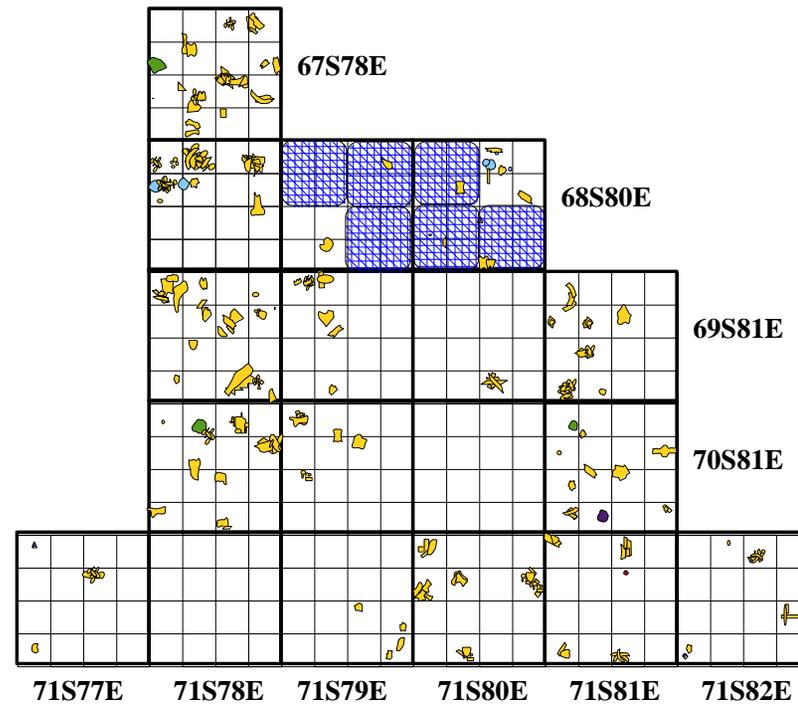
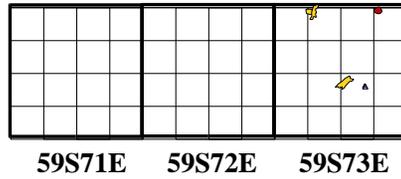
Figure 5.7: Artifact and feature distribution map of Level 2, 1 of 2.



# Cut Arm Site (FbNp-22) - Level 2

BLOCK 5

BLOCK 4



**LEGEND:**

-  Faunal
-  Debitage
-  FCR
-  Pottery/Ceramic
-  Pottery Concentration
-  Black Soil Stain with Charcoal Concentration
-  Rock



(Not representative for unexcavated space)

Figure 5.8: Artifact and feature distribution map of Level 2, 2 of 2.

## **Chapter 6**

### **Cultural Level 3**

#### **6.1 Introduction**

Level 3 is the third cultural occupation at the Cut Arm site. It ranges from a minimum depth of 18 cm dba to a maximum depth of 34 cm dba with an average thickness of 5 cm. The large depth range of the level is misleading and is due to the slope of the site from the northwest down towards the southeast. Based on four Prairie Side-Notched projectile points (Cat. #68S78E-81c, #69S781E-29, #69S81E-30, #71S80E-19) Level 3 can be confidently attributed to the Prairie Side-Notched complex.

#### **6.2 Pottery Assemblage**

##### **6.2.1 Precontact Pottery**

A total of 323 pottery fragments were recovered from Level 3 (Table 6.1). Grit appears to have been the most common form of temper; however, there are 3 pottery fragments that contain sand temper. Unidentifiable fragments constitute 69.04% of the pottery assemblage by number of items, but only 29.79% by mass. Complete sherds are the second most prevalent in number of items (20.74%) and first by mass (48.18%). Exterior exfoliations represent 9.91% of the level's precontact pottery fragments and interior exfoliations are only 0.31%.

The single interior exfoliation recovered has no identifiable characteristics. The majority of the exterior exfoliations (56%) are smoothed with no underlying impressions while another 20% show no identifying characteristics on their exterior surfaces at all. Heavily smoothed, fabric-impressions were recorded on 13% of the exterior exfoliations and 3% exhibited cord-roughening from a cord-wrapped paddle. A possible identification of Old Women's pottery can be attributed to 9% of the exterior exfoliation fragments based on the presence of smoothed, coarse fabric-impressions and a layered internal structure.

The majority (44) of the complete sherds in Level 3 cannot be narrowed to a specific sherd type because of their small size. There are 44 indeterminate complete sherds in the Level 3 pottery assemblage. These sherds are predominantly characterized by smoothed, coarse fabric-impressed exteriors and are likely Old Women's tradition. Another 40% of the indeterminate complete sherds are plain with heavy smoothing on their exterior surfaces. Smoothed cord-impressions were recorded on one sherd and smoothed fabric-impressions were present on another four.

Twenty body sherds were identifiable as well as two rim sherds and one shoulder sherd (Table 6.2). The majority of the body sherds have smoothed, plain exterior surfaces or no identifiable characteristics at all. One quarter of the sherds have heavy smoothing with unidentifiable underlying impressions on their exterior surfaces and as such can be tentatively identified as Mortlach pottery. The shoulder sherd is thin compared to the thickness of the other complete sherds. Of the rim sherds, one has a smoothed, plain exterior surface with a rounded lip and is potentially from an Avonlea Plain ware vessel. The other rim sherd has smoothed coarse fabric-impressions on its exterior surface with the smoothing extending onto the lip. This sherd can be more confidently assigned to the Old Women's tradition.

**Table 6.1:** Precontact pottery for Level 3.

<b>Fragment Description</b>	<b>Mass (grams)</b>	<b>Count</b>	<b>Percentage</b>
Complete sherd	83.3	67	20.74%
Exterior Exfoliation	37.8	32	9.91%
Interior Exfoliation	0.3	1	0.31%
Unidentifiable fragments	51.5	223	69.04%
Total	172.9	323	100%

**Table 6.2:** Quantification of complete sherds for Level 3.

<b>Sherd Type</b>	<b>Count</b>	<b>Percentage</b>
Rim	2	2.99%
Body	20	29.85%
Shoulder	1	1.49%
Indeterminate	44	65.67%
Total	67	100%

**Table 6.3:** Analysis of Level 3 complete sherds by type.

# of Items	Exterior Surface	Interior Surface	Rim Surface	Pottery Type
<i>RIM</i>				
1	Smoothed	N/A	Rounded lip	Possible Avonlea Phase
1	Smoothed, coarse fabric impressed	N/A	Coarse fabric-impression. Exterior smoothing extends onto lip	Old Woman's Phase
<i>BODY</i>				
11	Smoothed	N/A	N/A	Indeterminate
3	N/A	N/A	N/A	Indeterminate
1	Heavily smoothed, fabric-impressed	N/A	N/A	Indeterminate
5	Heavily smoothed, unidentifiable underlying texture	N/A	N/A	Possible Mortlach Phase
<i>SHOULDER</i>				
1	Exterior exfoliation	N/A	N/A	Possible Mortlach Phase
<i>INDETERMINATE</i>				
17	Heavily smoothed	N/A	N/A	Indeterminate
1	Smoothed, cord-impressed	N/A	N/A	Indeterminate
4	Smoothed, fabric-impressed	N/A	N/A	Indeterminate
22	Smoothed, coarse fabric-impressed	N/A	N/A	Possible Old Woman's Phase

## 6.3 Lithic Assemblage

### 6.3.1 Projectile Points

Four Prairie Side-Notched projectile points and one small, unidentifiable side-notched point are present in Level 3 at the Cut Arm site. The unidentifiable point (Cat. #68S80E-33) is made from silicified peat and was found in unit 68S80E, 38 cm below the surface. Three of the Prairie Side-Notched points are made of Swan River Chert while the other is fused shale. The latter (Cat. #69S81E-29; Figure 6.1 C) is broken and the end of the tip is missing. This point was found in unit 69S81E at a depth of 28 cm below the surface. It is 1.72 cm long, 0.41 cm thick, 0.91 cm wide at the notches and has a maximum width of 1.38 cm. Of the three Swan River

Chert points, Artifact #69S81E-30 (Figure 6.1 B) and Artifact #71S80E-19 (Figure 6.1 A) were found complete at 33 cm dbs and 24 cm dbs respectively. Artifact # 69S81E-30 is 1.55 cm long, 3.39 cm thick, 0.80 cm wide at the notched and has a maximum thickness of 1.09 cm. Artifact # 69S81E-19 is 1.99 cm long, 0.36 cm thick, 0.84 cm wide at the notches and has a maximum width of 1.07 cm. The third Swan River Chert point (Cat. #68S78E-81c) was recovered from a rodent burrow at 137 cm dbs where it had most likely been moved to from Level 3 via rodent activity.



**Figure 6.1:** Level 3 Prairie Side-Notched projectile points. A- Cat. #71S80E-19, B- Cat. #69S81E-30, C- Cat. #69S81E-29.

### 6.3.2 Bifaces

Level 3 at the Cut Arm site contains three bifacial tools. A fragment of an expedient basalt biface (Cat. #71S80E-24; Figure 6.2) was found at 21 cm dbs in unit 71S80E. A fragment of another expedient bifacial tool (Cat. #71S80E-15f) was found at 30 cm dbs in the same unit. The fragment is made of Knife River Flint and is therefore one of the few exotic items in the level. The only complete biface (Cat. #68S78E-37; Figure 6.3) is made of silicified peat and was found at 36 cm dbs in unit 68S78E. It measures 2.47 cm long, 1.66 cm wide and 0.55 cm thick. The tool has a triangular overall shape with distally expanding convex margins. The distal end has an angular point, while the proximal end is sub-convex. The dorsal and ventral surfaces are convex in cross-section and it has been bifacially worked on the entire length of both lateral margins.

### 6.3.3 Unifaces

A basalt uniface (Cat. #68S79E-26; Figure 6.5) from unit 68S79E was found at 31 cm dbb and has a mass of 120.5 g. The artifact is roughly rectangular in outline and is unifacially flaked on separate sections of the ventral and dorsal surfaces. It is 7.97 cm long, 6.58 cm wide

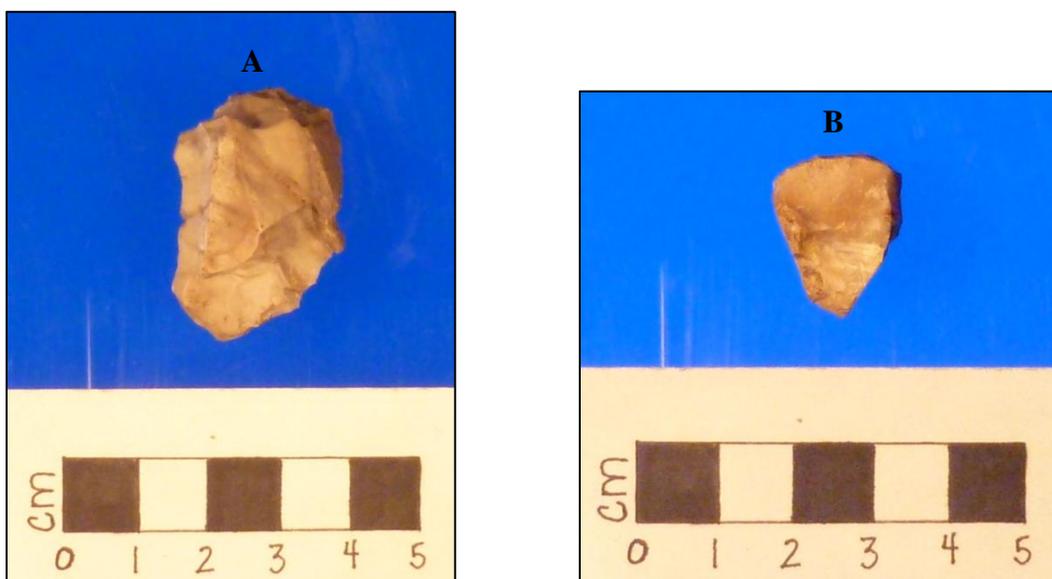


**Figure 6.2:** Basalt biface (Cat. #71S80E-24).



**Figure 6.3:** Silicified peat biface (Cat. #68S78E-37).

and 1.85 cm thick. A grey chert endscraper (Cat. #20S18E-23; Figure 6.4 A) was found 35 cm dbbs in unit 20S18E. The scraper has a mass of 11.5 g and is 3.67 cm long, 2.37 cm wide with a thickness of 1.59 cm. It has a roughly oval shape, is ventrally concave and dorsally convex with an angular, single bevel cross-section. Unit 71S80E produced a beige chert thumbnail endscraper (Cat. #71S80E-26; Figure 6.4 B). The tool was found at a depth of 25 cm below the surface and has a mass of 3.4 g. It is 2.27 cm long, 1.68 cm wide and 0.82 cm thick. It has straight lateral margins that expand towards its convex distal end and give the tool a triangular overall shape.



**Figure 6.4:** Level 3 endscrapers. A- Cat. #20S81E-23, B- Cat. #71S80E-26.

### 6.3.4 Retouched Flakes

All three of the retouched flakes in Level 3 are from unit 10S30E. The first is a secondary flake made of white chert (Cat. #10S30E-30) recovered from 26 cm dbbs. The flake is unifacially retouched on its lateral edges. A grey chert secondary flake (Cat. #10S30E-27) was found 29 cm below the surface and is also retouched on its lateral edges. The third retouched flake is a piece of silicified peat shatter (Cat. #10S30E-26). The shatter was found at 29 cm dbbs and has a small amount of unifacial retouch on one edge.



**Figure 6.5:** Basalt uniface (Cat. #68S79E-26).

### **6.3.5 Cores and Core Fragments**

Two core fragments, each of a different lithic material type, were recovered from Level 3. A Swan River Chert core fragment (Cat. #70S78E-31) was found in unit 70S78E at a depth of 25 cm db. The core shows no signs of having been heat-treated and has a mass of 72.4 g. A silicified peat core fragment (Cat. #67S78E-40) was recovered from unit 67S78E. The fragment has a mass of 116.0 g and was found at a depth of 32 cm.

### **6.3.6 Debitage**

Level 3 contains a total of 321 flakes and pieces of shatter (Table 6.4). Swan River Chert is the most common lithic material in the assemblage at 39.56%, 54% of which is heat-treated. Silicified peat is the second most common material type and represents 12.46%, with grey chert being the third most prevalent at 9.03% of the level's total debitage. Fourteen other material

types make up the remaining 38.95%. Exotic materials include nine flakes of Knife River Flint, two flakes of jasper and one piece of agate shatter.

Secondary flakes are the most common type of debitage recovered, representing 64.17% of the total. Shatter is the next highest at 28.04%, followed by secondary decortification flakes at 4.67% and primary decortification flakes at 3.12% of the sample. These percentages indicate that as with Level 1, the dominant lithic activity in Level 3 was later stage reduction.

**Table 6.4:** Lithic debitage from Level 3.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Agate	-	-	-	1	1	0.31%
Basalt	1	-	3	4	8	2.49%
Cathead Chert	-	-	-	1	1	0.31%
Chalcedony	-	-	1	-	1	0.31%
Chert	2	3	12	6 (H/T: n=3)	23	7.17%
Grey Chert	-	-	12 (H/T: n=2)	17	29	9.03%
Gronlid Siltstone	-	1	3	-	4	1.25%
Jasper	-	-	1	1	2	0.62%
Knife River Flint	2	-	7	-	9	2.80%
Quartz	-	-	12	7	19	5.92%
Quartzite	-	-	5	6	11	3.43%
Rhyolite	-	-	1	-	1	0.31%
Silicified Peat	1	-	30	9	40	12.46%
Silicified Siltstone	-	-	8	5	13	4.05%
Silicified Wood	-	1	3	1	5	1.56%
Swan River Chert	4 (H/T: n=3)	9 (H/T: n=2)	85 (H/T: n=46)	29 (H/T: n=18)	127	39.56%
White Chert	-	1	23	3	27	8.41%
Total	10	15	206	90	321	100%
Percent	3.12%	4.67%	64.17%	28.04%	100%	

### 6.3.7 Fire-Cracked Rock

Level 3 contains 183 pieces of fire-cracked rock with a total mass of 1714.7 g (Table 6.5). Granite is clearly the dominant material type, consisting of 165 pieces and 93.50% of the FCR by mass. The other materials present include sandstone (2.53% by mass), white chert (under 1% by mass) and indeterminate lithic materials (3.73% by mass).

**Table 6.5:** Fire-cracked rock from Level 3.

<b>Material Type</b>	<b>Number of Pieces</b>	<b>Mass (g)</b>	<b>Percent by Count</b>	<b>Percent by Mass (g)</b>
Granite	165	1603.3	90.16%	93.50%
Indeterminate	8	64.0	4.37%	3.73%
Sandstone	6	43.4	3.28%	2.53%
White Chert	4	4.0	2.19%	0.23%
Total	183	1714.7	100%	100%

### 6.4 Botanical Assemblage

Charcoal fragments were recovered from five units totaling 46 pieces with a mass of 2.4 g. The charcoal from unit 71S80E accounts for 67% of the Level 3 Botanicals.

### 6.5 Faunal Assemblage

The faunal assemblage for Level 3 consists of 4821 specimens with a combined mass of 6803.0 g (Table 6.6). Unidentifiable fragments represent 96.67% of the assemblage and identifiable specimens represent 3.24%. One taxon and two size classes were present within the identifiable remains. Specimens that were too fragmented or poorly preserved to be fully identified were assigned to a size class whenever possible. As a result, fragments from *Bison bison* and both SC6 and SC5-6 were identified.

There is very little evidence for cooking activities having taken place in Level 3 based on the faunal remains. None of the identifiable specimens were burned or calcined. If the faunal assemblage is examined as a whole, an overwhelming 94% of the specimens are unburned and only 3% are burned and 3% are calcined. Taphonomic alterations are present on under a quarter of the assemblage. Root etching and trowel trauma are the most common, however, insect

scoring was recorded on a small grouping of unidentifiable fragments from unit 71S81E. There was also a short cut mark on an unidentifiable fragment from unit 68S78E.

**Table 6.6:** Faunal counts for Level 3.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	123	48.0	-	-
Calcined Bone	151	38.2	-	-
Unburned Bone	4329	3527.4	141	3046.4
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	62	30.0	15	113.0
Total	4665	3643.6	156	3159.4

**Table 6.7:** Faunal taxa for Level 3.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	87	3	2.5
Very Large Mammal	58	N/A	N/A
Large to Very Large Mammal	11	N/A	N/A

### 6.5.1 Order Artiodactyla

#### *Bison bison*

*B. bison* remains represent 56% of the identified faunal assemblage in Level 3. A quantitative analysis by element of the adult *B. bison* remains can be found in Table 6.8. Based on the results of this analysis, the Number of Identified Specimens (NISP) is 87, the Minimum Number of Individuals (MNI) is 3 and the Minimum Number of Elements (MNE) is 2.5. There are also a small number of immature *B. bison* remains. These specimens include an incompletely fused, fragmented right distal metatarsal (Cat. #70S78E-24) as well as a left 2<sup>nd</sup> & 3<sup>rd</sup> carpal (Cat. #71S77E-7). Overall, there are a minimum of three adults and one immature *B. bison* represented by the assemblage.

**Table 6.8:** Adult *Bison bison* quantification by element for Level 3.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	5	5	1	0.6
2nd phalanx	-	-	-	4	4	1	0.5
3rd phalanx	-	-	-	5	5	1	0.6
Fused 2nd & 3rd carpal	2	1	-	-	3	2	1.5
Internal carpal	2	2	-	-	4	2	2.0
Radial carpal	1	1	-	-	2	1	1.0
Ulnar carpal	2	3	-	-	5	3	2.5
Unciform carpal	-	2	-	-	2	2	1.0
Astragalus	1	-	-	-	1	1	0.5
Calcaneous	-	1	-	-	1	1	0.5
1st tarsal	1	-	-	-	1	1	0.5
Fused 2nd & 3rd tarsal	2	1	-	-	3	2	1.5
Fused central & 4th tarsal	1	1	-	-	2	1	1.0
Lateral maleolus	3	-	-	-	3	3	1.5
5th metacarpal	-	-	-	1	1	1	0.5
Proximal metacarpal	-	2	-	-	2	2	1.0
Proximal ulna	3	-	-	-	3	3	1.5
Distal ulna	-	1	-	-	1	1	0.5
Proximal radius	1	1	-	-	2	1	1.0
Distal radius	-	2	-	-	2	2	1.0
Distal femur	-	1	-	-	1	1	0.5
Scapula glenoid fossa	1	-	-	-	1	1	0.5
Maxillary 4th premolar	1	-	-	-	1	1	0.5
Mandibular 1st molar	-	1	-	-	1	1	0.5

### 6.5.2 Miscellaneous Specimens

Miscellaneous specimens represent 44% of the identified faunal assemblage for Level 3. The NISP for the Very Large Mammal size class (SC6) is 58 (Table 6.7). Of these specimens, axial elements are the most prevalent including rib, vertebral, innominate and scapula fragments. Long bone fragments constitute another large portion of the SC6 specimens. Cranial fragments including tooth enamel and petrous temporal fragments along with distal limbs elements such as phalanges and metatarsals are also present.

The Large to Very Large size class (SC5-6) has a NISP of 11, the majority of which are large rib fragments (Table 6.7). One unidentifiable fragment from an immature individual was

also identified. Unfortunately, it was not possible to determine the specific element the specimen was from; only that it was not fully mature based on a billowed, unfused surface

## **6.6 Seasonality**

Seasonality cannot be determined for Level 3 due to a lack of the necessary floral or faunal evidence. Although immature faunal specimens were recovered, their age could not be estimated with sufficient precision to calculate seasonality.

## **6.7 Features and Artifact Distribution**

There is one rodent burrow, or krotovina, recorded in Level 3 (Figure 6.7). The burrow first appears at a depth of 30 cm and extends through Levels 4, 5, 6 and 7. The creation, use and infilling of the burrow has affected the area of the feature within these levels, resulting in movement and mixing of artifacts. The Prairie Side-Notched projectile point (Cat. #68S78E-81c) from unit 68S78E was recovered from 137 cm below the surface and it is likely that it was relocated there from Level 3. Artifact #68S78E-37, a silicified peat biface, was also recovered from within the rodent burrow at a depth of 36 cm. While it has been included as a part of the Level 3 assemblage, it is possible that the biface was moved upward within the site and may have originally been a part of another level.

Small numbers of artifacts were recovered from all of the excavation blocks; however, Block 4 is the area with the highest concentration of materials. The majority of the faunal assemblage in Level 3 was recovered from this area. Two pottery concentrations as well as most of the lithic tools were also found there as is evident from the level map in Figure 6.6 and 6.7. The smaller of the two pottery concentrations in Block 4 was in unit 69S79E (Figure 6.7). The spatial extent of the concentration is fairly limited, covering half of the unit's northeastern quadrant and ranging from 25 – 30 cm dbs. The second pottery concentration is larger and covers both of the northern quadrants of unit 69S80E (Figure 6.6).

The most noteworthy exception to the trend of artifact concentration within Block 4 is the presence of three retouched flakes in excavation Block 2. The depth measurements for these artifacts are in the shallow range for Level 3. It appears that these expedient tools are likely associated with the small lithic workshop area in Level 2 and their presence in the Level 3 assemblage is the result of mixing.

### 6.8 Interpretation of Level 3

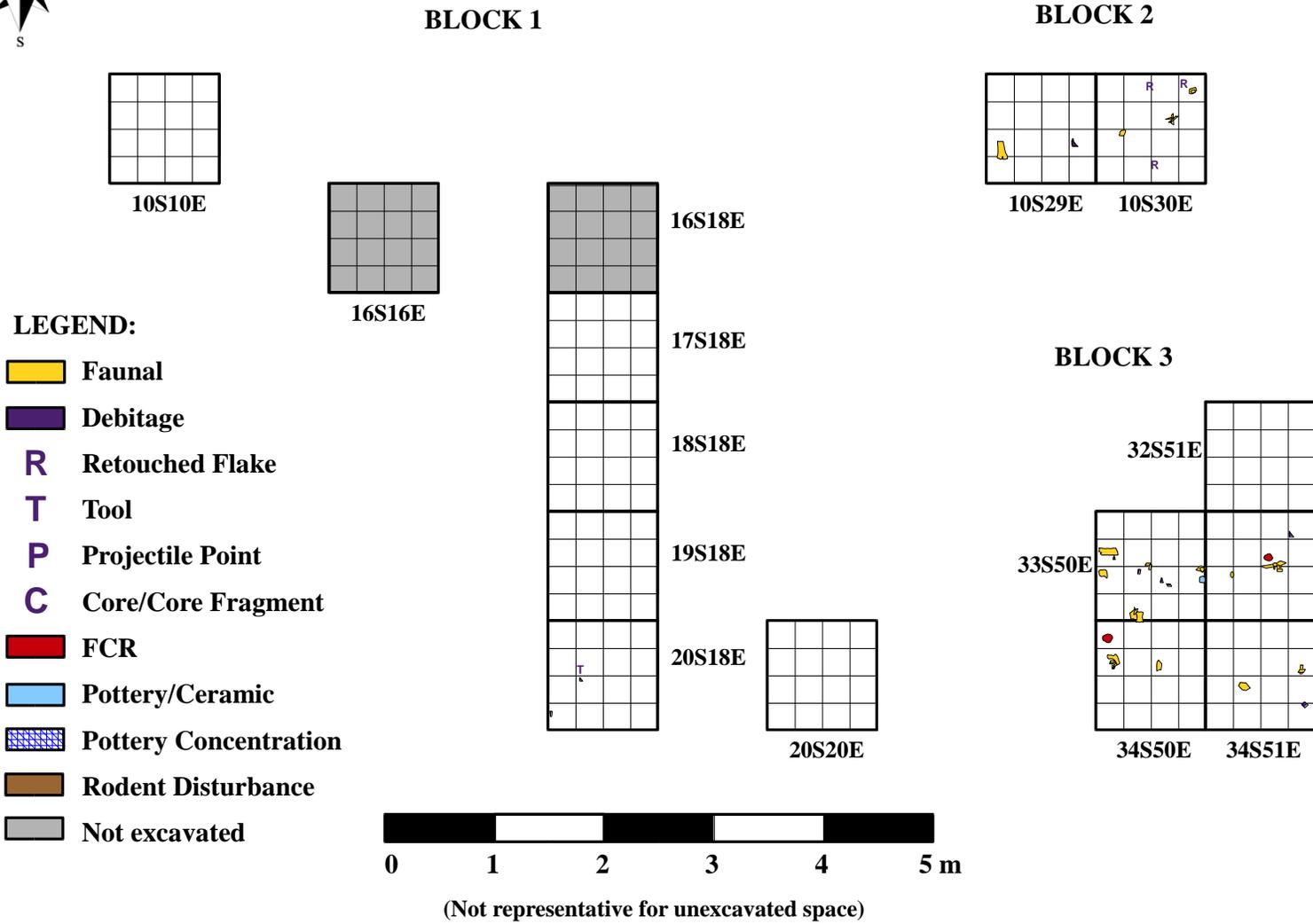
Level 3 is a larger component with a more substantial archaeological deposit than Level 1 or Level 2. Four *B. bison* are represented by the faunal assemblage including three mature and one immature individual. The elements identifiable as *B. bison* are primarily carpals, tarsals, phalanges and proximal/distal ends of long bones. There are a significant number of rib and vertebral fragments identified to SC6. Interestingly, ribs and vertebral fragments are inherently difficult to identify to taxon and little is seen of these elements from *B. bison* in Level 3. It is possible that these axial elements were fragmented during processing thereby making them increasingly difficult to identify and explaining their high frequency in the miscellaneous specimens.

The artifact assemblage in Level 3 is concentrated in excavation Block 4, representing a single main activity area. This activity area includes a mixture of projectile points, formed tools, debitage dominated by secondary flakes and shatter, faunal remains and pottery. The presence of these artifacts indicates that a mix of tasks typical of a habitation site were being performed. These tasks include secondary processing of faunal remains, tool re-sharpening and rejuvenation as well as the use of pottery vessels for storage and possibly cooking.

Based on the presence of four Prairie Side-Notched projectile points with specific, reliable depth measurements, the level can be identified as a component of the Prairie Side-Notched complex. The cultural affiliation of the occupation based on the pottery assemblage is not as clear. The poor quality of the pottery and variations in surface characteristics makes it difficult to come to any certain conclusions. It is highly likely that some of the sherds are from Old Women's vessels; however, there may also be fragments of Mortlach pottery. It should be noted that the possible Avonlea sherd can be identified only very tenuously and has a low depth measurement indicating it may actually be from Level 4. Since the only confident identification that can be made is of several sherds belonging to the Old Women's tradition, the pottery assemblage provides a small degree of support for the assignment of Level 3 to the Prairie Side-Notched complex.



# Cut Arm Site (FbNp-22) - Level 3



79

Figure 6.6: Artifact and feature distribution map of Level 3, 1 of 2.



# Cut Arm Site (FbNp-22) - Level 3

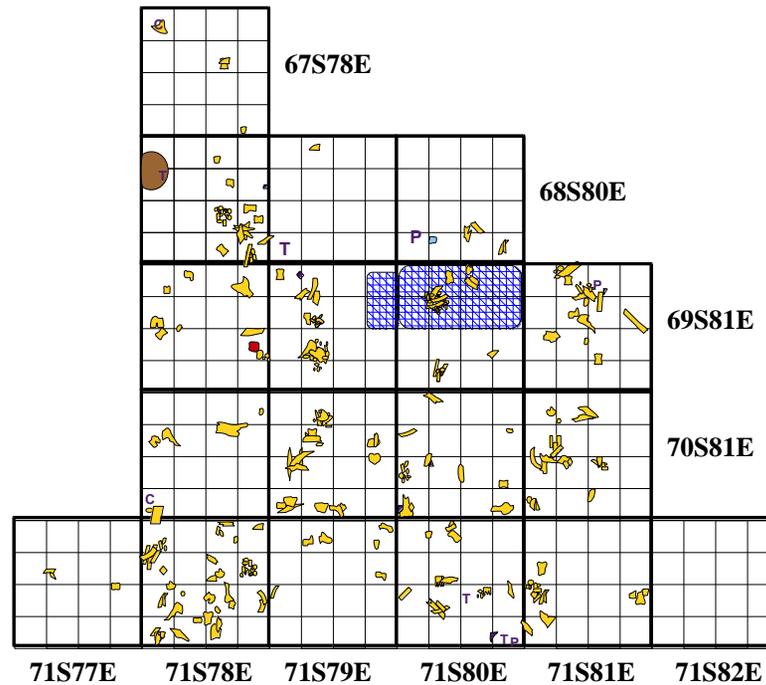
BLOCK 5

BLOCK 4



**LEGEND:**

-  Faunal
-  Debitage
- R** Retouched Flake
- T** Tool
- P** Projectile Point
- C** Core/Core Fragment
-  FCR
-  Pottery/Ceramic
-  Pottery Concentration
-  Rodent Disturbance
-  Not excavated



(Not representative for unexcavated space)

**Figure 6.7:** Artifact and feature distribution map of Level 3, 2 of 2.

## Chapter 7

### Cultural Level 4

#### 7.1 Introduction

Cultural Level 4 has a minimum depth of 26 cm below the surface extending down to a maximum depth of 50 cm. The apparent thickness of the level is misleading and is due to the slope of the site towards the southeast. The thickness of the level at any given point averages only 7 cm. The extent of the level is clearly defined in the stratigraphic profiles and has good separation from other levels. The level is present in all excavated units. Based on the presence of a Prairie Side-Notched projectile point (Cat. #69S80E-30) and possible Avonlea tradition pottery, Level 4 can be attributed to the Prairie Side-Notched complex.

#### 7.2 Pottery Assemblage

##### 7.2.1 Precontact Pottery

A total of 11 precontact pottery fragments with a mass of 5.8 g were recovered from Level 4 (Table 7.1). The pottery assemblage is 63.64% complete sherds while the remaining 36.36% is represented equally by both exterior exfoliations and unidentifiable fragments.

**Table 7.1:** Precontact pottery for Level 4.

<b>Fragment Description</b>	<b>Mass (grams)</b>	<b>Count</b>	<b>Percentage</b>
Complete sherd	4.4	7	63.64%
Exterior Exfoliation	0.8	2	18.18%
Unidentifiable fragments	0.6	2	18.18%
Total	5.8	11	100%

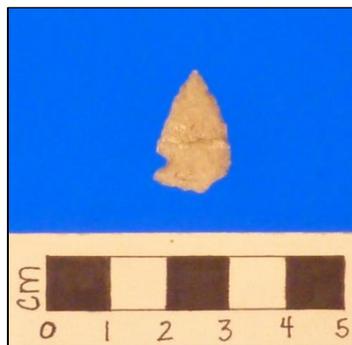
Neither of the unidentifiable fragments have any distinguishing characteristics. The two exterior exfoliations have been heavily smoothed on their exterior surfaces. The complete sherds

consist of three rim sherds (43%) and four of an indeterminate type (57%). Two of the rim sherds (Cat. #32S51E-44) narrow towards the former vessel's lip and have a rounded edge indicating a possible Avonlea affiliation. These sherds have a plain exterior surface and sand temper without internal layering. The other rim sherd (Cat. #68S80E-48) has a rounded rim profile and has been smoothed on its interior and exterior surfaces. It is thinner than the other rim sherds but can also be tentatively identified as Avonlea. The indeterminate complete sherds are most likely body fragments. One in particular (Cat. #32S51E-43) appears to be from the same vessel as the two sand tempered rim sherds and is therefore also potentially Avonlea. The interior and exterior surfaces of this sherd were smoothed and then oxidized during the firing process. The other three indeterminate sherds are very thin and tiny with plain smoothed exterior surfaces. Two of these sherds are also smoothed on their interior surface while the other has oxidation on its internal surface.

### 7.3 Lithic Assemblage

#### 7.3.1 Projectile Points

Two unidentifiable projectile point fragments and one Prairie Side-Notched projectile point were recovered from Level 4. The Prairie Side-Notched point (Cat. #68S80E-30; Figure 7.1) was found in unit 68S80E at a depth of 50 cm. It is made of white chert and has a length of 2.03 cm, a maximum width of 1.28 cm, is 0.32 cm thick. A measurement of the width at the notches is not possible due to one distal corner having been broken off. The unidentifiable point fragments are from unit 69S81E, 50 cm below the surface. Artifact #69S81E-51 is made from Swan River Chert and was broken perpendicular to the long axis of the point. As a result of this breakage only the tip was recovered. Artifact #69S81E-53 is also missing the distal half of the



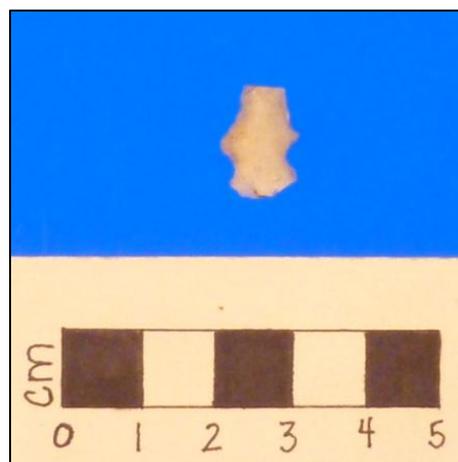
**Figure 7.1:** Prairie Side-Notched projectile point from Level 4 (Cat. #69S80E-30).

original point as it was broken diagonally across the midsection of the body. This latter point is made of white chert and is thicker in cross-section than the Swan River Chert tip.

### 7.3.2 Bifaces

Level 4 contains two complete bifaces (Cat. #68S80E-45, Cat. #17S18E-14), one biface fragment (Cat. #70S79E-56) and one broken drill (Cat. #68S78E-29c). The drill base is made of Swan River Chert and was found in unit 68S78E at a depth of 44 cm. The tool appears to have been hafted and the tip is broken off (Figure 7.2). A grey chalcedony biface fragment (Cat. #70S79E-56) was recovered from unit 70S79E at 37 cm below the surface. It is dorsally convex, slightly concave ventrally and has a triangular overall shape. The fragment has a mass of 3.2 g.

Artifact #68S80E-45 is a basalt biface made from a large primary decortification flake. It was recovered from unit 68S80E at a depth of 45 cm below the surface. The tool's overall shape is that of a pentagon and it has been bifacially flaked on its distal edge (Figure 7.3 A). In cross-section the dorsal surface is slightly convex and the ventral surface is straight. It has a mass of 229.1 g and is 8.88 cm long, 11.3 cm wide and 1.61 cm thick. Artifact #17S18E-14 is a smaller grey quartzite biface from a depth of 36 cm dbb in unit 17S18E. The biface is made from a decortification flake with a discoidal overall shape and is ventrally and dorsally convex in cross-section (Figure 7.3 B). Bifacial flaking is evident on the lateral margins of the distal half of the tool. It is 5.87 cm long, 6.19 cm wide and 1.6 cm thick with a mass of 70.7 g.



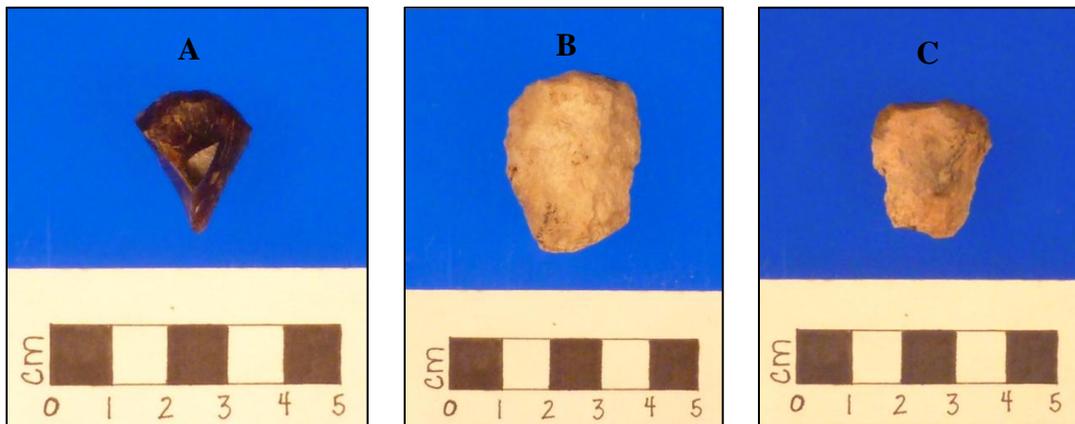
**Figure 7.2:** Bifacial drill (Cat. #68S78E-29c).



**Figure 7.3:** Level 4 bifaces. A- Cat.#68S80E-45, B- Cat. #17S18E-14.

### 7.3.3 Unifaces

A broken Knife River Flint endscraper (Cat. #69S78E-73b; Figure 7.4 A) was found between 45 – 50 cm dbs in unit 69S78E. The distal end is convex and unifacially flaked. In cross-section, the scraper is dorsally convex and ventrally concave. The endscraper has a mass of 3.1 g and is 2.48 cm long, 2.06 cm wide and 0.91 cm thick. The two other unifaces in Level 4 are made of heat-treated Swan River Chert. These scrapers are roughly oval in outline with a convex dorsal surface and a straight ventral surface. The distal ends of both tools are straight, with unifacial flaking extending roughly 1/3<sup>rd</sup> of the way up the lateral margins. The smaller of the two scrapers (Cat. #69S81E-46h; Figure 7.4 C) has a mass of 3.8 g, is 2.69 cm long, 2.34 cm wide and 0.62 cm thick. The larger scraper (Cat. #69S79E-50; Figure 7.4 B) is 3.67 cm long, 2.78 cm wide, 1.24 cm thick with a mass of 14.8 g.



**Figure 7.4:** Endscrapers. A- Cat. #69S79E-50, B- Cat. #69S78E-73b, C- Cat. #69S81E-46h.

### **7.3.4 Retouched Flakes**

In Level 4 there are four retouched flakes and flake fragments. Artifact #71S82E-14g is a secondary flake made of heat-treated Swan River Chert. It was found in unit 71S82E and exhibits unifacial retouch on one of its lateral edges. Unit 70S78E produced a heat-treated Swan River Chert secondary flake fragment (Cat. #70S78E-38). The fragment was found at 33 cm dbs and has unifacial retouch on one of its lateral margins. A third heat-treated Swan River Chert retouched flake (Cat. #17S18E-15) was found in unit 17S18E at 38 cm dbs. The flake has unifacial retouch on one of its lateral margins. A fragment of a brown chert secondary decortification flake (Cat. #71S81E-36d) was recovered from the adjacent unit, 71S81E, from between 29 – 37 cm dbs. The flake has a small amount of unifacial retouch on one edge.

### **7.3.5 Cores and Core Fragments**

A single complete core was recovered in Level 4 (Cat. #70S80E-43; Figure 7.5). It is made of Swan River Chert and shows no signs of having been heat-treated. The core was found in unit 70S78E at 40 cm dbs. It has a mass of 480.1 g and is 9.56 cm long, 7.12 cm wide with a thickness of 6.0 cm. Artifact #69S78E-64 is quartzite core fragment from unit 69S78E. The fragment is from 40 cm dbs and has a mass of 83.8 g. Artifact #68S80E-43 is an agate core fragment from unit 68S80E. It has a mass of 51.5 g and was found at 51 cm dbs.

### **7.3.6 Debitage**

Level 4 contains 886 pieces of debitage including primary and secondary decortification flakes, secondary flakes and shatter (Table 7.2). Secondary flakes are the most prevalent in the lithic assemblage, representing 57.59%. Shatter is the second most common with 35.21%, followed secondary decortification (5.74%) and primary decortification (1.46%) flakes.

The lithic materials present in the Level 4 assemblage are largely local in origin. Swan River Chert is the dominant lithic material type, constituting 42.07% of all debitage for the level. Roughly 20% of the Swan River Chert has been heat-treated. White chert is the second most common lithic material constituting 20.36% of the assemblage. This is followed by grey chert at 9.34%, and quartz at 7.65%. The other 20% of the flakes and shatter are made from 17 different



**Figure 7.5:** Swan River Chert core (Cat. #70S78E-43).

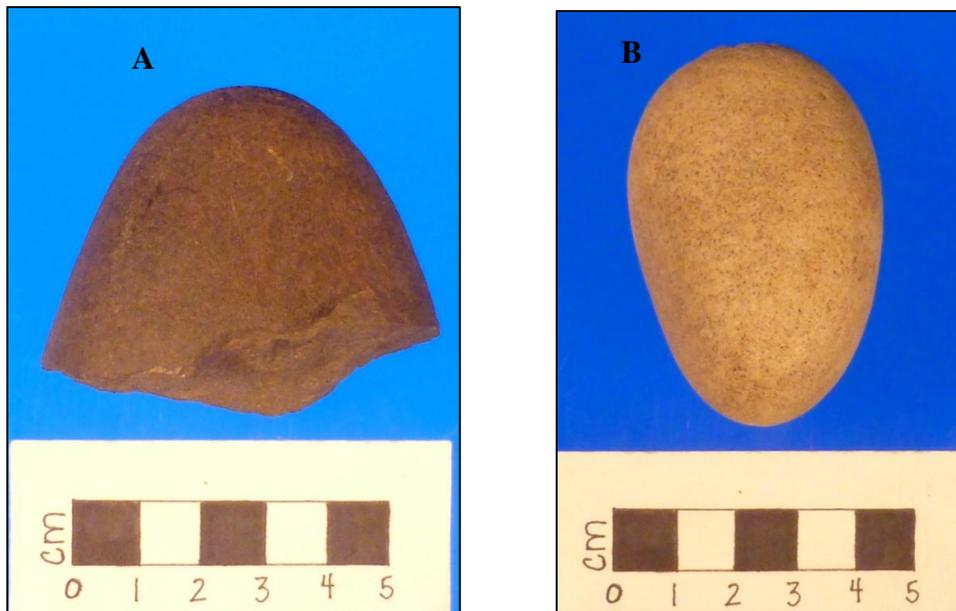


**Figure 7.6:** Cultural pebble of chert precipitated in limestone (CPL) (Cat. #70S80E-58).

lithic material types including silicified peat, miscellaneous cherts and quartzite. The materials that could not have been obtained locally include Knife River Flint, jasper and agate. Several other interesting lithic specimens were found including two flakes and a piece of shatter made from a nodule of grey chert precipitated in limestone (CPL) (Cat. #70S80E-58). It is possible that other pieces of grey chert debitage are in fact CPL and are not identifiable as such because the limestone cortex was removed.

### 7.3.7 Pecked Stone Tools

Artifact #68S80E-42 is a basalt hammerstone fragment with a mass of 161.7 g. The hammerstone was broken laterally and there is pecking/wear on one end (Figure 7.7 A). It is 5.05 cm long, 5.97 cm wide and 4.04 cm thick with a mass of 161.7 g. Artifact #68S80E-44 is a small hammerstone also with pitting on one end due to use (Figure 7.7 B). The lithic material of the tool is indeterminate because the cortex is unbroken. The hammerstone measures 6.19 cm long, 4.04 cm wide and 3.45 cm thick with a mass of 113.8 g.



**Figure 7.7:** Hammerstones in Level 4. A- Cat. #68S80E-42, B- Cat. #68S80E-44.

### 7.3.8 Fire-Cracked Rock

A total of 79 pieces and 5205.6 g of fire-cracked rock was recovered from Level 4 at the Cut Arm site (Table 7.3). Granite represents 93.5% of the FCR for the level, with 67 pieces and

a mass of 4867.3 g. The remaining 6.5% of the FCR consists primarily of gneiss, but also schist, sandstone and five pieces of indeterminate lithic material type.

**Table 7.2:** Lithic debitage from Level 4.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Agate		1	2		3	0.34%
Basalt			9	5	14	1.58%
Cathead Chert		1	2		3	0.34%
Chalcedony			3	1	4	0.45%
Chert	1	6 (H/T: n=1)	17 (H/T: n=4)	5	29	3.27%
Chert Precipitated in Limestone (CPL)	1	1			2	0.23%
Fused Shale			1	3	4	0.45%
Grey Chert	2	12	47 (H/T: n=7)	22 (H/T: n=3)	83	9.37%
Gronlid Siltstone	1	2	11	4	18	2.03%
Indeterminate			1		1	0.11%
Jasper			4	1	5	0.56%
Knife River Flint		1	10		11	1.24%
Other	2				2	0.23%
Quartz	2	1	33	32	68	7.67%
Quartzite		1	15	11	27	3.05%
Silicified Peat		8	21	13	42	4.74%
Silicified Siltstone			2	1	3	0.34%
Silicified Wood		2	5	3	10	1.13%
Siltstone			2		2	0.23%
Swan River Chert	2 (H/T: n=1)	14 (H/T: n=6)	227 (H/T: n=48)	131 (H/T: n=20)	374	42.21%
White Chert		1	100	80	181	20.43%
Total	11	51	512	312	886	100%
Percent	1.24%	5.76%	57.79%	35.21%	100%	

**Table 7.3:** Fire-cracked rock from Level 4.

<b>Material Type</b>	<b>Number of Pieces</b>	<b>Mass (g)</b>	<b>Percent by Count</b>	<b>Percent by Mass (g)</b>
Gneiss	2	259.9	2.53%	4.99%
Granite	67	4867.3	84.81%	93.50%
Indeterminate	5	48.7	6.33%	0.94%
Sandstone	1	12.7	1.27%	0.24%
Schist	4	17.0	5.06%	0.33%
Total	79	5205.6	100%	100%

#### **7.4 Botanical Assemblage**

Level 4 contains 11 pieces of charcoal. Eight of the charcoal fragments were found in unit 59S72E at a depth of 38 cm. The other three pieces were found in unit 69S79E at 50 cm db. The total mass for the charcoal in Level 4 is 0.2 g.

#### **7.5 Faunal Assemblage**

The faunal assemblage for Level 4 at the Cut Arm site consists of 2173 specimens with a mass of 2887.4 g. Unidentifiable specimens represent 96.41% of the assemblage, the majority (94%) of which is unburned bone (Table 7.4). Unburned tooth enamel represents only 4% of the unidentifiable assemblage. Burned and calcined bone are also present in minimal numbers.

Identified specimens represent 3.59% of the Level 4 fauna (Table 7.5). All of the identified specimens are unburned and include 69 specimens of bone and 9 of tooth enamel. *Bison bison* are a substantial portion of these specimens and *Canis sp.* is represented by a single specimen. Half of the identifiable remains could be narrowed to the size class Very Large Mammal (SC6). Finally, there were also a small number of fragments that could not be identified beyond Large or Very Large Mammal (SC5-6).

Taphonomic alterations to the assemblage include root etching, trowel trauma, insect scoring, rodent gnawing, cut marks and an imbedded lithic fragment. Root etching is present on 10% of specimens. Trowel trauma, insect scoring and rodent gnawing were each present on under 1% of the faunal specimens. A single cut mark was recorded on an unidentifiable bone fragment from unit 34S51E.

**Table 7.4:** Faunal counts for Level 4.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	25	17.5	-	-
Calcined Bone	17	3.9	-	-
Unburned Bone	1967	1403.0	69	1293.2
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	86	66.7	9	103.1
Total	2095	1491.1	78	1396.3

**Table 7.5:** Faunal taxa for Level 4.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	36	2	1.5
<i>Canis sp.</i>	1	N/A	N/A
Very Large Mammal	39	N/A	N/A
Very Large or Large Mammal	2	N/A	N/A

### 7.5.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens (NISP) for *Bison bison* is 36 (Table 7.5). Based on a detailed quantification by element of the adult *B. bison* assemblage (Table 7.6), the Minimum Number of Individuals (MNI) is 2, while the Minimum Number of Elements (MNE) is 1.5. This indicates that at least two adult *B. bison* are represented. The presence of an immature left mandibular 2<sup>nd</sup> premolar (Cat. #69S81E-52) indicates that there is also at least one immature individual, however a more specific age determination was not possible.

The only mature *B. bison* specimen that could be given an age estimate is a right mandibular body fragment containing a 4<sup>th</sup> premolar and a 1<sup>st</sup> molar (Cat. #68S78E-51; Figure 7.8). The specimen was recovered from unit 68S78E at 50 cm dbs. The premolar has heavy wear on the occlusal surface resulting in the entire crown having been lost down to the crown-root junction. The molar is also well worn to the point of full dentine exposure, with narrowing of the fossettes and deep cupping becoming evident. Unfortunately, measurement of the enamel height was not



**Figure 7.8:** Adult *B. bison* mandibular fragment containing P4 and M1.  
Top – View of the lateral side with anterior to the right of the photograph,  
Bottom – Occlusal view with lateral to the right of the photograph.

**Table 7.6:** Adult *Bison bison* quantification by element for Level 4.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	2	2	1	0.3
2nd phalanx	-	-	-	4	4	1	0.5
3rd phalanx	-	-	-	3	3	1	0.4
Internal carpal	1	2	-	-	3	2	1.5
Calcaneous	1	1	-	-	2	1	1.0
Fused 2nd & 3rd tarsal	-	1	-	-	1	1	0.5
Fused central & 4th tarsal	1	1	-	-	2	1	1.0
Lateral maleolus	-	2	-	-	2	2	1.0
Proximal metatarsal	-	1	-	-	1	1	0.5
Proximal femur	1	-	-	-	1	1	0.5
Mandibular 4th premolar	1	1	-	-	2	1	1.0
Mandibular 1st molar	1	1	-	-	2	1	1.0

possible due to the lack of a metaconid cusp which was broken off. Based on this analysis, the age at death of the individual represented by Artifact #68S78E-51 is 8 years or older (E. G. Walker, personal communication 2012).

### 7.5.2 Order Carnivora

#### *Canis sp.*

A single specimen identifiable as *Canis sp.* was recovered from Level 4 of the Cut Arm site (Table 7.5). The specimen (Cat. #68S79E-32a) is a crown fragment of a canine tooth. It is too small to determine if it is a maxillary or mandibular canine or which side of the body it was from. The fragment was found in unit 68S79E at a depth of 44-58 cm below the surface.

### 7.5.3 Miscellaneous Specimens

Fragments determined to belong to the Very Large Mammal size class (SC6) represent 50% of the identified faunal assemblage. The NISP for this size class is 39 with a total mass of 477.4 g (Table 7.5). Cranial fragments are the largest percentage (31%) of the Very Large Mammal specimens. Long bone fragments from radii, ulnae and humeri make up another 28% followed by axial elements including lumbar, thoracic and innominate fragments. Also present in small numbers are fragments of metapodials, phalanges and ribs. Artifact #33S51E-65 is a Very Large Mammal rib fragment containing a small piece of stone imbedded in the cortex (Figure 7.9). The fragment was not removed and could not be identified. Nonetheless, it is possible the fragment was from a projectile point and would therefore provide direct evidence for hunting activities at the site.

The Large to Very Mammal (SC5-6) specimens have an NISP of 2 and account for 2.5% of the identified faunal assemblage (Table 7.5). The SC5-6 specimens include an ilium fragment as well as a cranial fragment that have a combined mass of 12.1 g. It is highly likely that all of the miscellaneous specimens in Level 4 are *B. bison* as there is no evidence to support the presence of other large or very large mammals in this component of the Cut Arm site.



**Figure 7.9:** Lithic fragment imbedded in Very Large Mammal rib fragment (Cat. #33S51E-65).

## **7.6 Seasonality**

It is not possible to determine the seasonality of Level 4 at the Cut Arm site due to a lack of sufficient floral and faunal evidence.

## **7.7 Features and Artifact Distribution**

Two areas of possible rodent disturbance are present in Level 4. The first is the continuation of the krotovina that appeared in unit 68S78E of Level 3 (Figure 7.11). This area of disturbance is located in the western half of the northwest quad of this unit and extends from 5 cm to 30 cm south of the unit's northern edge. Another similar area of rodent disturbance is also present in the level. This second krotovina first appeared at roughly 32 cm dba and extended down to a maximum depth of 50 cm. Its horizontal extent includes the eastern quadrants of unit 71S81E and the western quadrants of 71S82E (Figure 7.11).

Features 4-1 and 4-2 are isolated areas of very dark soil containing small pieces of fire-cracked rock (Figure 7.10). Feature 4-1 is located in the northeast, southeast and southwest quadrants of unit 57S72E. It spans from roughly 25 cm to 30 cm dba. Feature 4-2 is in the middle portion of the southern half of unit 70S79E. It first appeared at 35 cm below the surface and has a maximum depth of 40 cm dba.

Block 2 has an interesting collection of cobbles, boulders and fire-cracked rock (Figure 7.8). Two large boulders and a dolomite slab form a line along the eastern edge of unit 10S29E. There are several large pieces of fire-cracked rock within the same unit along with a mix of debitage. No faunal remains, pottery or Botanicals were recovered from this area.

The remainder of the site area in Level 4 is lightly scattered with faunal and lithic artifacts. There are no visible concentrations of faunal remains and as a whole the faunal assemblage is less substantial than in Level 3. Most of the lithic tools recovered were from north of the second krotovina within Block 4. Several pottery sherds were also found in Block 4, although a small concentration was found in unit 34S51E of Block 3.

## **7.8 Interpretation of Level 4**

Level 4 is comprised of a smaller total area than Levels 1-3. Four of the units in the northwestern portion of the site bottomed-out prior to reaching the Level 4 deposits. These units had less substantial archaeological deposits, compressed stratigraphy and were not key sources

of information. The bulk of the archaeological deposits in Level 4 are therefore located in Blocks 3 and 4.

The features in Level 4 are dubious in nature. The possible hearths, Feature 4-1 and 4-2, do not have any evidence to support their identification as such. There is no clustering of artifacts in or around the features and there is minimal presence of heat-treated lithics or burned faunal remains anywhere in the level. It is likely that the changes in soil color noted in these areas were due to natural processes and not cultural ones.

The faunal assemblage in Level 4 is quite small, consisting of half the number of specimens and half the total mass of the faunal assemblage seen in Level 3. While two adult and one immature *B. bison* were identified, the NISP is half that in Level 3. This indicates that the lower number of faunal specimens is not due to a lower degree of fragmentation of the assemblage but that there are simply less faunal remains. The elements in the identified portion of the assemblage are low-utility items, primarily distal limb and cranial elements. This, in combination with the results of the quantitative analysis, could suggest that there were not a large number of carcasses being transported to the campsite at any one time. The elements seen are therefore present because the additional weight of them was of negligible concern.

A variety of tool types are present in Level 4 including projectile points, hammerstones, endscrapers, bifaces and retouched flakes. Several of the tools are broken, which may explain why they were discarded. The presence of secondary flakes, shatter and two hammerstones indicate that the tools were being used, resharpened and discarded when broken or exhausted.

The lithic assemblage in Level 4 is roughly double the size of that in Level 3. Most of the lithic material is locally obtainable, however exotic materials are also present. A Knife River Flint endscraper and 11 pieces of debitage indicate that the occupants of this component at the Cut Arm site were involved in long-distance trade networks. It is also reasonable to conclude that as a more difficult material to obtain, the Knife River Flint endscraper was resharpened and maintained as long as possible before it was finally discarded. A piece of jasper shatter and three jasper secondary flakes further support the conclusion that long-distance trade of lithic materials was occurring.

The pottery assemblage in Level 4 is the smallest of the Late Precontact levels at the Cut Arm site. The most noteworthy sherds are those identified as potentially Avonlea. These sherds are quite small and can be assigned only a tentative cultural affiliation based on their

characteristics. The co-occurrence of Prairie and Avonlea materials in Northern Plains sites has been previously noted and discussed by Cloutier (2004). It is therefore possible that Avonlea pottery could be in a Prairie Side-Notched complex component. Further, the presence of these sherds does not necessitate mixing of the archaeological deposits in question.

Overall, Level 4 at the Cut Arm site can be identified as a short-term habitation site belonging to the Prairie Side-Notched complex. The mix of materials including lithics, faunal and pottery constitute a sparse archaeological deposit. The presence of lithic tools and a relatively small number of faunal remains indicates that the primary activities in the site involved the use of lithic tools in activities that do not leave substantial archaeological evidence, for example scraping hides, as well as maintenance of these tools. The small faunal assemblage, with few high-utility items, does not indicate any sort of primary or even secondary processing from a recent kill occurred.



# Cut Arm Site (FbNp-22) - Level 4

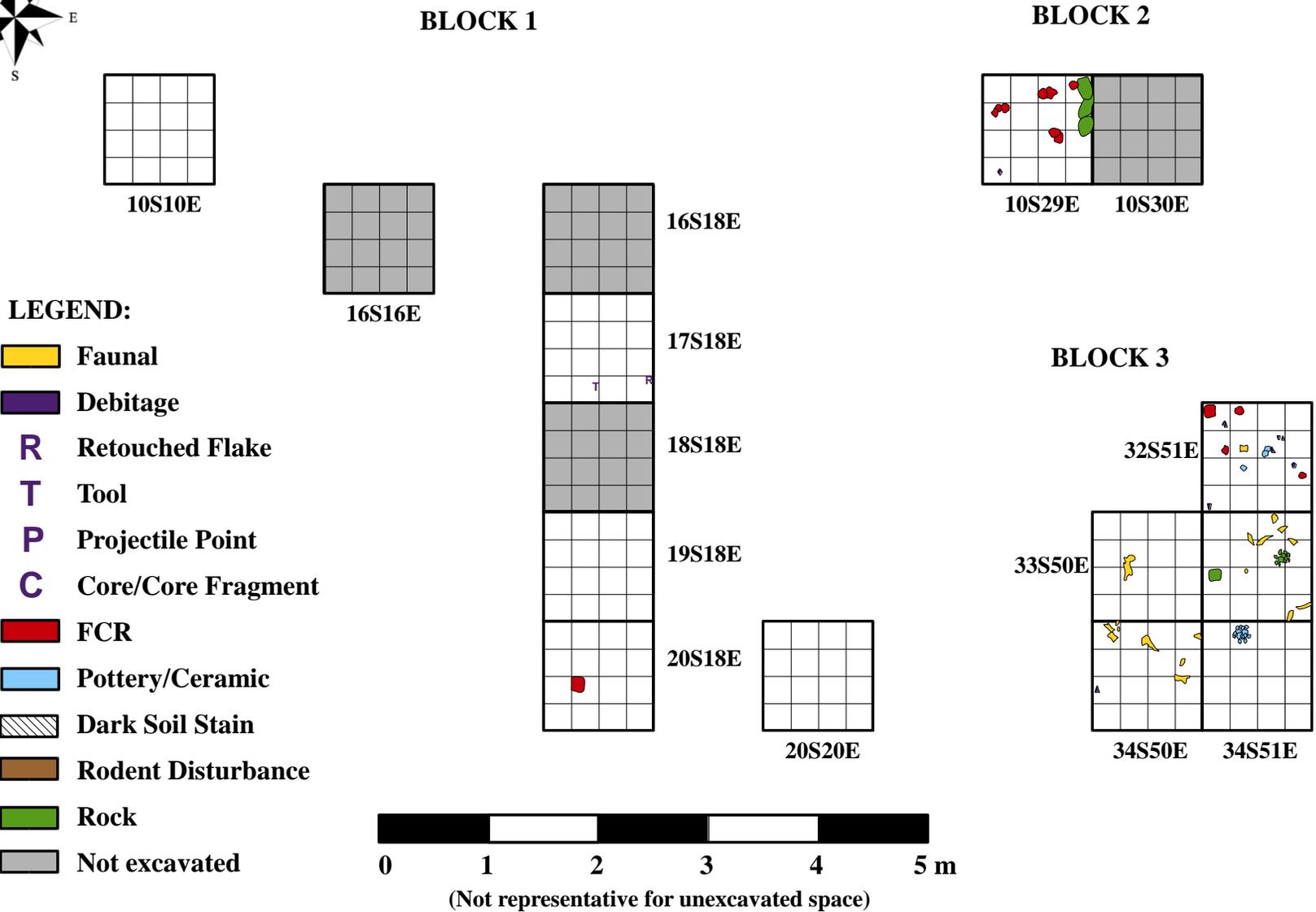
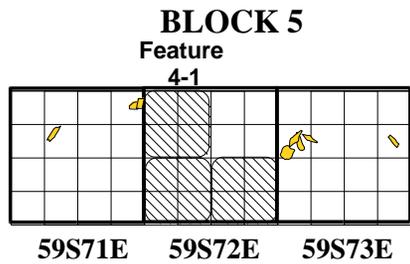


Figure 7.10: Artifact and feature distribution map of Level 4, 1 of 2.



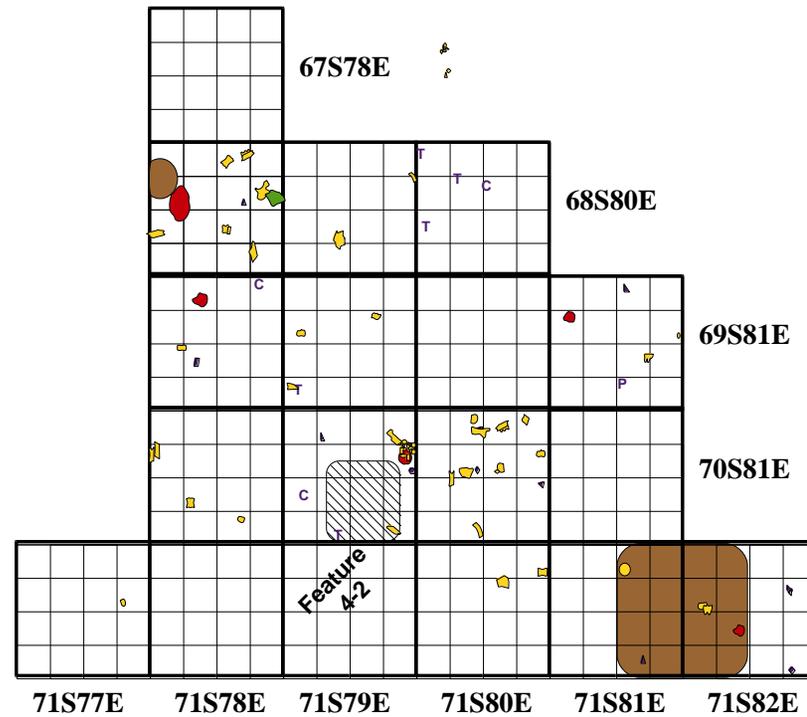
# Cut Arm Site (FbNp-22) - Level 4



**BLOCK 4**

**LEGEND:**

-  Faunal
-  Debitage
- R** Retouched Flake
- T** Tool
- P** Projectile Point
- C** Core/Core Fragment
-  FCR
-  Pottery/Ceramic
-  Dark Soil Stain
-  Rodent Disturbance
-  Rock
-  Not excavated



(Not representative for unexcavated space)

**Figure 7.11:** Artifact and feature distribution map of Level 4, 2 of 2.

## **Chapter 8**

### **Cultural Level 5**

#### **8.1 Introduction**

Cultural Level 5 consists of four distinct components: Level 5, Level 5a, Level 5b and Level 5c. The formation of these occupation layers is reflective of the difference in degree of non-cultural deposition between the northwestern portion of the site area and the southeastern portion. The northern units of the site have compressed stratigraphy with shallower deposits than the southern units. As a result, all of the units that were excavated to the Level 5 depth in Blocks 1 and 3 have a single component identified as Level 5 because of its position directly below Level 4. Division of Level 5 into multiple components was observed in the southeastern units of the site where a distinction between several occupational events is clear. Block 5 is transitional between the highly compressed stratigraphy in Block 1 and Block 3 and the better separation seen in Block 4. As such, it has a component identifiable as Level 5a but not Level 5b or Level 5c (Figure 3.5). Block 4 has three distinct occupational layers identified in the stratigraphic profiles as Level 5a, Level 5b and Level 5c (Figure 3.4). These layers are not all continuous throughout the block. Levels 5b and 5c are consistently present in the northern units of the excavation block, while all three are present in the middle units and Levels 5a and 5b are present in the southern units.

The substantial slope of the site results in deceptively large depth ranges for the Level 5 components. The depth range of Level 5a is 36 – 61 cm dbs. The thickness of this component at any given point is only 4.5 cm. The slope of the site also affects Level 5b and 5c. The depth range of 5b is 55 - 78 cm, with an average thickness of 5 cm. Level 5c has a depth range of 68 - 78 cm and has an average thickness of the 6 cm. The depth range of Level 5 is 51 – 65 cm dbs with an average thickness of 7 cm.

The cultural affiliation of Level 5a can be attributed to the Besant complex based on the presence of a nearly complete Besant projectile point (Cat. #70S78E-46) and a possibly Besant

projectile point base (Cat. #59S71E-22). The cultural affiliation of Level 5, Level 5b and Level 5c cannot be determined due to a lack of diagnostic artifacts.

## **8.2 Pottery Assemblage**

Four pottery fragments were recovered from Level 5 and 5b; however, no pottery was found in Level 5a or 5c. Unit 32S51E in Level 5 produced one interior exfoliation (Cat. #32S51E-59d). Three indeterminate fragments were recovered from unit 69S79E in Level 5b. While these pottery fragments were recovered from the components of Level 5 it is likely they originated in the upper pottery-bearing levels of the site and that they were moved downward via bioturbation.

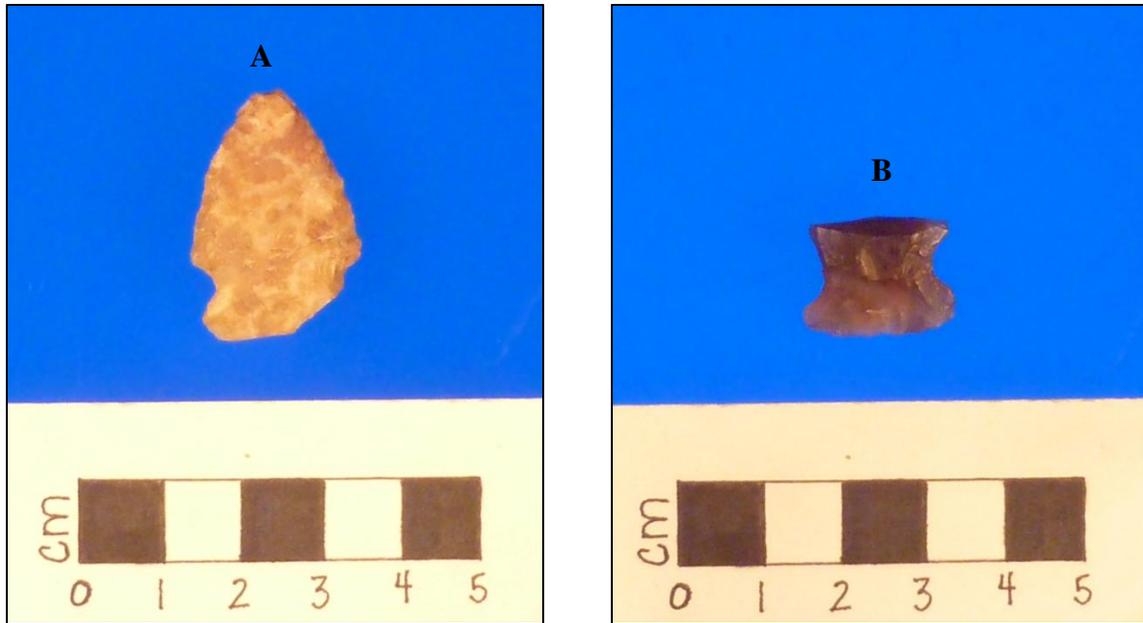
## **8.3 Lithic Assemblage**

### **8.3.1 Projectile Points**

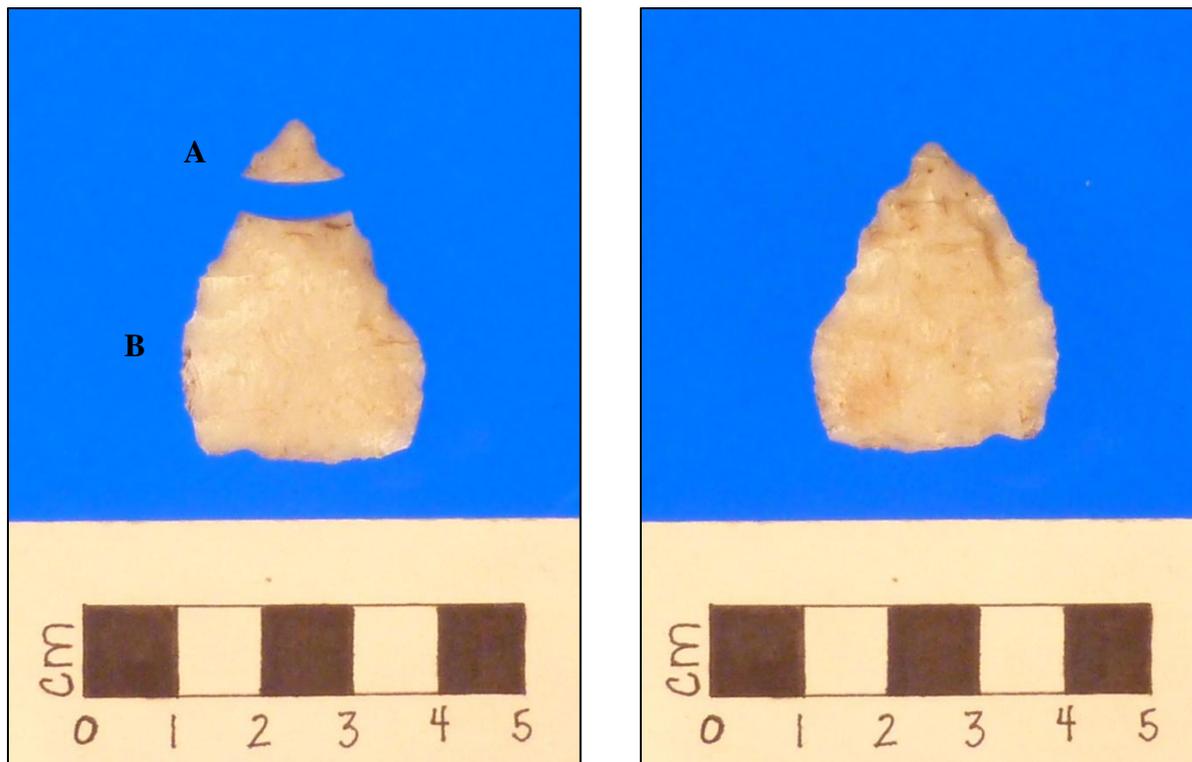
A projectile point fragment (Cat. #59S71E-22; Figure 8.1 B) and a nearly complete Besant projectile point (Cat. #70S78E-46; Figure 8.1 A) were recovered from Level 5a. The Besant projectile point was found in unit 70S78E, 45 cm below the surface. The point is made of heat-treated Swan River Chert and one of its distal corners is broken. It is 3.00 cm long, 0.60 cm thick, has a maximum width of 2.14 cm wide and is approximately 1.62 cm wide at the notches. Artifact #59S71E-22 is made of Knife River Flint and was recovered from unit 59S71E at 36 cm db. The projectile point was broken laterally across the top of its side notches leaving only the base. The fragment is 1.40 cm long, is 0.50 cm thick, has a maximum width of 1.90 cm and is 1.35 cm wide at the notches. Based on the characteristics present, the fragment is likely a Besant projectile point.

### **8.3.2 Bifaces**

Two conjoining biface fragments (Cat. #59S72E-17g, Cat. #59S72E-24) that form a single tool were recovered from Level 5a at the Cut Arm site (Figure 8.2). The fragments were recovered from unit 59S72E and are made of white chert. The tip fragment was found at 39 cm db and the body/base fragment was found at 44 cm db. The biface was broken perpendicular to the long axis of the tool close to the proximal end. When reconstructed, the biface has a



**Figure 8.1:** Level 5a projectile points. A- Besant projectile point (Cat. #59S71E-22), B- Possible Besant projectile point base (Cat. #59S71E-28).



**Figure 8.2:** Broken white chert biface, separate (left), reconstructed (right). A- Cat.#59S792E 17g, B – Cat. #59S72E-24.

triangular overall shape with one convex and one slightly concave lateral margin. It's dorsal and ventral surfaces are both convex in cross-section. The biface is 3.42 cm long, 2.77 cm wide and 0.68 cm thick.

### 8.3.3 Retouched Flakes

An expedient tool fragment was found in unit 32S51E of Level 5 at a depth of 68 cm (Cat. #32S51E-62; Figure 8.3). The tool is made from a jasper primary decortification flake and has retouch flaking and polish along its distal margin. Artifact #59S71E-28 is a broken secondary flake with unifacial retouch on one of its lateral margins (Figure 8.4). The flake was recovered from Level 5a at 49 cm dbs in unit 59S71E. It is made of a fine-grained tan and white quartzite.

### 8.3.4 Cores and Core Fragments

Two core fragments, each from a different component, were recovered in Level 5 at the Cut Arm site. Artifact #59S72E-26 was found in unit 59S72E in Level 5a. The lithic material is a grey chert precipitated in limestone (CPL). It has a mass of 49.5 g and is 4.7 cm long, 4.7 cm wide and 2.4 cm thick. Artifact #33S51E-70 is a red quartzite core with a mass of 529.6 g (Figure 8.5). This core was found in unit 33S51E of Level 5 at 58 cm dbs. A small number of flakes have been removed from the exterior surface of the cobble, which was discarded well before it was exhausted. The core is 7.5 cm long, 9.9 cm wide and has a thickness of 5.8 cm.



**Figure 8.3:** Retouched flake from Level 5 (Cat. #32S51E-62).



**Figure 8.4:** Retouched flake from Level 5a (Cat. #59S71E-28).



**Figure 8.5:** Red quartzite core from Level 5a (Cat. #33S51E-70).

**Table 8.1:** Lithic debitage from Level 5.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Chert	2	-	3	2	7	15.22%
Grey Chert	-	1	1	4	6	13.04%
Jasper	-	-	1	-	1	2.17%
Quartz	-	-	2	1	3	6.52%
Quartzite	-	-	1	4	5	10.87%
Swan River Chert	-	3	8	9	20	43.48%
		(H/T: n=3)	(H/T: n=7)	(H/T: n=1)		
White Chert	1	-	2	1	4	8.70%
Total	1	4	18	21	46	100%
Percent	2.17%	8.70%	39.13%	45.65%	100%	

### 8.3.5 Debitage

Debitage is present in all components of Level 5 at the Cut Arm site. 46 pieces of debitage were recovered from Level 5. This assemblage consists of 45.65% shatter, 39.13% secondary flakes, 8.70% secondary decortification flakes and 2.17% primary decortification flakes. Nearly half (43.48%) of the debitage in this component is Swan River Chert, 55% of which is heat-treated. The other lithic materials present include miscellaneous cherts (15.22%), grey chert (13.04%) and quartzite (10.87%). The remaining 17.39% of the assemblage consists of locally obtainable quartz and white chert as well as non-local jasper.

The debitage recovered from Level 5a consists of 578 flakes and pieces of shatter. The assemblage is 54.84% secondary flakes, 40.66% shatter, 2.60% secondary decortification flakes and 1.73% primary decortification flakes. There are 17 different lithic materials present, although the component is even more heavily dominated by Swan River Chert than Level 5. Swan River Chert constitutes 81.31% of the lithics in Level 5a; 3% of this is heat-treated. Small numbers of grey chert (3.11%) and miscellaneous cherts (1.73%) are also present as well as exotic materials including jasper and Knife River Flint.

Level 5b has a total of 49 pieces of debitage. 59.18% of the assemblage is secondary flakes, followed by shatter with 30.61%. Primary and secondary decortification flakes represent only 4.0% and 6.12% respectively. There are 13 types of lithic materials in Level 5b. Swan

River Chert (SRC) accounts for 36.73% of the assemblage. 22% of the SRC debitage is heat-treated. The other lithic materials with the highest number of specimens are grey chert (14.29%) and white chert (10.20%). Exotics for this component include jasper and agate shatter as well as a secondary flake of Knife River Flint.

Level 5c contains seven pieces of debitage. In continuation with the pattern seen in Level 5, 5a and 5b, secondary flakes represent the majority (57.14%) of the assemblage. Secondary decortification flakes account for 28.57%; while shatter represents 14.29% of debitage for level. Grey chert (42.86%) is the most prevalent lithic material. Five other material types are each seen in a single specimen and include secondary flakes made of jasper and Knife River Flint.

**Table 8.2:** Lithic debitage from Level 5a.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Chalcedony	-	-	1	1	2	0.35%
Chert	1 (H/T: n=1)	2	4	3	10	1.73%
Feldspathic Siltstone	-	-	-	1	1	0.17%
Fused Shale	-	-	1	-	1	0.17%
Grey Chert	1	2	12 (H/T: n=1)	3	18	3.11%
Gronlid Siltstone	-	1	3	-	4	0.69%
Jasper	-	-	3	2	5	0.87%
Knife River Flint	2	-	1	1	4	0.69%
Quartz	1	1	3	5	10	1.73%
Quartzite	-	-	2	1	3	0.52%
Sandstone	-	-	1	-	1	0.17%
Silicified Peat	4	-	9	1	14	2.42%
Silicified Siltstone	1	-	1	-	2	0.35%
Silicified Wood	-	-	-	13	13	2.25%
Siltstone	1	-	-	-	1	0.17%
Swan River Chert	-	9 (H/T: n=2)	263 (H/T: n=6)	198 (H/T: n=5)	470	81.31%
White Chert	-	-	13	6	19	3.29%
<b>Total</b>	<b>10</b>	<b>15</b>	<b>317</b>	<b>235</b>	<b>578</b>	<b>100%</b>
<b>Percent</b>	<b>1.73%</b>	<b>2.60%</b>	<b>54.84%</b>	<b>40.66%</b>	<b>100%</b>	

**Table 8.3:** Lithic debitage from Level 5b.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Agate	-	-	-	1	1	2.04%
Basalt	-	-	-	1	1	2.04%
Chert	-	-	3	1	4	8.16%
Fused Shale	-	-	-	1	1	2.04%
Grey Chert	-	1	6	-	7	14.29%
Jasper	-	-	-	1	1	2.04%
Knife River Flint	-	-	1	-	1	2.04%
Quartz	1	-	1	2	4	8.16%
Quartzite	1	-	1	1	3	6.12%
Silicified Peat	-	-	1	1	2	4.08%
Silicified Wood	-	1	-	-	1	2.04%
Swan River Chert	-	1 (H/T: n=1)	13 (H/T: n=2)	4 (H/T: n=1)	18	36.73%
White Chert	-	-	3	2	5	10.20%
Total	2	3	29	15	49	100%
Percent	4.08%	6.12%	59.18%	30.61%	100%	

**Table 8.4:** Lithic debitage from Level 5c.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Grey Chert	-	2	1	-	3	42.86%
Jasper	-	-	1	-	1	14.29%
Knife River Flint	-	-	1	-	1	14.29%
Silicified Peat	-	-	1	-	1	14.29%
Swan River Chert	-	-	-	1 (H/T: n=1)	1	14.29%
Total	-	2	4	1	7	100%
Percent	0%	28.57%	57.14%	14.29%	100%	

### **8.3.6 Fire-Cracked Rock**

There are 24 pieces of fire-cracked rock in Level 5 with a total mass of 111.9 g. 119 pieces of FCR were recovered from Level 5a. These items weigh 752.7 g and are 98% granite. Level 5b contains the largest amount of fire-cracked rock of the Level 5 components with 143 pieces and a mass of 7776.8 g. The majority of the FCR is granite and was recovered from Feature 5b-1 in unit 71S81E (Figure 8.6, Figure 8.9). Only 4% of the FCR by mass was recovered from outside of this feature and includes granite, sandstone and schist.

### **8.4 Botanical Assemblage**

No botanicals recovered from Level 5, 5a or 5c. Level 5b was the only component to contain plant remains including charcoal and a seed. One hundred and fifty pieces of charcoal, weighing a total of 0.6 g, were recovered during water-screening of the soil from Feature 5b-1 in unit 71S81E (Figure 8.9). An unidentifiable plant seed (Cat. #71S81E-47h) was also recovered from the boiling pit feature in unit 71S81E.

### **8.5 Faunal Assemblage**

Faunal remains are present in Levels 5, 5a, 5b and 5c. Level 5 contains 113 specimens with a mass of 435.3 g. Unidentifiable specimens account for 94% of the Level 5 faunal assemblage. The majority of the unidentifiable remains are unburned bone. Six of the 106 specimens are unburned enamel and one is burned bone. Identifiable specimens account for 6% of the Level 5 faunal assemblage by number of items; however, they are 63% by mass. One of these specimens is unburned tooth enamel and the other six are unburned bone.

Level 5a has 627 specimens with a mass of 642.7 g. Unidentifiable fragments account for 90% of the Level 5a faunal assemblage, most of which is unburned bone (93%). Unburned tooth enamel constitutes 6% of the unidentifiable remains, burned bone is less than 1% and calcined bone is also under 1%. Identifiable fragments constitute 10% of the fauna assemblage in Level 5a. This portion of the assemblage is 95% unburned bone and 5% unburned tooth enamel.

The faunal assemblage in Level 5b contains 567 specimens with a mass of 617.0 g. All of the identifiable specimens are unburned bone and represent a total of 3% of the faunal specimens for the level. Unidentifiable remains are 97% of the Level 5b faunal assemblage. The

majority of these unidentifiable specimens are unburned bone (90%), followed by unburned tooth enamel (7%), burned bone (2%) and calcined bone (1%).

Level 5c has 145 faunal specimens weighing 515.4 g. Unidentifiable specimens represent 95% of the assemblage by number of items and 27%. The unidentifiable faunal remains are 92% unburned bone, 4% unburned tooth enamel and 4% burned bone. All of the identifiable specimens are unburned bone.

The taphonomic alterations on the Level 5, 5a, 5b and 5c faunal assemblages are limited. 11.50% of the specimens in Level 5 have root etching and a few fragments also show signs of trowel trauma. Level 5a has root etching on 11.32% of the assemblage and trowel trauma is

**Table 8.5:** Faunal counts for Level 5, 5a, 5b and 5c.

Condition of Faunal	Level 5				Level 5a				Level 5b				Level 5c			
	Unid. Count	Mass (g)	Id. Count	Mass (g)	Unid. Count	Mass (g)	Id. Count	Mass (g)	Unid. Count	Mass (g)	Id. Count	Mass (g)	Unid. Count	Mass (g)	Id. Count	Mass (g)
Burned Bone	1	0.3	-	-	1	1.9	-	-	10	3.7	-	-	6	1.0	-	-
Calcined Bone	-	-	-	-	1	0.5	-	-	8	0.2	-	-	-	-	-	-
Unburned Bone	101	157.9	6	267.6	527	403	60	192.9	493	400.7	19	201.0	126	116.6	7	395.4
Burned Tooth Enamel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcined Tooth Enamel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unburned Tooth Enamel	4	1.2	1	8.3	35	11.9	3	32.5	37	11.4	-	-	6	2.4	-	-
Total	106	159.4	7	275.9	564	417.3	63	225.4	548	416.0	19	201.0	138	120.0	7	395.4

visible on 8.86%. One of the root-etched specimens, a tibial shaft fragment (69S78E-78), also has a cut mark. Level 5b has root etching on 15.35% of its faunal assemblage and trowel trauma is present of 1.06% of the specimens. Level 5c has root etching on 14.48% of the specimens and trowel trauma on 0.69%.

Across the components of Level 5, two taxa and three size classes were identified. These include *Bison bison*, *Canis sp.*, Small Mammal (SC2), Very Large Mammal (SC6) and Large to Very Large Mammal (SC5-6). Based on a complete lack of evidence to support the presence of large mammals other than *Bison bison* at the Cut Arm site, the Very Large Mammal and Large to Very Large Mammal specimens in the Level 5 components are most likely *B. bison* remains.

### 8.5.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens (NISP) of *B. bison* in Level 5 is 5 (Table 8.6). The elements identified include a 1<sup>st</sup> phalange fragment, a 2<sup>nd</sup> maxillary molar, a distal calcaneous fragment and a petrous temporal. Based on the results of a quantitative analysis by element (Table 8.7) the Minimum Number of Individuals (MNI) is 1 and the Minimum Number of Elements (MNE) is 0.5. One immature specimen (Cat. #34S50E-61) was recovered from Level 5. Artifact #34S50E-61 is a distal radius fragment with partial fusion of the distal epiphysis. This partial fusion indicates that the individual's age at death was around the 5<sup>th</sup> postnatal year. Unfortunately, this method of determining skeletal age is not very accurate and can only be used as a rough estimate (E. G. Walker, personal communication 2012). Regardless of this, the presence of the radial fragment indicates that at least one immature bison as well as one adult bison are represented by the faunal remains.

**Table 8.6:** Faunal taxa for Level 5, 5a, 5b, 5c.

Taxon/Size Class	Level 5			Level 5a			Level 5b			Level 5c		
	NISP	MNI	MNE	NISP	MNI	MNE	NISP	MNI	MNE	NISP	MNI	MNE
<i>Bison bison</i>	5	1	0.5	5	1	0.1	7	1	0.5	5	1	0.5
<i>Canis sp.</i>	-	-	-	1	1	0.5	-	-	-	1	1	0.5
Small Mammal	-	N/A	N/A	1	N/A	N/A	-	N/A	N/A	-	N/A	N/A
Very Large Mammal	2	N/A	N/A	38	N/A	N/A	11	N/A	N/A	1	N/A	N/A
Large to Very Large Mammal	-	N/A	N/A	18	N/A	N/A	1	N/A	N/A	-	N/A	N/A

Level 5a has a NISP of 5, a MNI of 1 and a MNE of 0.1 (Table 8.6, Table 8.7). Elements that were identified include a proximal sesmoid, a 2<sup>nd</sup> phalange, a molar fragment and the spinous process of a cervical vertebra. An unfused femoral head (Cat. #71S81E-42) recovered from unit 71S81E was identifiable as having come from an immature *Bison bison*. When combined with the quantitative analysis of adult remains, it is clear that the Level 5a faunal assemblage consists of at least one adult and one juvenile bison.

Level 5b has a NISP of 7, a MNI of 1 and a MNE of 0.5 (Table 8.6, Table 8.7). The elements identified include a fragmented 1<sup>st</sup> phalange, three tarsals and a rib fragment. Level 5c has a NISP of 5, an MNI of 1 and an MNE of 0.5 (Table 8.6, Table 8.7). The elements identified include a 2<sup>nd</sup> phalange and several distal humerus fragments.

**Table 8.7:** Adult *Bison bison* quantification by element for Level 5, 5a, 5b and 5c.

<b>Level 5</b>							
<b>Element</b>	<b>Left</b>	<b>Right</b>	<b>Axial</b>	<b>Indeterminate</b>	<b>Total Number</b>	<b>MNI</b>	<b>MNE</b>
1st phalanx fragment	-	-	-	1	1	1	0.1
Distal Calcaneous	1	-	-	-	1	1	0.5
Petrous temporal	1	-	-	-	1	1	0.5
Maxillary 2nd premolar	-	1	-	-	1	1	0.5
<b>Level 5a</b>							
<b>Element</b>	<b>Left</b>	<b>Right</b>	<b>Axial</b>	<b>Indeterminate</b>	<b>Total Number</b>	<b>MNI</b>	<b>MNE</b>
2nd phalanx	-	-	-	1	1	1	0.1
<b>Level 5b</b>							
<b>Element</b>	<b>Left</b>	<b>Right</b>	<b>Axial</b>	<b>Indeterminate</b>	<b>Total Number</b>	<b>MNI</b>	<b>MNE</b>
1st phalanx	-	-	-	1	1	1	0.1
Fused 2nd & 3rd tarsal	1	-	-	-	1	1	0.5
Fused central & 4th tarsal	1	-	-	-	1	1	0.5
Lateral malleolus	-	1	-	-	1	1	0.5
<b>Level 5c</b>							
<b>Element</b>	<b>Left</b>	<b>Right</b>	<b>Axial</b>	<b>Indeterminate</b>	<b>Total Number</b>	<b>MNI</b>	<b>MNE</b>
2nd phalanx	-	-	-	1	1	1	0.1
Distal humerus	-	1	-	-	1	1	0.5

## 8.5.2 Order Carnivora

### *Canis sp.*

Specimens belonging to an indeterminate species of canid were identified in Level 5a and 5c. In both levels the Number of Identified Specimens (NISP) is 1, the Minimum Number of Individuals (MNI) is 1 and the Minimum Number of Elements (MNE) is 0.5 (Table 8.6). The *Canis sp.* specimen in Level 5a is a left mandibular 4<sup>th</sup> premolar fragment from a mature individual. The Level 5c specimen is a pubis fragment from the acetabulum of a left innominate and is also from a mature animal.

## 8.5.3 Miscellaneous Specimens

The miscellaneous specimens in Level 5 belong to the Very Large Mammal size class. The total Number of Identified Specimens is 2 (Table 8.6), both of which are petrous temporal fragments. Level 5a contains 38 Very Large Mammal specimens, 18 Large to Very Large Mammal specimens and one Small Mammal specimen. The latter (Cat. #59S71E-26b) is a complete left femur from a small rodent and the Large to Very Large Mammal specimens are rib fragments from unit 71S82E. The Very Large Mammal fragments include rib fragments, a fragmented vertebra, tibial shaft fragments, an ulnar carpal fragment, a 1<sup>st</sup> phalange fragment, a petrous temporal fragment and a tooth fragment. Seven of the nine rib fragments, the thoracic vertebrae and the phalange fragment have incompletely fused epiphyses indicating the presence of at least one immature individual in the assemblage.

Level 5b contains specimens identifiable to the Very Large Mammal size class as well as the Large to Very Large Mammal size class (Table 8.6). The NISP of the former is 11, while the NISP of the SC5-6 is only 1. The NISP of SC6 is 11 and includes phalange fragments, metapodial fragments and a calcaneous fragment. Level 5c has one specimen attributed to the Very Large Mammal size class. The specimen is a long bone shaft fragment.

## 8.6 Seasonality

Seasonality cannot be determined for Level 5, 5a, 5b or 5c due to the lack of sufficient floral and faunal remains.

## 8.7 Features and Artifact Distribution

The spatial boundaries of the components in Level 5 are restricted by the way in which the site was formed. In Levels 5a, 5b and 5c the occupations are visible as separate components because of the relatively high rate of hillslope sediment deposition that occurred in the base of the coulee (Rutherford 2004). The area where these components can be differentiated is restricted to the southeastern half of the site in excavation Block 4 and Block 5. The Level 5 component does not extend into this southeastern area. It is only found in the northwestern half of the site in Blocks 1 and 3 where Level 5a, 5b and 5c are not distinguishable. This is due to a lack of the significant inter-occupational sediment deposition that is seen in Blocks 4 and 5.

Artifact distribution in Level 5 is limited to the spatial boundaries of each component. There are no visible artifact concentrations in any of the occupational layers and the small amount of cultural debris is fairly evenly distributed (Figure 8.7).

Continuous throughout Level 5a, Level 5b and Level 5c is a krotovina in unit 68S78E that originated in Level 3. The disturbance is located within the western half of the northwest quadrant the unit (Figure 8.8, Figure 8.9, Figure 8.10). Another area of rodent disturbance (Figure 8.8) continuing from previous levels is present. The extent of the feature is reduced from that in Level 4 and covers only the northeast and southeast quadrants of unit 71S81E.

Feature 5b-1 is a circular concentration of FCR, only some of which was recoverable due crumbling (Figure 8.6, Figure 8.9). The feature also contained flakes, pieces of charcoal and a



**Figure 8.6:** Feature 5b-1 from unit 71S81E.

plant seed (Cat. #71S81E-47h). Raw, burned and calcined bone fragments were found in and around the feature and a concentration of small bone fragments were recovered from directly under it. The pit has a minimum depth is 65 cm and a maximum depth of 85 cm below the surface. The feature is in the southeastern portion of unit 71S81E. The large amount of fire-cracked rock in combination with charcoal and bone fragments exhibiting varying degrees of burning indicates that Feature 5b-1 is a boiling pit.

### **8.8 Interpretation of Level 5**

The lithic assemblages of Levels 5, 5a, 5b and 5c indicate a mix of activities were taking place at the Cut Arm site. The largest lithic assemblage is from Level 5a; however, the trends in tools and debitage are seen in all four components. The activities occurring include testing cobbles for viable lithic materials, early stages of tool manufacture and resharpening/rejuvenation of existing tools. The evidence for these activities is not concentrated within a specific area in any of the components. Such a range of activities with no designated activity areas supports the interpretation of Level 5 as being a short-term habitation site.

The faunal remains of Level 5 are also consistent with a short-term campsite occupation. *B. bison* remains were found in Level 5, Level 5a, Level 5b and Level 5c. At least one adult bison is represented by the faunal assemblage of each component. A minimum of one immature bison is also present in Level 5 and Level 5a. There is a small amount of evidence to support the presence of a coyote-sized canid in Level 5a and again in Level 5c. The species of canid represented as well as how and why the canid remains became a part of the assemblage is unknown.

The sole feature attributable to human modification is a boiling pit (Feature 5b-1) in Level 5b. The pit appears to have been used in food preparation of bison and possibly plant foods. Unfortunately, the seed recovered from the pit cannot be identified. Additionally, there is no way to determine whether the seed was intended as part of the site inhabitants' diet or is intrusive into the pit from the surrounding environment. The presence of a cooking feature is typical for a habitation site and would not be expected in a special purpose site such as a primary processing area.

The pottery fragments recovered from Level 5 and Level 5b are problematic. As is discussed above, it is most likely that the pottery was moved down into these components by

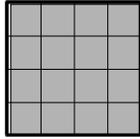
rodent activity. It is also possible that the pottery is in its original context and is a product of the Besant complex. Unfortunately, the pottery fragments in Level 5 and Level 5b do not provide any details to clarify which of these scenarios are accurate.

Level 5a is the only component where cultural affiliation can be determined with any certainty. Based on the presence of a Besant projectile point Level 5a is a Besant complex occupation. There are no sources of definitive evidence in the other occupational layers; however, the boiling pit in Level 5b supports the conclusion it may also belong to the Besant complex. Boiling pits are an important aspect in the rendering of fat from bones for making pemmican, an innovation seen during the Besant complex. Finally, the presence of Knife River Flint in Level 5a, 5b and 5c adds further support for a Besant affiliation as this exotic lithic is known to have been particularly favored during the Besant complex.

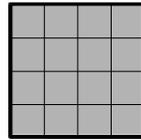


# Cut Arm Site (FbNp-22) - Level 5

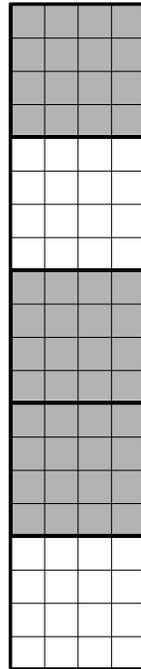
## BLOCK 1



10S10E



16S16E



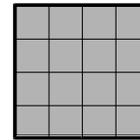
16S18E

17S18E

18S18E

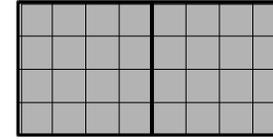
19S18E

20S18E



20S20E

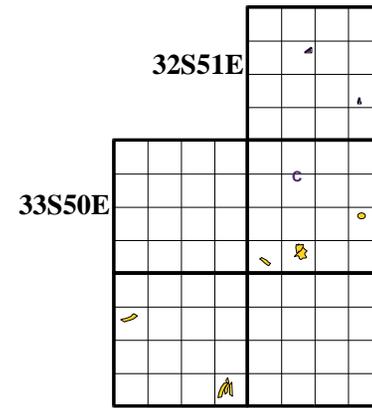
## BLOCK 2



10S29E

10S30E

## BLOCK 3



32S51E

33S50E

34S50E

34S51E

### LEGEND:

-  Faunal
-  Debitage
-  Retouched Flake
-  Tool
-  Projectile Point
-  Core/Core Fragment
-  FCR
-  Boiling Pit Feature
-  Rodent Disturbance
-  Rock
-  Not excavated



(Not representative for unexcavated space)

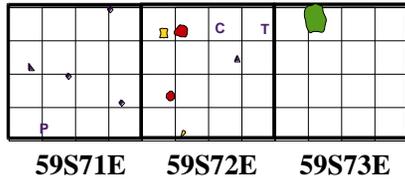
Figure 8.7: Artifact and feature distribution map of Level 5.



# Cut Arm Site (FbNp-22) - Level 5a

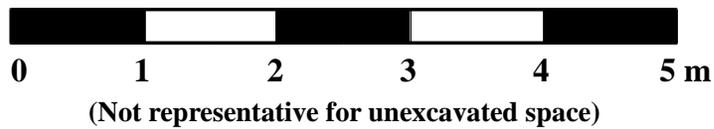
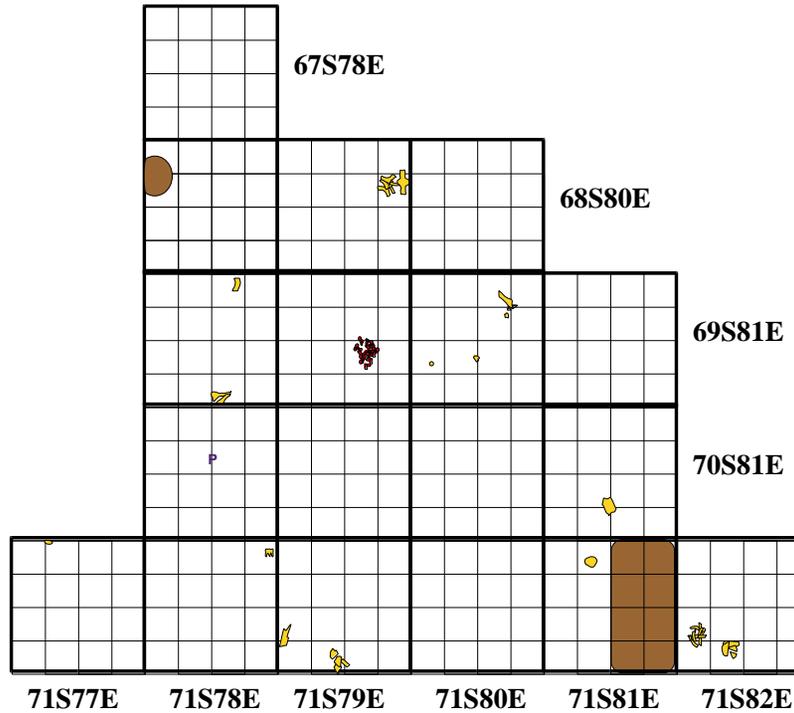
BLOCK 5

BLOCK 4



**LEGEND:**

- Faunal
- Debitage
- R** Retouched Flake
- T** Tool
- P** Projectile Point
- C** Core/Core Fragment
- FCR
- Boiling Pit Feature
- Rodent Disturbance
- Rock
- Not excavated



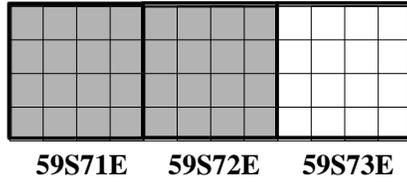
**Figure 8.8:** Artifact and feature distribution map of Level 5a.



# Cut Arm Site (FbNp-22) - Level 5b

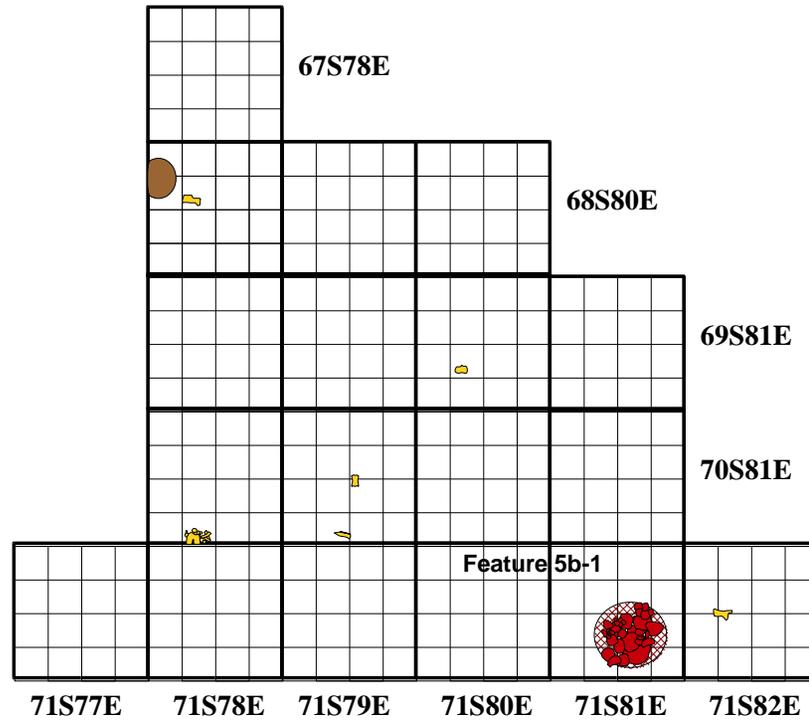
BLOCK 5

BLOCK 4



**LEGEND:**

- Faunal
- Debitage
- R** Retouched Flake
- T** Tool
- P** Projectile Point
- C** Core/Core Fragment
- FCR
- Boiling Pit Feature
- Rodent Disturbance
- Rock
- Not excavated



(Not representative for unexcavated space)

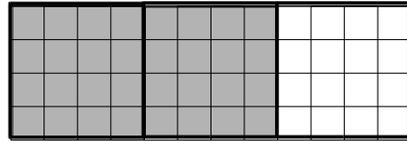
Figure 8.9: Artifact and feature distribution map of Level 5b.



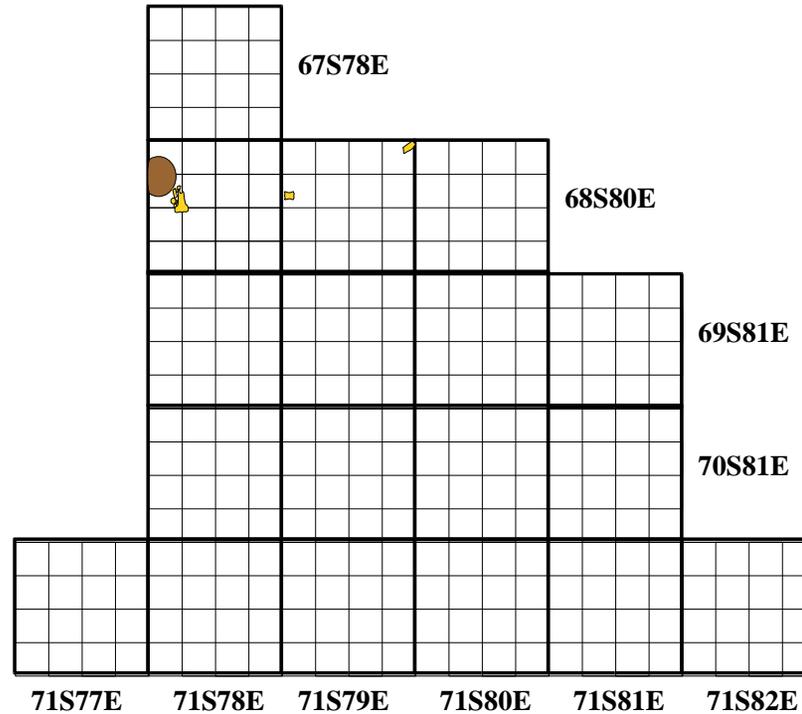
# Cut Arm Site (FbNp-22) - Level 5c

BLOCK 5

BLOCK 4



59S71E 59S72E 59S73E



**LEGEND:**

-  Faunal
-  Debitage
- R** Retouched Flake
- T** Tool
- P** Projectile Point
- C** Core/Core Fragment
-  FCR
-  Boiling Pit Feature
-  Rodent Disturbance
-  Rock
-  Not excavated



(Not representative for unexcavated space)

Figure 8.10: Artifact and feature distribution map of Level 5c.

## **Chapter 9**

### **Cultural Level 6**

#### **9.1 Introduction**

Cultural Level 6 in the Cut Arm site is present in all units except 68S80E. The level ranges in depth from 68 cm – 100 cm below the surface. The slope of the site down towards the southeast is responsible for the unusually wide depth range. The thickness of the level at any given point is only 5.5 cm and is a much more accurate representation of the stratigraphy. There are no culturally diagnostic materials to use in determining cultural affinity. A radiocarbon date of  $3,550 \pm 50$  cal B.P. (Table 3.3) was obtained from a metatarsal (Cat. #71S80E-61) in unit 71S80E. The date indicates that the Level 6 occupation took place during the McKean series.

#### **9.2 Lithic Assemblage**

##### **9.2.1 Projectile Points**

An unidentifiable projectile point fragment (Cat. #69S79E-85; Figure 9.1) was recovered from unit 69S79E at a depth of 97 cm below the surface. The original point was broken at an angle from the tip down to the notches on both sides. The resultant fragment includes the base, the lower half of the side notches and the central portion of the blade. The fragment is made of Knife River Flint and has a mass of 1.0 g. It is 1.70 cm long, 0.38 cm thick and has a basal width/maximum width of 1.49 cm.

##### **9.2.2 Expedient Tools**

Level 6 contains one expedient tool recovered from unit 71S77E at a depth of 79 cm. The artifact (Cat. #71S77E-15; Figure 9.2) is a crude cobble tool made from mottled beige, grey and red quartzite. The tool has minor pecking on one end and a mass of 880.9 g. It is 11.68 cm long, 6.74 cm wide and 8.16 cm thick.



**Figure 9.1:** Knife River Flint projectile point fragment (Cat. #69S79E-85).



**Figure 9.2:** Quartzite cobble tool (Cat. #71S77E-15).

### 9.2.3 Debitage

Level 6 contains 85 pieces ofdebitage. Secondary flakes consist of 63.53% of the assemblage, followed by shatter with 30.59%, secondary decortification flakes with 4.71% and primary decortification flakes with 1.18%.

Knife River Flint is the most common lithic material type in Level 6 with 36.47% of thedebitage. This is in sharp contrast to Levels 1 through 5c where local materials dominate the assemblages. The second most prevalent lithic material in Level 6 is Swan River Chert (21.18%), 11% of which is heat-treated. Quartzite and silicified peat each account for 8.24%, quartz constitutes 7.06% and white chert accounts for 5.88%. Five different lithic materials including chert precipitated in limestone (CPL) and jasper constitute the remaining 12.93% of the assemblage.

**Table 9.1:** Lithicdebitage from Level 6.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Chert	-	-	-	2	2	2.35%
Chert Precipitated in Limestone (CPL)	-	1	-	1	2	2.35%
Granite	1	-	-	-	1	1.18%
Jasper	-	-	-	2	2	2.35%
Grey Chert	-	-	2	1 (H/T: n=1)	3	3.53%
Knife River Flint	-	1	30	-	31	36.47%
Quartz	-	-	1	5	6	7.06%
Quartzite	-	1	2	4	7	8.24%
Silicified Peat	-	1	6	-	7	8.24%
Silicified Wood	-	-	-	1	1	1.18%
Swan River Chert	-	-	10 (H/T: n=1)	8 (H/T: n=1)	18	21.18%
White Chert	-	-	3	2 (H/T: n=1)	5	5.88%
<b>Total</b>	<b>1</b>	<b>4</b>	<b>54</b>	<b>26</b>	<b>85</b>	<b>100%</b>
<b>Percent</b>	<b>1.18%</b>	<b>4.71%</b>	<b>63.53%</b>	<b>30.59%</b>	<b>100%</b>	

### 9.2.4 Fire-cracked Rock

A total of 63 pieces of fire-cracked rock with a mass of 356.1 g were recovered from Level 6. Roughly 90% of the FCR is granite, 4% is quartzite and 6% is schist. When examined by mass quartzite accounts for roughly 90% of the fire-cracked rock, while granite constitutes 10% and schist only 1%.

### 9.3 Faunal Assemblage

The faunal assemblage for Level 6 at the Cut Arm site consists of 1205 specimens with a mass of 3803.5 g. Unidentifiable specimens represent 82.90% of the faunal remains by number of items and 28.44% by mass. When examined by degree of burning, 94% of the unidentifiable specimens are unburned bone, 4% are unburned tooth enamel, 1% are calcined bone and under 1% are burned bone. Identifiable specimens represent 17.10% of the total faunal assemblage and 71.56% by mass. The majority (95%) of the identifiable remains are unburned bone with a small number (5%) that are unburned tooth enamel. Whenever possible, all identifiable specimens were assigned to a genus and species. If identification could not be done to this degree of precision, the specimen was placed within a size class. Within the Level 6 assemblage *Bison bison* is the only taxon identified and Very Large Mammal (SC6) is the only size class.

**Table 9.2:** Faunal counts for Level 6.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	2	0.9	-	-
Calcined Bone	12	2.2	-	-
Unburned Bone	942	1048.6	196	2336.3
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	43	29.9	10	385.6
Total	999	1081.6	206	2721.9

**Table 9.3:** Faunal taxa for Level 6.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	144	1	1
Very Large Mammal	62	N/A	N/A

**Table 9.4:** Adult *Bison bison* quantification by element for Level 6.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	2	2	1	0.3
2nd phalanx	-	-	-	2	2	1	0.3
Fused 2nd & 3rd carpal	-	1	-	-	1	1	0.5
Internal carpal fragment	-	1	-	-	1	1	0.5
Fused 2nd & 3rd tarsal	1		-	-	1	1	0.5
Metatarsal	-		-	1	1	1	0.5
Distal humerus	-	1	-	-	1	1	0.5
Scapula glenoid fossa	-	1	-	-	1	1	0.5
Dentary	1	1	-	-	2	1	1.0
Mandibular 2nd premolar	1	1	-	-	2	1	1.0
Mandibular 3rd premolar	1	1	-	-	2	1	1.0
Mandibular 4th premolar	1	1	-	-	2	1	1.0
Mandibular 1st molar	1	1	-	-	2	1	1.0
Mandibular 2nd molar	1	1	-	-	2	1	1.0
Mandibular 3rd molar	1	1	-	-	2	1	1.0
Maxillary 2nd premolar	1	-	-	-	1	1	0.5
Maxillary 3rd premolar	1	-	-	-	1	1	0.5
Maxillary 1st premolar	1	-	-	-	1	1	0.5
Maxillary 2nd molar	1	-	-	-	1	1	0.5
Maxillary 3rd molar	1	-	-	-	1	1	0.5

### 9.3.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens for *Bison bison* in Level 6 is 144 (Table 9.3). The majority of the *B. bison* remains are cranial, although some distal limb elements, long bones and flat bones are also present. Based on the quantitative analysis in Table 9.4 the Minimum Number of Individuals is 1 and the Minimum Number of Elements is also 1. These results indicate that at least one mature individual is represented by the assemblage.

The presence of an immature individual in the assemblage is supported by a fragmented right mandible containing a deciduous 3<sup>rd</sup> premolar, a deciduous 4<sup>th</sup> premolar, an erupting 3<sup>rd</sup> molar and erupted 1<sup>st</sup> and 2<sup>nd</sup> molars (Cat. #67S78E-63a; Figure 9.3). The deciduous 3<sup>rd</sup> premolar is fully worn, having obliterated its fossettes. The deciduous 4<sup>th</sup> premolar is markedly worn. The exostylid and ectostylid are both in wear, with the former being separate from the crown and the latter still adjoined. The 1<sup>st</sup> molar's exostylid is 9 mm from occlusion but is in wear. The 2<sup>nd</sup> molar is below the alveolus, while the 3<sup>rd</sup> molar is barely protruding above the alveolar margin. An age estimate of 1.5 years at death can be made with considerable certainty due to the specific state of tooth eruption and wear seen in this specimen (E. G. Walker, personal communication 2012).

Artifact #68S78E-74a is a mature, incomplete left mandible containing its premolars and molars (Figure 9.4). All of the premolars and the 1<sup>st</sup> molar are in wear. The molar's fossettes are still strong and the exostylid is worn but still slightly joined to the crown. The 2<sup>nd</sup> molar is in wear with the exostylid separate from the crown but in wear. The 3<sup>rd</sup> molar is in wear with the exostylid 6 mm from occlusion. Based on the state of wear described, this individual was 4.5 years of age at the time of death (E. G. Walker, personal communication 2012).

Artifact #71S82E-57a (Figure 9.5) is an incomplete right mandible containing its premolars and molars. The 1<sup>st</sup> molar is heavily worn and deeply cupped. The prefossette is nearly obliterated and the metaconid height is 175 mm. The 2<sup>nd</sup> molar is moderately worn with the base of the enamel on the metaconid above the level of the alveolus. The exostylid on the 3<sup>rd</sup> molar is in wear and the enamel base of the metaconid is close to the alveolus. Based on the degree of wear present on the dentition, the individual was 7.5 to 7.7 years of age at death (E. G. Walker, personal communication 2012).



**Figure 9.3:** *Bison bison* fragmented left mandible, lateral view (Cat. #68S78E-74a).



**Figure 9.4:** *Bison bison* fragmented right mandible, lateral view (Cat. #67S78E-63a).



**Figure 9.5:** *Bison bison* incomplete right mandible, lateral view (Cat. #71S82E-37a).

### 9.3.2 Miscellaneous Specimens

Fragments identified as Very Large Mammal (SC6) are the entirety of the miscellaneous specimens for Level 6. The Number of Identified Specimens of Very Large Mammal is 62, 100% of which is unburned bone (Table 9.3). The miscellaneous specimen fragments consist of 74% limb elements and 26% axial elements. The limb bones represented include a 3<sup>rd</sup> phalanx, humerus, radius, ulna and tibia. The axial elements represented include a scapula, sacrum, vertebra and mandible.

### 9.4 Seasonality

An estimate of age at death can be made for three of the *B. bison* specimens in Level 6. Cat. #67S78E-63a is 1.5 years of age based on dental eruption. Cat. #68S78E-74a is 4.5 years of age based on dental wear. Cat. #71S82E-37a is 7.5 to 7.7 years of age also based on dental wear. These estimates are specific enough to allow for the determination of seasonality and although the sample size is extremely small (n=3), the age cohort groups suggest a procurement event of mid to late fall (E. G. Walker, personal communication 2012).

## 9.5 Features and Artifact Distribution

Feature 6-1 is a rock pile that was uncovered in the northwest quadrant of unit 70S80E (Figure 9.7). The feature is 43 cm long by 38 cm wide with a depth range of 75 cm – 90 cm db. Three other large, unaltered rocks were found in close proximity to Feature 6-1. One was in the southwest quadrant of unit 70S80E and the other two were on the eastern boundary of unit 70S81E (Figure 9.7). Also within excavation Block 4 is a krotovina located in the western half of the northwest quadrant of unit 68S78E. The krotovina is the continuation of rodent activity that first appeared in Level 3 and extends through Levels 4, 5a, 5b and 5c.

The artifact assemblage for Level 6 is not evenly distributed throughout the site area (Figure 9.8). Roughly fifty percent of the lithic assemblage is concentrated in units 69S78E (10%), 69S79E (33%) and 69S80E (10%). Unit 71S79E is also an area containing a notable

**Table 9.5:** Lithic types in artifact-dense units.

Unit	Lithic Type	Number of Items	Total
69S78E	Secondary flake	15	16
	Shatter	1	
69S79E	FCR	39	51
	Secondary flake	8	
	Shatter	2	
	Unidentifiable projectile point	1	
	Secondary decortification flake	1	
69S80E	Secondary flake	9	16
	Shatter	7	
71S79E	FCR	21	21

concentration (14%) of lithics. The majority of the items in units 69S79E and 71S79E are fire-cracked rock (Table 9.8). Units 69S78E and 69S80E contain primarily secondary flakes but also a small amount of shatter.

The spatial distribution pattern of the Level 6 faunal remains is not as pronounced as the lithic assemblage; however, there is a noteworthy difference in the number of items recovered from each unit (Figure 9.8). Unit 67S78E contains the largest concentration of faunal specimens, with 19% of the assemblage. Another 12% of the total was recovered from unit 71S82E, 15%

was recovered from unit 69S78E and 10% was recovered from unit 69S80E. These latter two units also overlap with the location of the main lithic concentration.

## 9.6 Interpretation of Level 6

Level 6 is the only occupational layer in the Cut Arm site where seasonality of occupation can be determined. Although the sample is small, the specimens clearly and consistently indicate that the site was utilized in mid to late Fall. The cultural affiliation of Level 6 cannot be determined from the archaeological assemblage due to a lack of diagnostics artifacts; however, the radiocarbon date obtained from a *B. bison* metatarsal ( $3,550 \pm 50$  cal B.P.) indicates a McKean series period of occupation.

Quantitative analysis of the faunal assemblage shows that at least one mature and one immature *B. bison* are represented; however, when the age assessments of the three *B. bison* mandibles recovered are also considered it is clear that the assemblage consists of two mature individuals as well as the one immature. There is no evidence for the presence of other large mammal species and as such the SC6 specimens are likely also *B. bison*.

The lithic assemblage is indicative of long distance trade for high quality lithic materials. There appears to have been careful conservation and maximization of these exotics which were supplemented by the use of local materials for more expedient tasks. Lithic activities are focused in a 3m by 1m space in units 69S78E, 69S79E and 69S80E (Figure 9.8).

The purpose of the rock pile (Feature 6-1) and associated boulders in units 71S80E and 71S81E is not clear. The boulders are situated between a concentration of fire-cracked rock to the north and another FCR concentration to the south. Although there is no record of charcoal or soil staining, the fire-cracked rock suggests the presence of a hearth. The other units with high artifact densities are also outside the area encompassed by the boulders and rock pile. One possible explanation for this is that the rocks and rock pile were part of a dwelling or shelter with faunal processing and lithic resharpening activities having taken place around a hearth outside of the structure.

The archaeological remains recovered from Level 6 at the Cut Arm site can be interpreted as a short-term, mid to late Fall campsite. The number of animals represented by the faunal assemblage is small, consisting primarily of cranial elements exhibiting very little burning. The assemblage is not substantial enough to suspect a kill site and the elements present do not

support its interpretation as a processing site. The small number of decortification flakes and dominance of Knife River Flint imply that the site was not selected for lithic procurement and no major tool manufacture was occurring. Finally, the interesting spatial distribution of artifacts around the boulders and rock pile feature could indicate the presence of a dwelling and further support the interpretation of Level 6 as a campsite.



# Cut Arm Site (FbNp-22) - Level 6

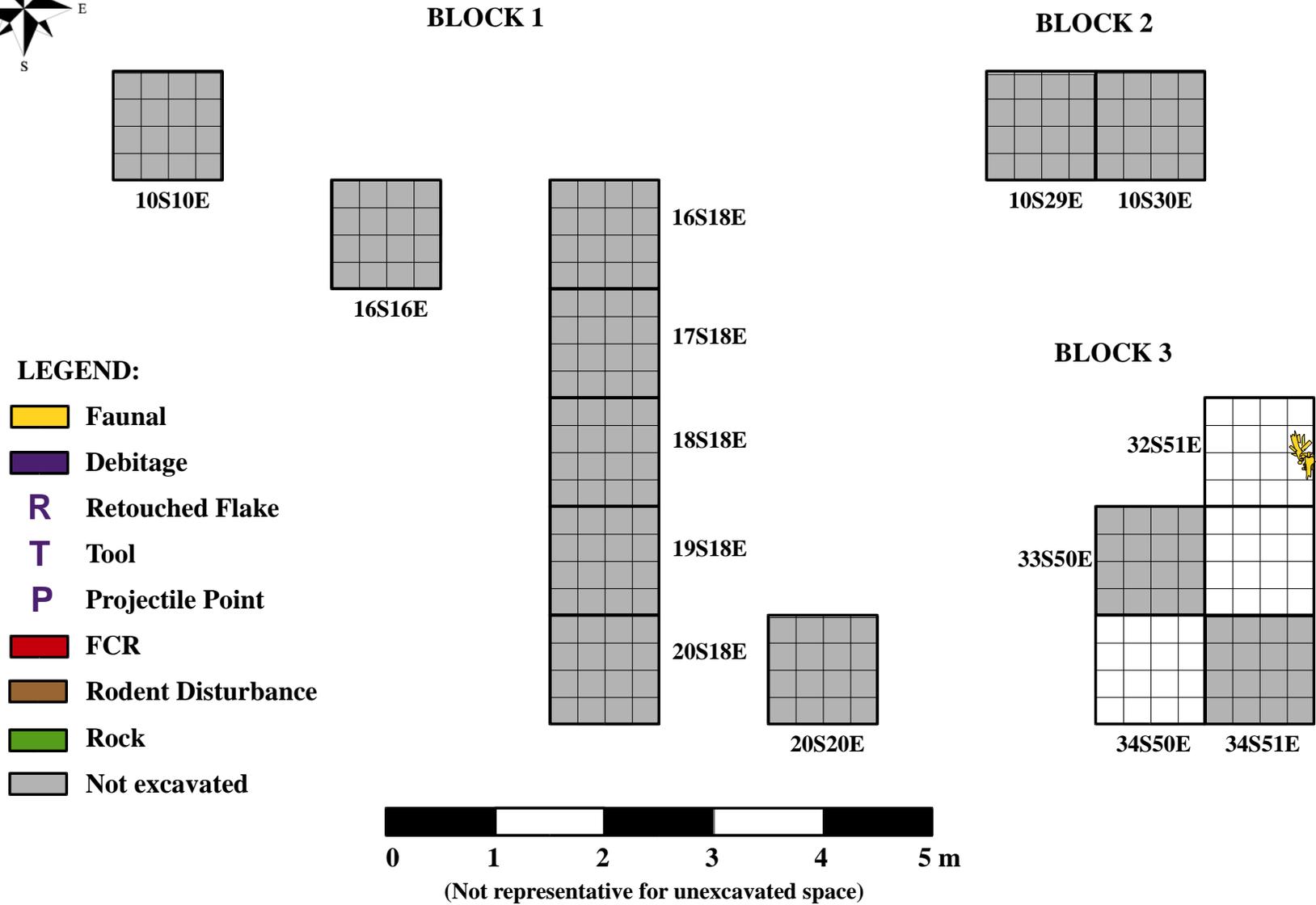


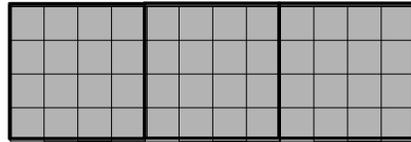
Figure 9.6: Artifact and feature distribution map for Level 6, 1 of 2.



# Cut Arm Site (FbNp-22) - Level 6

BLOCK 5

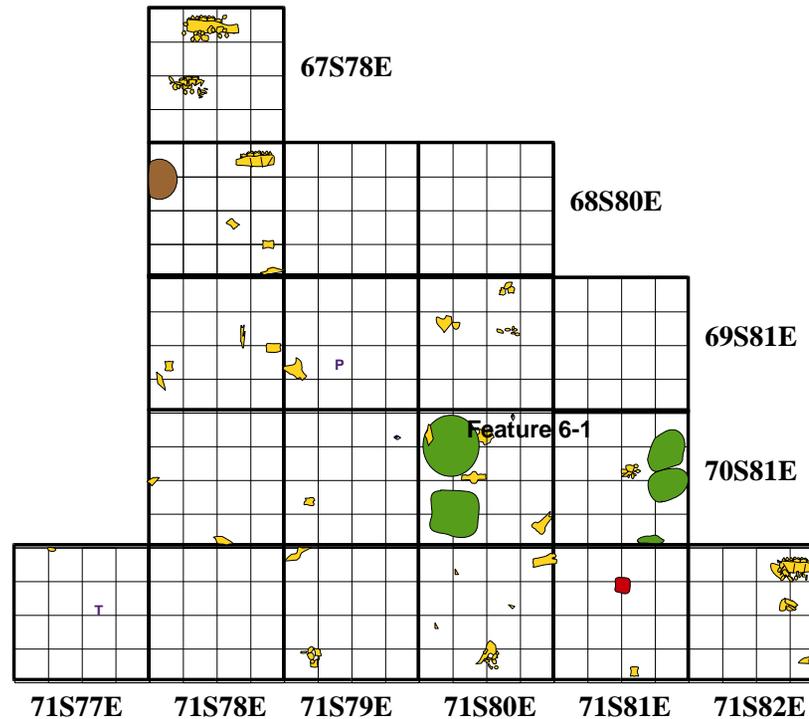
BLOCK 4



59S71E 59S72E 59S73E

## LEGEND:

-  Faunal
-  Debitage
-  Retouched Flake
-  Tool
-  Projectile Point
-  FCR
-  Rodent Disturbance
-  Rock
-  Not excavated



(Not representative for unexcavated space)

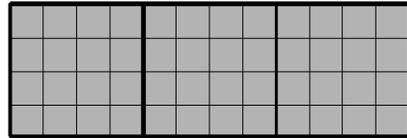
Figure 9.7: Artifact and feature distribution map for Level 6, 2 of 2.



# Cut Arm Site (FbNp-22) - Level 6

BLOCK 5

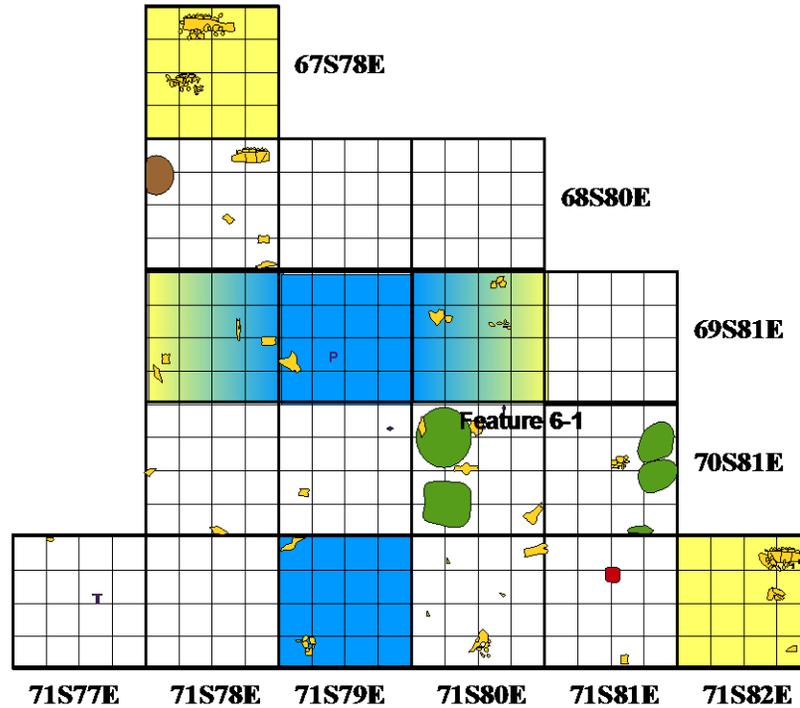
BLOCK 4



59S71E 59S72E 59S73E

**LEGEND:**

- Unit containing high percentage of faunal assemblage
- Unit containing high percentage of lithic assemblage
- Faunal
- Debitage
- R Retouched Flake
- T Tool
- P Projectile Point
- FCR
- Rodent Disturbance
- Rock
- Not excavated



(Not representative for unexcavated space)

Figure 9.8: Faunal and lithic concentrations in Level 6.

## **CHAPTER 10**

### **Cultural Level 7**

#### **10.1 Introduction**

Cultural Level 7 has an average thickness of only 6 cm, but ranges in depth from a minimum of 80 cm db to a maximum of 113 cm db. The large depth range is due to the slope of the site from the northwest down towards the southeast. The level is discontinuous across the site and there is no separation between Level 7 and Level 8 in unit 70S81E due to the height of a bone bed feature (Feature 8-1) in the lower level. The cultural affiliation of Level 7 cannot be determined as there were no diagnostics recovered and no chronometric dating was undertaken.

#### **10.2 Lithic Assemblage**

##### **10.2.1 Uniface**

Two unifacial tools were recovered from Level 7 at the Cut Arm site. Artifact #68S78E-77c is a white chert endscraper (Figure 10.1). The tool was found between 109 cm - 118 cm db in unit 68S78E. It is 1.50 cm long, 1.36 cm wide and 0.31 cm thick. The overall shape of the scraper is triangular with a convex distal working edge and straight lateral margins. Artifact #71S80E-60 is a grey chert uniface from 88 cm db in unit 71S80E (Figure 10.2). The overall shape of the tool is an oval, with a pointed proximal end. One of the lateral margins was uniaxially flaked and utilized as a working edge. The uniface has a length of 4.03 cm, is 2.56 cm wide and 1.02 cm thick.

##### **10.2.2 Abrader**

An abrading tool was recovered from the northwest quadrant of unit 68S80E. The ventral surface of the granite cobble (Cat. #68S80E-61e; Figure 10.3) shows signs of having been heavily utilized as a grinding stone. The cobble is 8.66 cm long, 8.35 cm wide and 5.94 cm thick. The tool was recovered from between 92 cm – 117 cm below the surface.



**Figure 10.1:** White chert endscraper (Cat. #68S78E-77c).



**Figure 10.2:** Grey chert uniface (Cat. #71S80E-60).



**Figure 10.3:** Granite cobble abrader ventral surface (Cat. #68S80E-61e).

### 10.2.3 Debitage

The debitage assemblage for Level 7 is quite small, consisting of 25 flakes and pieces of shatter (Table 10.1). Shatter is the most ubiquitous form of debitage, representing 56% of the assemblage. Secondary flakes are the second most common and represent 36% of the assemblage. Primary and secondary decortification flakes are represented by one specimen each and account for 4% of the debitage in Level 7. The dominant lithic material type is Swan River Chert (28%). Evidence of heat-treatment is present on 57% of the Swan River Chert debitage. Miscellaneous cherts (20%) are the second most prevalent material type, followed by quartzite (12%) and silicified peat (8%). The remaining 32% of the assemblage is divided amongst eight lithic material types including one piece of jasper shatter as well as a secondary flake of Knife River Flint.

### 10.2.4 Fire-Cracked Rock

Seventy-four pieces of fire-cracked rock with a total mass of 1042.4 g were recovered from Level 7. The assemblage consists of 66 pieces of granite FCR and eight pieces of schist FCR.

**Table 10.1:** Lithic debitage from Level 7.

Material Type	Primary Decortification Flakes	Secondary Decortification Flakes	Secondary Flakes	Shatter	Total	Percent
Chalcedony	-	-	-	1	1	4.00%
Chert	-	-	-	5	5	20.00%
Grey Chert	-	-	-	1	1	4.00%
Gronlid Siltstone	-	-	1	-	1	4.00%
Jasper	-	-	-	1	1	4.00%
Knife River Flint	-	-	1	-	1	4.00%
Limestone	-	-	-	1	1	4.00%
Quartz	-	1	-	-	1	4.00%
Quartzite	1	-	1	1	3	12.00%
Silicified Peat	-	-	1	1	2	8.00%
Swan River Chert	-	-	4 (H/T: n=3)	3 (H/T: n=1)	7	28.00%
White Chert	-	-	1 (H/T: n=1)	-	1	4.00%
Total	1	1	9	14	25	100%
Percent	4.00%	4.00%	36.00%	56.00%	100%	

### 10.3 Faunal Assemblage

The faunal assemblage for Level 7 contains 1491 specimens with a mass of 2518.8 g (Table 10.2). Unidentifiable fragments represent 95.64% of the assemblage. The unidentifiable remains consist of 93% unburned bone, 5% unburned tooth enamel, 1% burned bone and under 1% calcined bone. Identifiable specimens represent 4.36% of the total faunal assemblage. The majority (75%) of the identifiable remains are unburned bone; however, there are also 16 specimens (25%) of unburned tooth enamel. One taxon and three size classes were identified including *Bison bison*, Small Mammal (SC2), Very Large Mammal (SC6) and Very Large or Large Mammal (SC5-6) (Table 10.3).

Taphonomic alterations seen in the assemblage include root etching and trowel trauma. Trowel trauma is present on 16 fragments or 1% of all faunal specimens in Level 7. Root etching was recorded on 154 fragments, or 10% of the assemblage. An unidentifiable bone fragment (Cat. #70S81E-60c) from unit 70S81E has reddish-orange staining on its cortical surface. The cause of the discoloration is not clear; however, it is possible that this staining is due to contact with red ochre.

**Table 10.2:** Faunal counts for Level 7.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	11	4.0	-	-
Calcined Bone	1	0.1	-	-
Unburned Bone	1335	1044.1	49	1306.4
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	79	48.6	16	115.6
Total	1426	1096.8	65	1422.0

**Table 10.3:** Faunal taxa for Level 7.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	27	1	0.5
Small Mammal	2	N/A	N/A
Very Large Mammal	34	N/A	N/A
Very Large or Large Mammal	2	N/A	N/A

### 10.3.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens for *Bison bison* is 27 (Table 10.3). The Minimum Number of Individuals is 1 and the Minimum Number of Elements is 0.5 (Table 10.4). Based on this quantitative analysis a minimum of one adult *B. bison* is represented by the Level 7 assemblage. A deciduous mandibular 2<sup>nd</sup> premolar (Cat. #71S77E-19d) was recovered from unit 71S77E, indicating that at least one immature individual is also represented. While the recorded

depth of the tooth was 106 cm db, it was recovered from an area of possible rodent disturbance and its original provenience is therefore questionable.

The specimens used in the quantification of adult *B. bison* elements (Table 10.4) are entirely limb elements. A small number of tooth and vertebral fragments identifiable to *B. bison* were also recovered from Level 7. These specimens could not be identified with sufficient precision to be included in the Table 10.4 analysis.

**Table 10.4:** Adult *Bison bison* quantification by element for Level 7.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
2nd phalanx	-	-	-	3	3	1	0.4
3rd phalanx	-	-	-	1	1	1	0.1
Accessory carpal	1	-	-	-	1	1	0.5
Astragalus	1	-	-	-	1	1	0.5
Lateral maleolus	1	-	-	-	1	1	0.5
Fused central & 4th tarsal	1	-	-	-	1	1	0.5
Metacarpal	1	-	-	-	1	1	0.5
Proximal radius	-	1	-	-	1	1	0.5
Distal tibia	-	1	-	-	1	1	0.5

### 10.3.2 Miscellaneous Specimens

Level 7 contains 65 specimens identifiable to size class. The NISP for the Small Mammal (SC2) size class is 2. These specimens (Cat. #68S79E-52a) are two halves of a small rodent incisor that was split longitudinally. The fragments were recovered from unit 68S79E and may represent the presence of intrusive rodent activity that was not discernible in the soil. The NISP for the Very Large Mammal (SC6) size class is 34. The specimens identified include long bones, ribs, vertebra, ischial and cranial fragments. An immature individual is represented by a vertebral centrum fragment and matching unfused epiphyseal fragment (Cat. #71S78E-78b). The NISP for the Very Large to Large Mammal (SC5-6) size class is 2. These specimens are fragments of an indeterminate articular surface from a deer to bison-sized mammal.

## **10.4 Seasonality**

Although several immature faunal specimens were recovered, their specific ages at death could not be estimated. As a result, the seasonality of Level 7 cannot be determined due to a lack of sufficient floral and faunal evidence.

## **10.5 Features and Artifact Distribution**

Level 7 contains two features and two krotovina (Figure 10.4). The krotovina in unit 68S78E is the termination of a burrow that originated in Level 3 and was present throughout Levels 3, 4, 5a, 5b, 5c and 6. In Level 7 the krotovina extends north into unit 67S78E. The second krotovina is located between the northwest and northeast quadrants of unit 71S81E. It measures roughly 20 cm north to south and 10 cm west to east but does not interfere with the dark soil staining in Feature 7-2.

Feature 7-1 and 7-2 are areas of dark soil staining (Figure 10.4). Feature 7-1 is located in the southeast quadrant of unit 70S78E. Feature 7-2 is located in the western half of unit 71S81E and consists of one large stain adjacent to two smaller ones. The feature measures 65 cm north to south and 50 cm west to east.

Several areas of artifact concentration are present throughout the site area in Level 7. There are two units that each contain over 10% of the faunal assemblage. Unit 71S78E has 19% of the faunal specimens for the level and 68S80E contains 15% (Figure 10.5). The former is adjacent to Feature 7-1 and only three units west of Feature 7-2. The bulk of the lithic assemblage (55%) is also concentrated in and around this area of the site. Units containing lithic concentrations of over 10% include unit 71S77E (14%), 71S78E (15%), 71S79E (14%) and 70S79E (12%) (Figure 10.5). All four of these units are dominated by fire-cracked rock (Table 10.5); however, this is unsurprising as there are three times as many pieces of FCR as debitage in Level 7.

## **10.6 Interpretation of Level 7**

The Level 7 cultural occupation at the Cut Arm site is a small, discontinuous archaeological deposit. The cultural affiliation of the level cannot be determined. A relative date can be estimated based on the radiocarbon date of  $3,550 \pm 50$  cal B.P. for Level 6 and  $3,690 \pm 50$  cal B.P. for Level 6 (Table 3.3).

**Table 10.5:** Lithic types in artifact-dense units.

Unit	Lithic Type	Number of Items	Total
70S79E	FCR	12	13
	Secondary Flake	1	
71S77E	FCR	15	15
71S78E	FCR	17	17
71S79E	FCR	9	15
	Secondary Flake	3	
	Shatter	3	

The lithic assemblage in Level 7 is dominated by locally obtainable cherts, particularly Swan River Chert. As shatter and secondary flakes are the most common forms of debitage in the small assemblage, the lithic activities occurring in Level 7 appear to have been minor resharpening and repair. Level 7 does not contain any diagnostic tools. A granite abrader was recovered from unit 68S80E which coincides with a concentration of faunal specimens.

There is a concentration of fire-cracked rock between Feature 7-3 and Feature 7-4 in the southern extent of Block 4. The combination of FCR and the areas of dark soil staining suggest rocks were being heated for cooking.

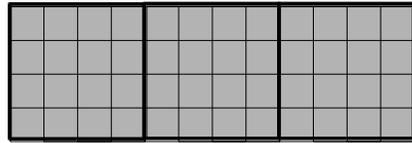
The faunal assemblage indicates that the site's occupants were utilizing *B. bison* and possibly other bison-sized mammals. The *B. bison* remains are dominated by distal limb elements. The elements identified to SC6 are largely axial and may also be *B. bison* specimens that were more thoroughly processed and therefore became less readily identifiable. A minimum of 1 mature *B. bison* and one immature *B. bison* are represented by the faunal assemblage. The two Small Mammal specimens are most likely intrusive, a conclusion that is supported by the rodent burrows in excavation Block 4. Overall, the size of the assemblage is quite small, indicating a short-term occupation by a limited number of individuals.



# Cut Arm Site (FbNp-22) - Level 7

BLOCK 5

BLOCK 4



59S71E 59S72E 59S73E

## LEGEND:

-  Faunal
-  Debitage
-  Tool
-  FCR
-  Rodent Disturbance
-  Dark Soil Staining
-  Rock
-  Not excavated

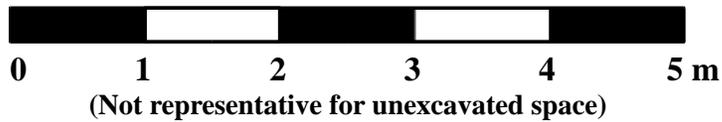
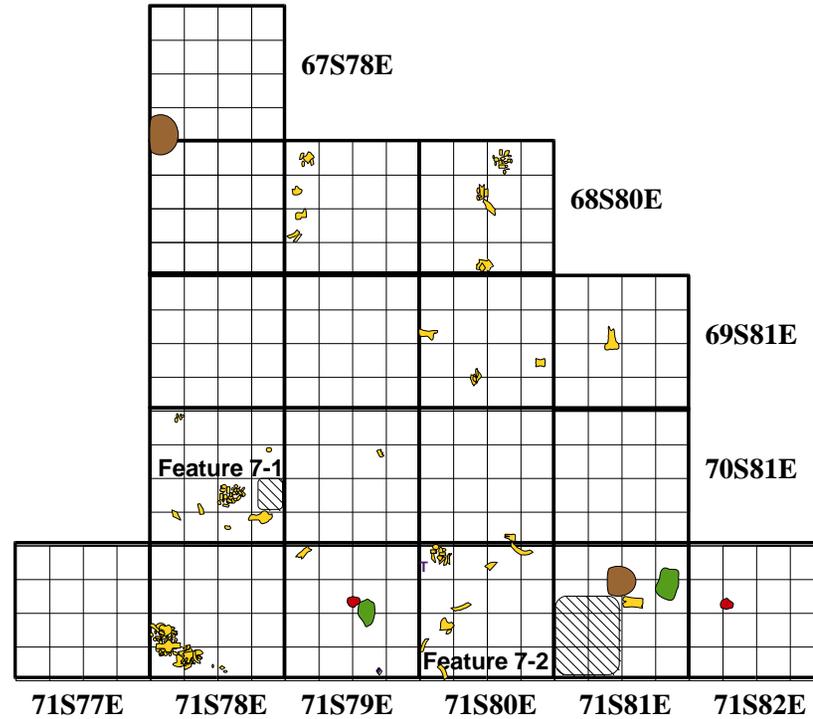


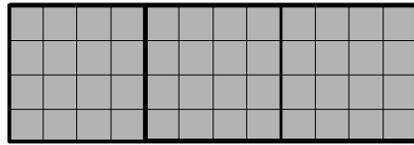
Figure 10.4: Artifact and feature distribution map for Level 7.



# Cut Arm Site (FbNp-22) - Level 7

BLOCK 5

BLOCK 4



59S71E 59S72E 59S73E

**LEGEND:**

-  Unit containing high percentage of faunal assemblage
-  Unit containing high percentage of lithic assemblage
-  Faunal
-  Debitage
-  Tool
-  FCR
-  Rodent Disturbance
-  Dark Soil Staining
-  Rock
-  Not excavated

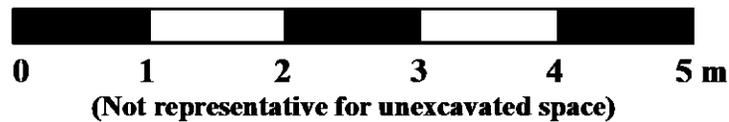
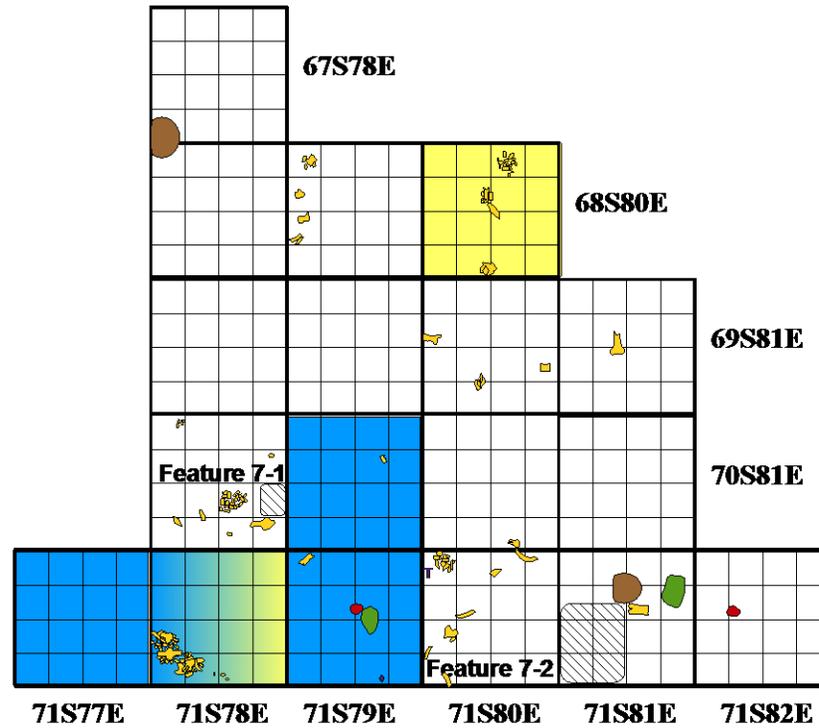


Figure 10.5: Units of artifact concentration for Level 7.

## **CHAPTER 11**

### **Cultural Level 8**

#### **11.1 Introduction**

Cultural Level 8 has a depth range of 103 cm -136 cm below the surface. This large variance in depth is due to the slope of the site to the southeast from the northwest as well as the presence of Feature 8-1 in unit 70S81E. The average thickness of the level is 7.5 cm and is more representative of the nature of the occupation. Level 8 is present in all units of excavation Block 4. The archaeological deposits in excavation Block 1, Block 2, Block 3 and Block 5 do not extend to the depth of Level 8. The cultural affiliation of Level 8 is the McKean series based on a McKean Lanceolate projectile point (Cat. #69S80E-55) recovered from unit 69S80E. This is confirmed by two radiocarbon dates placing the deposits at an age of between  $3,690 \pm 50$  cal B.P. and  $3,770 \pm 60$  cal B.P. (Table 3.3).

#### **11.2 Lithic Assemblage**

##### **11.2.1 Projectile Points**

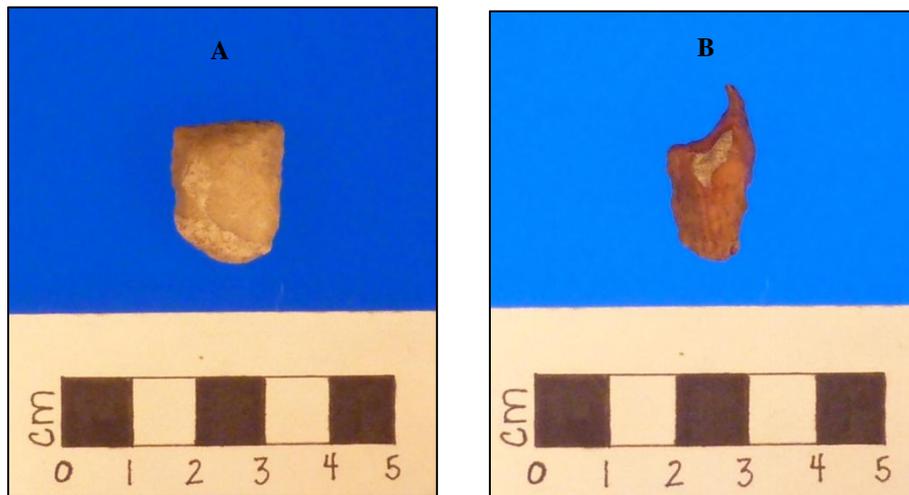
One McKean Lanceolate projectile point (Cat. #69S80E-55; Figure 11.1) was recovered from unit 69S80E at a depth of 114 cm db. The projectile point is made of heat-treated Swan River Chert and has a mass of 1.9 g. One of its basal corners is broken making it impossible to measure the basal width. The maximum width of the projectile point is 1.80 cm, the maximum length is 2.93 cm and the maximum thickness is 0.50 cm.

##### **11.2.2 Unifaces**

A porcellinite endscraper (Cat. #70S78E-89f; Figure 11.2 A) was recovered from unit 70S78E. The tool was found between 106 cm – 120 cm below the surface and has a mass of 2.6 g. It is 2.17 cm long, 1.70 cm wide and 0.61 cm thick. The overall shape of the endscraper is



**Figure 11.1:** McKean Lanceolate projectile point (Cat. #69S80E-55).



**Figure 11.2:** Level 8 unifacial tools. A- Cat. #70S78E-89f, B- Cat. #70S79E-121.

rectangular with straight distal and lateral margins and a convex proximal working edge. Its ventral surface is slightly concave and it has an asymmetrically convex dorsal surface.

A heat-treated, brown chert spokeshave (Cat. #70S79E-121; Figure 11.2 B) was recovered from unit 70S79E, 105 cm – 115 cm below the surface. The tool is ventrally slightly concave, dorsally convex and has convex lateral margins forming a rounded proximal end. The distal end was unilaterally flaked to create an asymmetrical, concave notch. The maximum

length of the spokeshave is 2.57 cm, its maximum width is 1.27 cm and its thickness is 0.59 cm. Spokeshaves are typically wood-working tools used for scraping and shaving tasks; however, it is possible Artifact #70S79E-121 may have been utilized for other purposes as well.

### 11.2.3 Debitage

The Level 8 lithic debitage assemblage contains 72 flakes and pieces of shatter (Table 11.1). Secondary flakes are the most common type of debitage and represent 62.50% of the assemblage. Shatter is the next most common with 19.44%, followed by secondary decortification flakes with 13.89% and primary decortification flakes with 1.39%. Swan River Chert is the dominant lithic material type (54.17%) in the Level 8 debitage assemblage (Table 11.1). Artifact #69S81E-83 is a chert cobble that has had a few large flakes removed to test its potential as a lithic material source (Figure 11.3). The cobble supports the trend seen in the rest of the debitage assemblage that the site's occupants were exploiting primarily local lithic materials. Other than Swan River Chert, 12.50% of the debitage is made of quartz, 9.72% is made of grey chert and 6.94% is white chert. The remaining 16.67% consists of seven lithic material types including one jasper secondary flake and two Knife River Flint secondary decortification flakes.



**Figure 11.3:** Chert cobble (Cat. #69S81E-83).

**Table 11.1:** Lithic debitage from Level 8.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Quartzite				1	1	1.39%
Cathead Chert				1	1	1.39%
Chalcedony	-	-	1	-	1	1.39%
Chert	-	-	2	2	4	5.56%
Grey Chert	-	3	2	2	7	9.72%
Jasper	-	-	1	-	1	1.39%
Knife River Flint	-	2	-	-	2	2.78%
Quartz	1	-	4	4	9	12.50%
Quartzite	-	1	1	-	2	2.78%
Swan River Chert	-	4 (H/T: n=2)	30 (H/T: n=17)	5 (H/T: n=4)	39	54.17%
White Chert	-	-	4	1	5	6.94%
<b>Total</b>	<b>1</b>	<b>10</b>	<b>45</b>	<b>14</b>	<b>72</b>	<b>100%</b>
<b>Percent</b>	<b>1.39%</b>	<b>13.89%</b>	<b>62.50%</b>	<b>19.44%</b>	<b>100%</b>	

**Table 11.2:** Fire-cracked rock from Level 8.

<b>Material Type</b>	<b>Number of Pieces</b>	<b>Mass (g)</b>	<b>Percent by Count</b>	<b>Percent by Mass (g)</b>
Granite	1110	12616.9	99.20%	94.67%
Indeterminate	7	689.1	0.63%	5.17%
Sandstone	2	20.7	0.18%	0.16%
<b>Total</b>	<b>1119</b>	<b>13326.7</b>	<b>100%</b>	<b>100%</b>

#### 11.2.4 Fire-Cracked Rock

A total of 1119 pieces of fire-cracked rock with a mass of 13326.7 g were recovered from Level 8 (Table 11.2). Granite represents 94.67% of the FCR for the level by mass.

Indeterminate lithic material types account for 5.17% of the assemblage by mass, while sandstone accounts for 0.16% by mass.

### 11.3 Botanical Assemblage

Level 8 contains 260 pieces of charcoal with a mass of 4.0 g. One hundred and sixty six of the pieces (64%) were recovered from Feature 8-2 in unit 70S81E. No other plant remains were recovered.

### 11.4 Faunal Assemblage

There are 3630 specimens in the Level 8 faunal assemblage with a total mass of 1326.1 g (Table 11.3). Unidentifiable fragments represent 63.66% of this assemblage and consist of 83% unburned bone, 10% burned bone and 6% unburned tooth enamel. A small number of calcined bone fragments account for under 1% of the unidentified assemblage. Identifiable specimens represent 36.34% of the faunal remains. The majority (94%) of the identifiable specimens are unburned bone. Burned bone accounts for 5% of the identifiable assemblage and unburned tooth enamel accounts for roughly 1%.

As in the other levels of the Cut Arm site, the identifiable specimens have been assigned to a genus and species whenever possible. If there was insufficient information to determine a specimen's specific taxonomic designation size classes have been used to categorize the remains. Level 8 contains specimens belonging to *Bison bison* as well as the Very Large Mammal (SC6) size class, the Very Large to Large Mammal (SC5-6) size class and the Small Mammal (SC2) size class (Table 11.4). A strong argument can be made that the fragments identified as Very Large Mammal, and even Very Large to Large Mammal, are *Bison bison*. The specimens were found in close association with *B. bison* remains and there is no evidence in Level 8 for the presence of other large or very large mammals.

Direct evidence for human modification in the faunal assemblage is present on a fragmented thoracic vertebra (Cat #70S81E-68). The specimen is from an immature bison and has a short cut mark on its cortical surface. Taphonomic alterations in the assemblage include rodent gnawing, root etching and trowel trauma. Rodent tooth marks are visible on one immature Very Large Mammal thoracic vertebra fragment (Cat. #70S80E-97a). Discoloration is present on a Very Large Mammal 2<sup>nd</sup> phalange fragment (Cat. #71S78E-87) that appears to have been the result of bleaching from extended sun exposure during excavation.

**Table 11.3:** Faunal counts for Level 8.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	235	88.1	60	33.0
Calcined Bone	11	0.3	-	-
Unburned Bone	1922	1256.0	1242	8782.4
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	143	34.7	17	131.6
Total	2311	1379.1	1319	8947.0

**Table 11.4:** Faunal taxa for Level 8.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	1097	2	1.0
Small Mammal	3	N/A	N/A
Very Large Mammal	162	N/A	N/A
Very Large or Large Mammal	57	N/A	N/A

### 11.4.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens for *Bison bison* in Level 8 is 1097 with a mass of 6135.6 g (Table 11.4). This accounts for approximately 83% of the identified faunal assemblage. A quantitative analysis of the adult *B. bison* remains by element was performed (Table 11.5). The analysis found that the Minimum Number of Individuals is 2 and the Minimum Number of Elements is 1.0. This indicates that at least two adult *Bison bison* are represented by the remains from Level 8. At least one immature individual is also represented by the assemblage based on the presence of 46 immature vertebral fragments.

Cranial fragments account for 91.16% of the specimens identified as *B. bison*. The fragments were recovered from the northeast quadrant of unit 68S78E. Burned fragments account for 6% of these fragments and 100% of the identifiable burned specimens in Level 8. The difficulty of identifying cranial fragments to specific, sided elements prevents the inclusion of these specimens in the quantitative analysis of MNI and MNE. In addition, several *B. bison*

**Table 11.5:** Adult *Bison bison* quantification by element for Level 8.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	1	1	1	0.1
2nd phalanx	-	-	-	2	2	1	0.3
Metatarsal	-	1	-	-	1	1	0.5
Proximal radius	-	1	-	-	1	1	0.5
Distal humerus	1	-	-	-	1	1	0.5
Patella	1	-	-	-	1	1	0.5
Tibia	-	1	-	-	1	1	0.5
Scapula	-	2	-	-	2	2	1.0
5th lumbar vertebra	-	-	1	-	1	1	1.0
Proximal sacrum	-	-	1	-	1	1	1.0
1st incisor	1	1	-	-	2	1	1.0
2nd incisor	1	1	-	-	2	1	1.0
3rd incisor	1	1	-	-	2	1	1.0
Mandibular 1st premolar	-	-	-	1	1	1	0.5
Mandibular 2nd premolar	-	1	-	-	1	1	0.5
Mandibular 3rd premolar	1	-	-	-	1	1	0.5
Mandibular 4th premolar	-	1	-	-	1	1	0.5
Mandibular 1st molar	-	1	-	-	1	1	0.5
Mandibular 2nd molar	-	1	-	-	1	1	0.5
Mandibular 3rd molar	-	1	-	-	1	1	0.5
Mandible	-	1	-	-	1	1	0.5

teeth were recovered that could be sided but not identified to tooth number. This could again lead to a deceptively low MNI and MNE.

An age at death estimate was possible for Artifact #71S77E-24a (Figure 11.4). The specimen is a complete right mandible containing the 4<sup>th</sup> premolar, 1<sup>st</sup> molar, 2<sup>nd</sup> molar and 3<sup>rd</sup> molar. The metaconid height for the 1<sup>st</sup> molar cannot be measured due to a broken cusp. The tooth is in full wear with the prefossette and postfossettes visible and only starting to narrow and the exostylid in wear. Based on the state of wear, the individual was 5.5 years of age at the time of death (E. G. Walker, personal communication 2012).



**Figure 11.4:** *Bison bison* right mandible with P4, M1, M2 and M3, lateral view (Cat. #71S77E-24a).

#### 11.4.2 Miscellaneous Specimens

The Small Mammal (SC2) size class is represented by three specimens (Table 11.4). The specimens were recovered from the northeast quadrant of unit 70S79E. The remains are from a ground squirrel-sized mammal and include two mandible fragments (Cat. #70S79E-127b) as well as one rib fragment (Cat. #70S79E-127d). The Very Large to Large Mammal size class has an NISP of 57 (Table 11.4). The majority (58%) of these specimens are small innominate fragments. The other 42% of the SC5-6 specimens are rib shaft fragments.

The NISP for the Very Large Mammal (SC6) size class is 162 (Table 11.4). A minimum of one immature individual is represented based on the presence of 20 immature vertebral fragments including those identifiable as cervical, thoracic and lumbar. There are 100 rib fragments in the SC6 assemblage. In examining the remains by their size it is clear that the large number of rib fragments is not the result of intensive processing. Only 4% of the rib fragments are under 5.0 cm in size and the remaining 96% are 5.0 cm long or larger. Also present in the SC6 assemblage are mature vertebral fragments representing 24 of the 162 identified specimens. The degree of fragmentation of the vertebral specimens is low. Roughly 92% of the specimens

are larger than 5.0 cm and only 8% are smaller than 5.0 cm. Also present in the SC6 assemblage are long bone fragments, cranial fragments, a scapula fragment, a carpal fragment and a phalange fragment.

### 11.5 Seasonality

The seasonality for the Level 8 occupation at the Cut Arm site cannot be determined. This is because there were no floral remains recovered and the immature faunal remains present cannot be identified with sufficient precision to estimate their specific age at death.

### 11.6 Features and Artifact Distribution

There are several areas of artifact concentration in Level 8. The spatial distribution of the lithic debitage and tools was examined separately from the fire-cracked rock because of the large amount of the latter present in the level. The majority (81.2%) of the fire-cracked rock was recovered from four units in excavation Block 4 (Table 11.6). Unit 70S81E has a concentration of 26.30% of the Level 8 FCR, while unit 68S80E contains 24.50%, unit 71S77E contains 17.50% and unit 71S81E contains 12.90%. The lithic tools and debitage are concentrated in

**Table 11.6:** Highest concentrations of FCR by unit in Level 8.

Unit	Mass (g)	Percentage
70S81E	3510.6	26.30%
68S80E	3260.3	24.50%
71S77E	2326.2	17.50%
71S81E	1725.4	12.90%

units 70S78E, 70S79E and 70S80E (Table 11.7, Figure 11.7). A small number of the items represented in these units are shatter and decortification flakes; however, the artifacts are dominated by secondary flakes. Both the endscraper (Cat. #70S78E-89f) and the spokeshave (Cat. #70S79E-121) were also recovered from within this three-unit area of lithic concentration.

The spatial distribution of the Level 8 faunal assemblage was examined by both number of items and by mass. The unit with the highest concentration of faunal remains by number of specimens is unit 68S78E with 35.1% (Figure 11.7). The second largest concentration by

number of items is unit 70S80E with 9.3% of the faunal assemblage. By mass, unit 70S81E has the greatest percentage of the faunal assemblage with 36.6% (Figure 11.7). The unit with the second highest concentration (by mass) is unit 71S77E in the southwest corner of Block 4.

**Table 11.7:** Lithic types in artifact-dense units.

Unit	Lithic Type	Number of Items	Total	Percent (of total debitage and tools)
70S78E	Secondary Flake	8	10	13.33%
	Endscraper	1		
	Shatter	1		
70S79E	Secondary Flake	10	16	21.33%
	Secondary Flake Decortification Flake	4		
	Spokeshave	1		
	Shatter	1		
70S80E	Secondary Flake	9	12	16.00%
	Shatter	2		
	Secondary Decortification Flake	1		

The faunal concentration identified in units 70S80E and 70S81E are the result of the bone bed feature, Feature 8-1, in this area of the site (Figure 11.4, Figure 11.6). Feature 8-1 consists primarily of Very Large Mammal rib and vertebral fragments. The thoracic vertebra fragment (Cat. #70S81E-68) with a cut mark that is described in section 11.3 was also recovered from within Feature 8-1. The McKean lanceolate projectile point (Cat. #69S80E-55) was recovered from the edge of this feature in unit 68S81E.

Overlapping with Feature 8-1 is Feature 8-2 (Figure 11.5, Figure 11.6). Feature 8-2 is a circular area of dark stained soil containing charcoal and fire-cracked rock as well as burned and unburned bone fragments. The depth range of the feature is 109 cm - 135 cm dbfs and is located beneath the eastern edge of Feature 8-1. Features 8-3 and 8-4 are also circular, contained areas of dark stained soil (Figure 11.6). Feature 8-4 has a rounded, pit-shaped outline and contains burned and calcined bone fragments, charcoal, two pieces of debitage and a small amount of FCR. It is directly east of several large rocks, one of which is burned on its exterior surface.



**Figure 11.5:** Feature 8-1 bone bed in unit 70S81E at 125 cm dbs.



**Figure 11.6:** Feature 8-2 charcoal stain in east quadrants (bottom) of unit 70S81E.

Feature 8-4 has a minimum depth of 103 cm and extends down to a maximum of 122 cm db. Feature 8-3 has a depth range of 112 cm – 116 cm below the surface. Charcoal, burned and unburned bone fragments were recovered from within the feature. It is likely that Feature 8-4 and Feature 8-3 are the remains of hearths in the southern and southwestern extents of the site area.

### **11.7 Interpretation of Level 8**

Level 8 at the Cut Arm site represents a substantial archaeological deposit. There are a larger number of features present compared with the upper levels of the site as well as a larger faunal assemblage. The faunal remains include a minimum of two adult and one juvenile *Bison bison* and a large number of both mature and immature Very Large Mammal specimens. Unlike several of the upper levels in the site, Level 8 is not dominated by distal limb elements. The majority of the *B. bison* and SC6 assemblage are cranial fragments, vertebral fragments and rib fragments. The rib and vertebra fragments are not highly fragmented. This indicates that they were broken during butchering to obtain the meat in the body portion of the animals, but not utilized for the nutritional content of the marrow. The cranial fragments are more fragmented and have a higher percentage exhibiting signs of burning. This may indicate that the edible portions of the head were prepared during butchering of the remainder of the animal. Two specimens from a ground squirrel-sized Small Mammal may also have been utilized as a food resource; however, the animal may be intrusive and non-cultural.

The lithic assemblage in Level 8 consists of primarily secondary flakes and local lithic materials. Three pieces of debitage made of exotic materials indicate that some tools were made of non-local materials and that the site's occupants were maximizing the life of tools made from these hard to obtain materials.

Level 8 at the Cut Arm site appears to have been a processing locale. This conclusion is supported by multiple findings in the level. The presence of three hearth features surrounded by concentrations of faunal and lithic artifacts indicates that they were the main areas of activity in Level 8. There is no evidence for the presence of structures that would have been present in a habitation site. The dominance of secondary flakes in the assemblage indicates that very little if any tool manufacture was occurring. It appears instead that pre-existing tools were being resharpened as they became dull with use. This would be a necessary and important part of

processing activities. The two tools and one projectile point recovered were either broken or small in size from having been reworked, suggesting they were exhausted and intentionally disposed of. Finally, the faunal assemblage indicates that butchering of animal remains for meat was a major activity at the site, a pattern that would be typical for a processing locale.

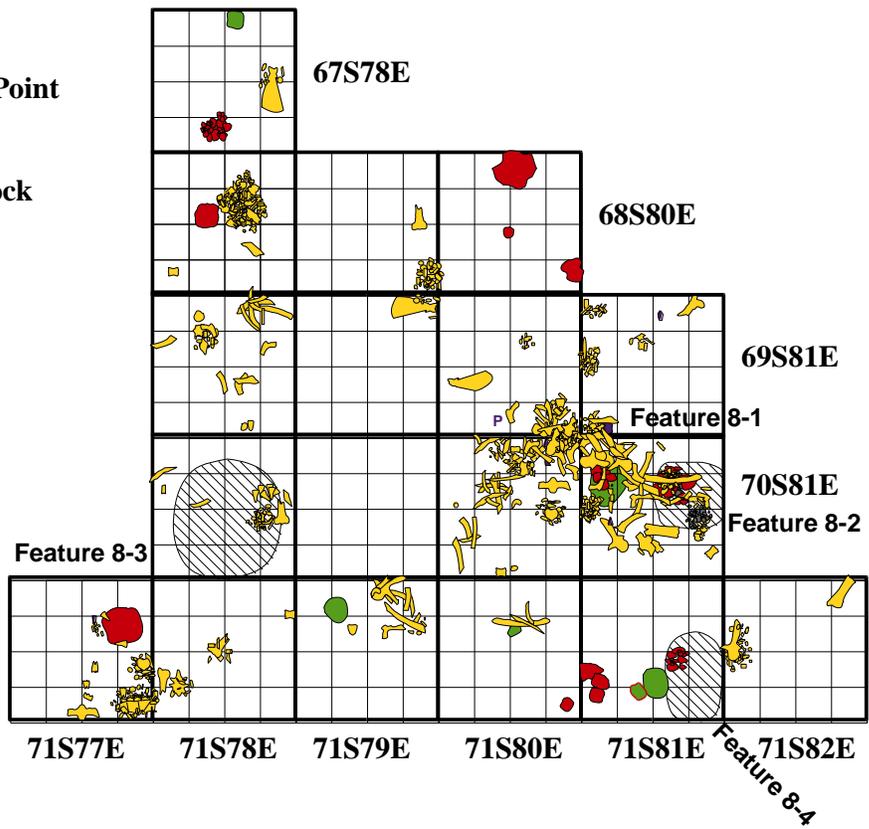
# Cut Arm Site (FbNp-22) - Level 8



**LEGEND:**

**BLOCK 4**

- Faunal
- Debitage
- P Projectile Point
- FCR
- Burned Rock
- Charcoal
- Dark Soil
- Staining
- Rock



(Not representative for unexcavated space)  
Blocks 1, 2, 3 and 5 not excavated

**Figure 11.7:** Artifact and feature distribution map for Level 8.

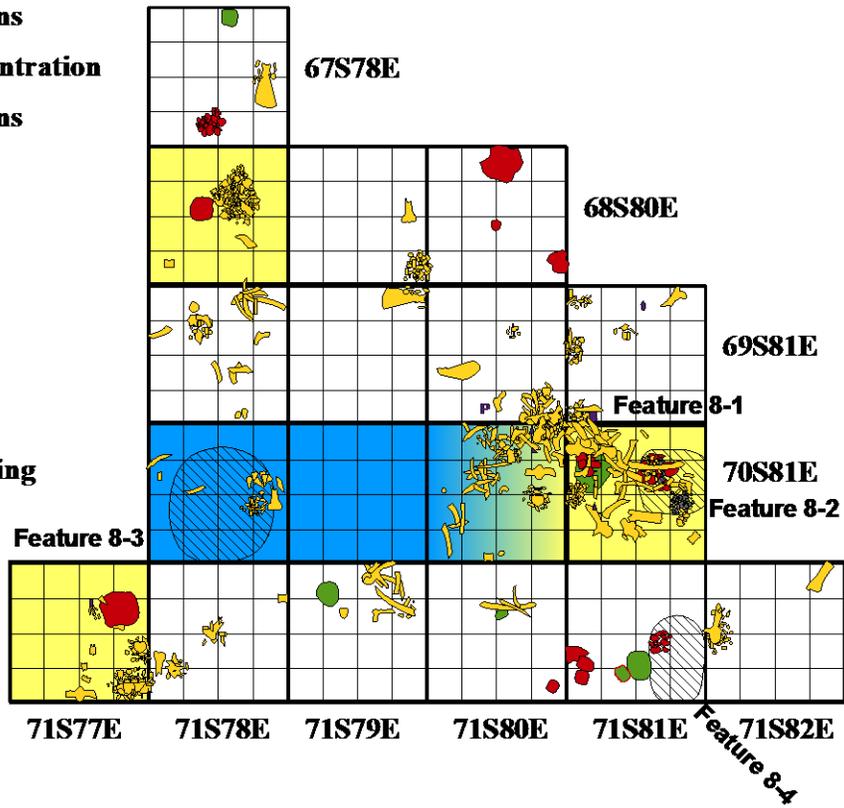
# Cut Arm Site (FbNp-22) - Level 8



**LEGEND:**

- Unit with concentration of faunal remains
- Unit with concentration of faunal remains
- Faunal
- Debitage
- Projectile Point
- FCR
- Burned Rock
- Charcoal
- Dark Soil Staining
- Rock

**BLOCK 4**



(Not representative for unexcavated space)  
 Blocks 1, 2, 3 and 5 not excavated

Figure 11.8: Units of artifact concentration for Level 8.

## **CHAPTER 12**

### **Cultural Level 9**

#### **12.1 Introduction**

Cultural Level 9 is present in all units of excavation Block 4. The level ranges in depth from 123 cm – 179 cm depth below the surface. This substantial range in depth is due to the slope of the site from the northwest down towards the southeast. The average thickness of the level is only 6 cm and provides a more accurate representation of the nature of the archaeological deposits. The level can be confidently attributed to the Oxbow complex based on the presence of an Oxbow projectile point (Cat. #71S82E-57) recovered from unit 71S82E. This is confirmed by a radiocarbon date of  $4270 \pm 55$  cal B.P. (Table 3.3).

#### **12.2 Lithic Assemblage**

##### **12.2.1 Projectile Points**

An Oxbow projectile point (Cat. #71S82E-57; Figure 12.1) was recovered from a depth of 130 cm below the surface in unit 71S82E. It has a length of 2.63 cm, a maximum width of 1.65 cm, is 1.46 cm wide at the notches and is 0.40 cm thick. The point is made of grey chert and is complete.

##### **12.2.2 Debitage**

The lithic debitage assemblage consists of 18 flakes and pieces of shatter (Table 12.1). Secondary flakes represent 38.89% of the Level 9 debitage with 7 items. Six pieces of shatter were recovered and represent 33.33% of the assemblage. Four secondary decortification flakes account for 22.22% of the debitage and one primary decortification flake accounts for 5.56%.

Grey chert is the most common (22.22%) lithic material type (Table 12.1). Cathead chert, chalcedony, quartz and Swan River chert each consist of 11.11% of the assemblage. The other 33.36% of the Level 9 debitage consists of six different material types. This includes one



**Figure 12.1:** Oxbow projectile point (Cat. #71S82E-57).

**Table 12.1:** Lithic debitage from Level 9.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Cathead Chert	-	1	-	1	2	11.11%
Chalcedony	1	-	-	1	2	11.11%
Chert	-	-	1	-	1	5.56%
Grey Chert	-	-	3	1	4	22.22%
Jasper	-	1	-	-	1	5.56%
Quartz	-	-	1	1	2	11.11%
Quartzite	-	-	-	1	1	5.56%
Silicified Peat	-	-	-	1	1	5.56%
Siltstone	-	1	-	-	1	5.56%
Swan River Chert	-	1 (H/T: n=1)	1 (H/T: n=1)	-	2	11.11%
White Chert	-	-	1	-	1	5.56%
<b>Total</b>	<b>1</b>	<b>4</b>	<b>7</b>	<b>6</b>	<b>18</b>	<b>100%</b>
<b>Percent</b>	<b>5.56%</b>	<b>22.22%</b>	<b>38.89%</b>	<b>33.33%</b>	<b>100%</b>	

secondary decortification flake of jasper as well as two heat-treated flakes of Swan River Chert. A dependence on locally obtainable materials is clearly evident. These materials appear to have been supplemented by carefully curated exotics obtained through long-distance trade networks.

### 12.2.3 Fire-Cracked Rock

A total of 427 pieces of fire-cracked rock with a mass of 848.0 g were recovered. Schist accounts for 2.80% of the FCR in Level 8 while granite accounts for the remaining 97.20%.

**Table 12.2:** Faunal counts for Level 9.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	1	0.4	-	-
Calcined Bone	3	0.3	-	-
Unburned Bone	511	217.4	38	978.1
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	27	11.5	15	151.4
Total	542	229.6	53	1129.5

**Table 12.3:** Faunal taxa for Level 9.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	28	2	1.0
Very Large Mammal	23	N/A	N/A
Very Large or Large Mammal	2	N/A	N/A

### 12.3 Faunal Assemblage

The Level 9 faunal assemblage consists of 595 specimens with a mass of 1359.1 g. Unidentifiable fragments account for 91.09% of the faunal assemblage (Table 12.2). The majority (94%) of the unidentifiable remains are unburned bone, but also include unburned tooth enamel (5%), calcined bone (1%) and burned bone (under 1%). Identifiable remains account for 8.91% of the Level 9 faunal assemblage (Table 12.2). Seventy-two percent of the identifiable remains are unburned bone while the remaining 28% are unburned tooth enamel. Those

specimens that could not be identified to genus or species were attributed to a size class whenever possible. As a result specimens belonging to *Bison bison*, Very Large Mammal (SC6) and Very Large to Large Mammal (SC5-6) were identified (Table 12.3). There is no evidence to suggest the presence of large or very large mammals in the assemblage other than *B. bison*. It is therefore likely that the specimens identified to SC6 and SC5-6 are from bison and are too incomplete to identify fully.

Evidence of human modification is present in a cut mark on a vertebra epiphyseal fragment (Cat. #70S79E-150c). The fragment was recovered from unit 70S79E and is from a juvenile Very Large Mammal (SC6). Taphonomic alterations present in the faunal assemblage include root etching and trowel trauma. The latter is present on two *Bison bison* cranial fragments, while the former is present on 6% of all faunal specimens.

### 12.3.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens for *Bison bison* is 28 with a mass of 1035.7 g (Table 12.3). These specimens account for roughly 53% of the identified faunal remains in Level 9. Based on the results of the quantitative analysis by element in Table 12.4 the Minimum Number of Individuals is 2 and the Minimum Number of Elements is 1.0. This indicates that at least two adult *B. bison* are represented by the faunal assemblage. The mature *B. bison* specimens in Level 9 are not predominantly from one particular part of the animal. The elements represented include cranium, maxilla, vertebra, phalanges and humeri. At least one immature individual is also represented (Table 12.5) based on the presence of several immature specimens including three vertebral fragments (Cat. #69S79E-98a; Cat. #70S79E-150a), a 3<sup>rd</sup> maxillary molar fragment (Cat. #70S79E-146) and a fragmented right maxilla (Cat. #69S79E-99).

Artifact #69S79E-99 is the only specimen in Level 9 for which an age at death estimate can be made (Figure 12.2). The specimen consists of a fragmented right maxilla, a deciduous 4<sup>th</sup> premolar, and permanent 2<sup>nd</sup> premolar, 3<sup>rd</sup> premolar, 4<sup>th</sup> premolar, 1<sup>st</sup> molar, 2<sup>nd</sup> molar and 3<sup>rd</sup> molar. Neither the 2<sup>nd</sup> or 3<sup>rd</sup> premolars are fully erupted and the deciduous 4<sup>th</sup> premolar is in the process of being replaced by the permanent 4<sup>th</sup> premolar. The deciduous 4<sup>th</sup> premolar is heavily cupped and all fossetids are nearly lost. The 1<sup>st</sup> molar exostylid has undergone wear and as a result is 4 mm. The 2<sup>nd</sup> molar is erupted and in wear while the 3<sup>rd</sup> molar is not fully erupted.



**Figure 12.2:** *Bison bison* right maxilla with mixed dentition, lateral view (Cat. #69S79E-99).

**Table 12.4:** Adult *Bison bison* quantification by element for Level 9.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
2nd phalanx	-	-	-	2	2	1	0.3
Internal carpal	-	1	-	-	1	1	0.5
Distal humerus	-	1	-	-	1	1	0.5
Maxillary 2nd premolar	2	-	-	-	2	2	1.0
Occipital	-	-	1	-	1	1	1.0
Petrous temporal	1	1	-	-	2	1	1.0

**Table 12.5:** Immature *Bison bison* quantification by element for Level 9.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
Maxillary 2nd premolar	-	1	-	-	1	1	0.5
Maxillary 3rd premolar	-	1	-	-	1	1	0.5
Maxillary 4th premolar	-	1	-	-	1	1	0.5
Maxillary 4th premolar deciduous	-	1	-	-	1	1	0.5
Maxillary 1st molar	-	1	-	-	1	1	0.5
Maxillary 2nd molar	-	1	-	-	1	1	0.5
Maxillary 3rd molar deciduous	1	1	-	-	2	1	1.0

The stage of tooth eruption combined with the degree of dental wear indicates that this individual was roughly 2.5 years of age at death (E. G. Walker, personal communication 2012).

### 12.3.2 Miscellaneous Specimens

The Number of Identified Specimens for the Very Large to Large Mammal (SC5-6) size class is 2 (Table 12.3). The specimens are two cranial fragments, one of which is an alveolar fragment. The NISP for the Very Large Mammal (SC6) size class is 23 (Table 12.3). Immature vertebral fragments represent 82.61% of the Very Large Mammal assemblage. Seven of the 19 immature specimens were from a single fragmented cervical vertebra which was reconstructed. The other 17.39% of the Very Large Mammal specimens include a left ischium fragment, a left ilium fragment, a petrous temporal fragment and an indeterminate tooth fragment.

### 12.4 Seasonality

Seasonality cannot be determined for the Level 9 occupation at the Cut Arm site. Although immature faunal specimens were recovered there are too few to make an estimate in regards to the seasonality of occupation.

## 12.5 Features and Artifact Distribution

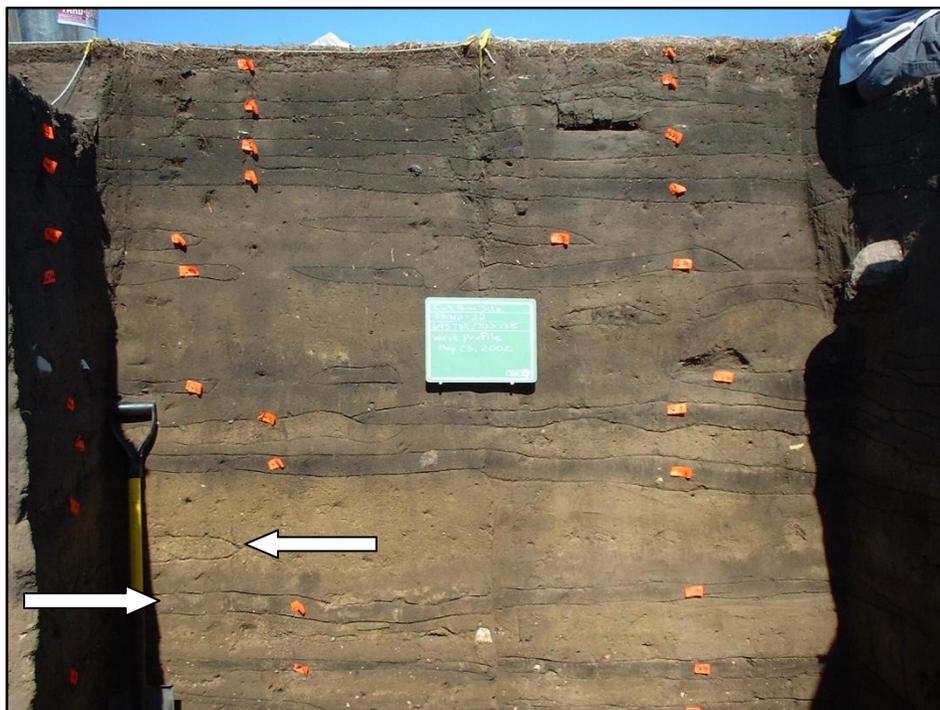
No features were present in Level 9 at the Cut Arm site. No lithic or faunal artifacts concentrations are apparent from those artifacts that were mapped using three-point provenience (Figure 12.3). When the entire assemblage is examined by number of items in each unit, small areas of concentration are visible (Figure 12.5). The majority of the fire-cracked rock in Level 9 was found concentrated (93.67%) in unit 71S80E. Other lithics were recovered primarily from within units 71S79E and 71S78E (Table 12.6). Unit 71S79E contains 16% of the lithic assemblage and unit 71S78E contains 21%. The majority of the Level 9 faunal remains are concentrated in units 70S78E, 70S79E and 70S80E (Figure 12.5). These units are directly north and adjacent to the lithic concentration. Unit 70S79E contains 137 specimens, or 23% of the faunal assemblage. Unit 70S78E contains 118 specimens (20%) and 102 specimens (17%) were recovered from unit 70S80E.

**Table 12.6:** Lithic types by unit.

Unit	Debitage	Number of Items	Total	Percentage
68S80E	Shatter	1	1	5%
69S79E	Secondary Decortification Flake	1	1	5%
70S81E	Shatter	1	1	5%
71S81E	Secondary Flake	1	1	5%
71S82E	Secondary Flake	1	2	11%
	Oxbow projectile point	1		
69S78E	Shatter	1	2	11%
	Secondary Decortification Flake	1		
70S78E	Secondary Flake	2	2	11%
70S80E	Shatter	1	2	11%
	Secondary Flake	1		
71S79E	Secondary Flake	2	3	16%
	Secondary Decortification Flake	1		
71S78E	Primary Decortification Flake	1	4	21%
	Secondary Decortification Flake	1		
	Shatter	2		

## 12.6 Interpretation of Level 9

Level 9 is present in the southeast portion of the Cut Arm site in the area designated as excavation Block 4. Based on the distribution of artifacts the majority of activity appears to have occurred in the southwest units of the block. The lithic assemblage is not extensive; however, it does include a complete Oxbow projectile point. The debitage assemblage indicates that local lithic materials were utilized as well as non-local jasper. A dependence on local materials is typical for the Oxbow complex and lends support to the attribution of Level 9 to this archaeological culture. The faunal assemblage is sparse in comparison to that seen in Level 8 and is constituted by different elements. Level 9 contains a high percentage of immature remains. A substantial portion of the identifiable remains are teeth, cranial and mandibular fragments. Despite the limited size of the faunal assemblage, at least two mature and one immature *B. bison* are represented based on the calculation of MNI.



**Figure 12.3:** Stratigraphic profile of west wall of units 69S78E (right) and 70S78E (left). Top arrow points to gravel lens, lower arrow points to Level 9.

Overall, Level 9 at the Cut Arm site is a puzzling assemblage. Much of the evidence and lack thereof is contradictory. For example, the presence of a complete projectile point is balanced by a lack of any other tools. The type of debitage with the highest number of items is secondary flakes, but there was also a small number of each type of debitage recovered. Despite the lithic assemblage being quite small, an exotic flake from an intermediate stage of tool production was recovered. In regards to the faunal assemblage it is also not large; however, remains of two adult *B. bison* are present. The elements represented are not those that would be expected to be intentionally transported repeatedly from kill to processing to habitation site. The cranial elements are somewhat fragmented which could indicate processing activities. Unfortunately, a processing site interpretation is not supported due to the absence of features, lack of tools, and small amount of secondary flakes and shatter.

It appears possible that the dichotomy seen in the Level 9 assemblage is due to partial degradation of the deposits by erosion and slope instability. Based on a detailed sedimentological analysis of archaeological sites in and around the Opimihaw Creek valley, Rutherford (2004) states that an “interval of frequent hillslope erosion and sedimentation occurred in both valleys [South Saskatchewan River valley and the Opimihaw Creek valley] between approximately 4.5 ka B.P. and 3.5 ka B.P.”. The occurrence of increased slope activity around the time of the Level 9 cultural occupation is supported by the presence of a gravel lens (Figure 12.3) that was recorded in the profile of unit 70S78E between Level 9 and Level 8. Furthermore, root etching is minimal in the faunal assemblage of Level 9. This may be expected during times of slope instability when less grass growth would have occurred. If this is the case, Level 9 can be interpreted as a short-term Oxbow complex occupation that is incomplete due to natural erosional.

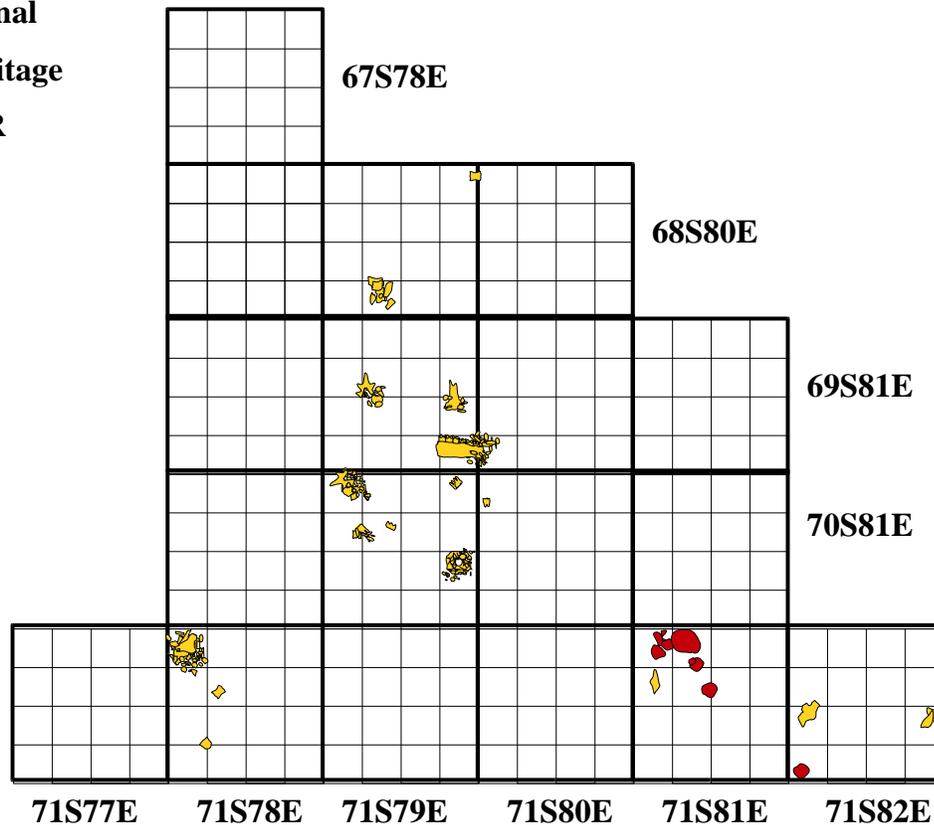
# Cut Arm Site (FbNp-22) - Level 9



## BLOCK 4

### LEGEND:

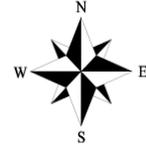
-  Faunal
-  Debitage
-  FCR



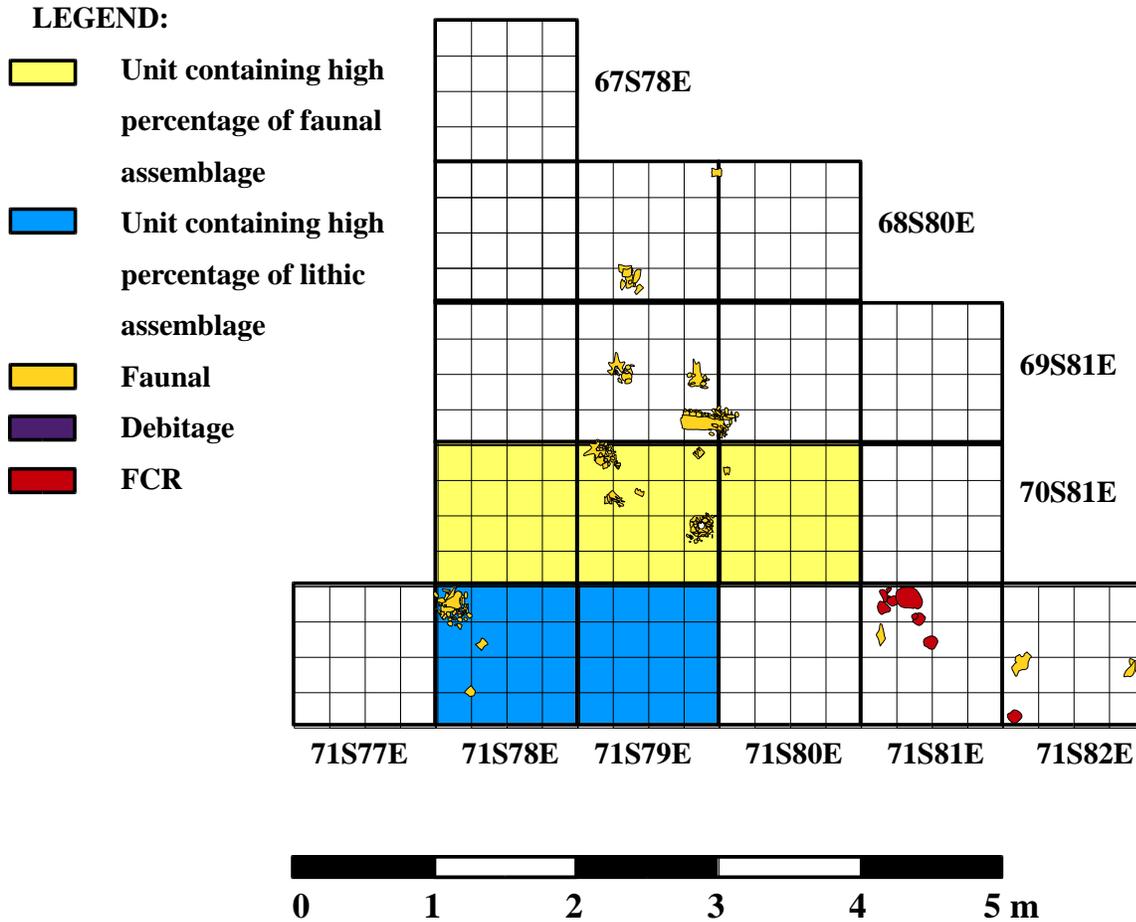
(Not representative for unexcavated space)  
Blocks 1, 2, 3 and 5 not excavated

Figure 12.4: Artifact and feature distribution map for Level 9.

# Cut Arm Site (FbNp-22) - Level 9



## BLOCK 4



(Not representative for unexcavated space)  
 Blocks 1, 2, 3 and 5 not excavated

**Figure 12.5:** Units of artifact concentration for Level 9.

## **CHAPTER 13**

### **Cultural Level 10**

#### **13.1 Introduction**

Level 10 at the Cut Arm site ranges in depth from 147 cm - 198 cm depth below the surface. The substantial depth range is due to the slope of the site from the northwest towards the southeast. The average thickness of the level is only 7 cm and is a more accurate representation of the archaeological deposit. No radiocarbon dates were obtained for Level 10. An unidentifiable Early Side-Notched projectile point (Cat. #71S79E-119) was recovered from unit 71S79E, indicating an Early Middle Precontact period occupation.

#### **13.2 Lithic Assemblage**

##### **13.2.1 Projectile Points**

An Early Side-Notched projectile point (Cat. #71S79E-119; Figure 13.1) made of Knife River Flint was recovered from unit 71S79E at a depth of 169 cm below the surface. It is 0.42 cm thick, 3.76 cm long and has a maximum width of 2.16 cm. The base of the point is broken off and missing, making a measurement of the width at the notches as well as a more specific identification impossible.

##### **13.2.2 Retouched Flakes**

Artifact #71S81E-90b is a small secondary flake fragment exhibiting unifacial retouch on its dorsal surface. The fragment is made of brown chert and has a mass of 0.1 g. It was recovered from 166 cm below the surface in unit 71S81E.



**Figure 13.1:** Early Side-Notched projectile point (Cat. #71S79E-119).

### 13.2.3 Cores and Core Fragments

A grey chert core fragment (Cat. #70S79E-156b) was recovered from 195 cm dbs in unit 71S79E. The fragment has a mass of 27.0 g. It has a length of 3.81 cm, a width of 3.01 cm and a thickness of 2.14 cm.

### 13.2.4 Debitage

The debitage assemblage for Level 10 at the Cut Arm site consists of 20 flakes and pieces of shatter (Table 13.1). There are 11 pieces of shatter representing 55.00% of the assemblage. Secondary flakes are the second most common type of debitage with 35.00% of the total, followed by secondary decortification flakes with 10.00%. No primary decortification flakes were recovered. This absence of primary decortification flakes indicates that early stage tool manufacture was not occurring; however, the grey chert core fragment (Cat. #70S79E-156b) in combination with the prevalence of secondary flakes and shatter of the same material may suggest otherwise.

The dominant lithic material type (25%) in Level 10 is grey chert (Table 13.1). Swan River Chert is the second most prevalent material type representing 20.00% of the assemblage.

Quartzite accounts for 15.00%, followed by white chert and miscellaneous cherts each accounting for 10.00% of the total debitage. The remainder (20%) of the assemblage is equally represented by Knife River Flint, quartz, silicified peat and silicified siltstone. It is likely that the Knife River Flint secondary flake (Cat. #71S79E-118) is connected to the Early Side-Notched projectile point of the same material. The nearest source for Knife River Flint is western North Dakota and the pieces seen at the Cut Arm site were likely obtained from this southern location through long-distance trade.

A red ochre pebble (Cat. #71S81E-90d) as well as a red ochre cobble (Cat. #71S82E-61) were recovered from units 71S81E and 71S82E respectively. The combined mass of the two pieces is 379.6 g. The ochre was not recovered in direct association with any artifacts and whether its presence is culturally relevant cannot be said with any certainty.

**Table 13.1:** Lithic debitage from Level 10.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Chert	-	-	1 (H/T: n=1)	1	2	10.00%
Grey Chert	-	-	3	2	5	25.00%
Knife River Flint	-	-	1	-	1	5.00%
Quartz	-	-	-	1	1	5.00%
Quartzite	-	-	-	3	3	15.00%
Silicified Peat	-	-	-	1	1	5.00%
Silicified Siltstone	-	1	-		1	5.00%
Swan River Chert	-	1 (H/T: n=1)	1 (H/T: n=1)	2 (H/T: n=2)	4	20.00%
White Chert	-		1	1	2	10.00%
<b>Total</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>11</b>	<b>20</b>	<b>100%</b>
<b>Percent</b>	<b>0%</b>	<b>10.00%</b>	<b>35.00%</b>	<b>55.00%</b>	<b>100%</b>	

### 13.2.5 Fire-Cracked Rock

A total of 43 pieces of fire-cracked rock with a mass of 259.1 g were recovered from Level 10. Granite accounts for 72.09% of the FCR by number of items and 65.69% by mass. Schist accounts for 27.91% by number of items and 34.31% by mass.

### 13.3 Botanical Assemblage

Charcoal is the only type of botanical recovered from Level 10. There are 12 pieces with a mass of 2.5 g. One hundred percent of the charcoal recovered was from the southern quadrants of unit 71S81E.

### 13.4 Faunal Assemblage

The faunal assemblage consists of 201 specimens with a mass of 533.4 g (Table 13.2). Unidentifiable fragments represent 85.57% of the assemblage. Unburned bone accounts for 90.70% of the unidentifiable remains and 9.30% are unburned tooth enamel. Identifiable remains account for 14.43% of the faunal assemblage. The majority (93.10%) of the identifiable assemblage is unburned bone and the remaining 6.90% is unburned tooth enamel. No burned or calcined faunal remains were recovered from Level 10. Taphonomic alterations to the faunal assemblage include root etching and trowel trauma. Root etching is present on 8.46%, or 17 of 201 specimens. Trowel trauma is present on only two specimens, or roughly 1% of the assemblage.

As in all other levels of the Cut Arm site, each faunal specimen was identified with as much precision as possible. Those fragments that could not be assigned to a genus or species were classified by animal size if determinable. Two taxa and two size classes were identified including *Bison bison*, *Canis sp.*, Very Large Mammal (SC6) and Very Large to Large Mammal (SC5-6) (Table 13.3). It is highly likely that the specimens categorized as SC6 and SC5-6 are *B. bison* as there is no indication that other species of large or very mammals are present at the Cut Arm site.

**Table 13.2:** Faunal counts for Level 10.

<b>Condition of Faunal</b>	<b>Unidentified Count</b>	<b>Mass (g)</b>	<b>Identified Count</b>	<b>Mass (g)</b>
Burned Bone	-	-	-	-
Calcined Bone	-	-	-	-
Unburned Bone	156	112.5	27	372.4
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	16	9.4	2	39.1
Total	172	121.9	29	411.5

**Table 13.3:** Faunal taxa for Level 10.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	8	1	0.5
<i>Canis sp.</i>	10	1	0.5
Very Large Mammal	10	N/A	N/A
Very Large or Large Mammal	1	N/A	N/A

### 13.4.1 Order Artiodactyla

#### *Bison bison*

The Number of Identified Specimens for *Bison bison* is 8 with a combined mass of 325.9 g (Table 13.3). A quantification of the mature *B. bison* remains by element is presented in Table 13.4. The results of this quantification indicate that the Minimum Number of Individuals represented by the assemblage is one and the Minimum Number of Elements is 0.5. In addition to the limb elements listed in Table 13.4, two unidentifiable molar fragments were also recovered. No immature bison specimens were recovered in Level 10.

**Table 13.4:** Adult *Bison bison* quantification by element for Level 10.

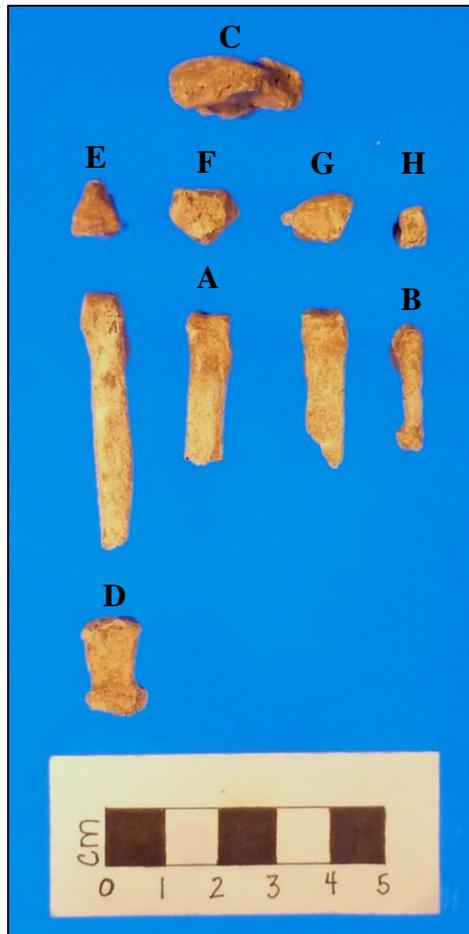
Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
1st phalanx	-	-	-	1	1	1	0.1
Proximal ulna	1	-	-	-	1	1	0.5
Proximal radius	1	-	-	-	1	1	0.5
Distal ulna	-	1	-	-	1	1	0.5

### 13.4.2 Order Carnivora

#### *Canis sp.*

The Number of Identified Specimens for *Canis sp.* is 10 with a mass of 10.3 g (Table 13.3). The elements represented include a 2<sup>nd</sup> phalange (Cat. #71S79E-121d), a right radial carpal (Cat. #71S79E-121c), a right 1<sup>st</sup> carpal (Cat. #71S79E-121h), a right 2<sup>nd</sup> carpal (Cat. #71S79E-121g), a right 3<sup>rd</sup> carpal (Cat. #71S79E-121e), a right 4<sup>th</sup> carpal (Cat. #71S79E-121f), a

right 1<sup>st</sup> metacarpal (Cat. #71S79E-121b) and three indeterminate right proximal metacarpal fragments (Cat. #71S79E-121b). This is the sole level in the Cut Arm site that has a higher NISP for *Canis sp.* than *Bison bison*. Due to the higher than normal number of canid remains a quantification by element was performed (Table 13.5). The Minimum Number of Individuals is 1 and the Minimum Number of Elements is 0.5. This indicates that at least one mature canid is represented by the assemblage. The canid remains (Cat. #71S79E-121a to #71S79E-121h; Figure 13.2A-H) were recovered from 158 cm dbs in the northeast quadrant of unit 71S79E. The specimens appear to be from the right forelimb of a single large canid as they are all the same color, exhibit root etching and have very similar patterns of weathering.



**Figure 13.2:** *Canis sp.* partial forelimb. A- Cat. #71S79E-121a, B- Cat. #71S79E-121b, C- Cat. #71S79E-121c, D- Cat. #71S79E-121d, E- Cat. #71S79E-121e, F- Cat. #71S79E-121f, G- Cat. #71S79E-121g, H- Cat. #71S79E-121h.

**Table 13.5:** Adult *Canis sp.* quantification by element for Level 10.

Element	Left	Right	Axial	Indeterminate	Total Number	MNI	MNE
Radial carpal	-	1	-	-	1	1	0.5
1st carpal	-	1	-	-	1	1	0.5
2nd carpal	-	1	-	-	1	1	0.5
3rd carpal	-	1	-	-	1	1	0.5
4th carpal	-	1	-	-	1	1	0.5
1st metacarpal	-	1	-	-	1	1	0.5

### 13.4.3 Miscellaneous Specimens

The Very Large to Large Mammal (SC5-6) size class has an NISP of 1 (Table 13.3). The specimen (Cat. #70S81E-108) is an unidentifiable cranial fragment with a mass of 4.6 g from unit 70S81E. The Very Large Mammal (SC6) size class has an NISP of 10 (Table 13.3). Rib fragments account for 50% of the specimens. The other 50% of the assemblage consists of cranial fragments including three petrous temporal fragments, one jugal fragment and an external auditory meatus fragment.

### 13.5 Seasonality

Seasonality cannot be determined for the Level 10 cultural occupation due to a lack of sufficient floral and faunal remains.

### 13.6 Features and Artifact Distribution

Feature 10-1 is a possible hearth or cooking pit in unit 71S80E (Figure 13.3). The area contains dark stained soil, is noticeably softer than the surrounding matrix and contains several rocks. The feature has a minimum depth of 143 cm and extends down to a maximum depth of 161 cm below the surface. Feature 10-2 is also an area of dark stained soil (Figure 13.3). The feature is located in unit 71S81E and extends from 166 cm dbb to 170 cm dbb. Feature 10-2 is considerably smaller than Feature 10-1 and is most likely not a hearth.

The artifact assemblage in Level 10 is not evenly distributed amongst the units of excavation Block 4 (Figure 13.4). The majority of fire-cracked rock is concentrated in unit 67S78E and unit 71S81E. The majority of the faunal assemblage is located in four of the

southern units in Block 4. Unit 71S82E contains 20% of all faunal specimens in Level 10. Unit 70S81E has the second highest number of items (17%), followed by unit 71S80E (14%) and unit 71S79E (11%). The lithic assemblage is present in minor concentration in three units that are also in the southern half of excavation Block 4. Units 70S79E and 71S77E each contain 17% of the debitage and tools for the level. Unit 71S79E contains 13% of the lithic assemblage including the Early Side-Notched projectile point (Cat. #71S79E-119).

**Table 13.6:** Lithic types in artifact-dense units.

Unit	Lithic Type	Number of Items	Total	Percentage (of total debitage and tools)
71S79E	Early Side-Notched Projectil Point	1	3	13%
	Secondary Flake	1		
	Shatter	1		
70S79E	Core fragment	1	4	17%
	Secondary Decortification Flake	1		
	Shatter	2		
71S77E	Secondary Flake	2	4	17%
	Shatter	2		

### 13.7 Interpretation of Level 10

Level 10 consists of a varied archaeological assemblage consistent with a short-term campsite including a hearth or cooking feature, a range of lithic debitage and a modest faunal assemblage. The lithic assemblage is small and varied, with the only notable absence in debitage being primary decortification flakes. The lithics are dominated by local materials; however, the presence of two Knife River Flint specimens indicates that exotics were also being obtained and utilized. The range of lithic refuse with no overwhelming majority of a specific debitage or tool type indicates a variety of lithic activities were being performed.

Artifacts were recovered scattered in small numbers throughout Level 10. The main activity area of the site is in the southern portion of excavation Block 4. Feature 10-1 and Feature 10-2 are both located in this primary activity area (Figure 13.3). Feature 10-1 is very

probably the remnants of a hearth or cooking pit as it contains charcoal staining, FCR and several large rocks. It appears that this feature was cleaned-out prior to re-use resulting in the dark soil staining identified as Feature 10-2 as well as the fire-cracked rock and charcoal recovered from unit 71S81E.

The approximate age and cultural affiliation of Level 10 can be determined based on the diagnostics within the level as well as the information known about the overlying deposits. The radiocarbon date obtained for Level 9 is  $4270 \pm 55$  cal B.P. (Table 3.3). An Oxbow projectile point was also recovered in good context from Level 9. Level 10 is stratigraphically below and therefore at least as old as these deposits. The presence of a broken projectile point in Level 10 that can be identified as Early Side-Notched corresponds nicely with a pre-Oxbow age. This places the date for Level 10 somewhere in the beginning of the Middle Middle Precontact period or Early Middle Precontact period, between roughly 4,500 – 7,500 years B.P.

The interpretation of Level 10 as an Early Middle Precontact period occupation is supported by the faunal assemblage. While the majority of the faunal specimens are *B. bison* or Very Large Mammal, roughly 35% of the identifiable remains are canid. This is the only level in the Cut Arm site where *Canis sp.* represents such a large percentage of the identifiable remains. The specimens were recovered from the main activity area of the site and do not exhibit any signs of scavenger activity. Pletz (2010) notes that while *B. bison* remained the essential prey species during the Altithermal, canid remains are typically seen in Gowen components on the Northern Plains at this time and that the reason for their presence is multi-faceted including dietary, transportation, protection and spiritual purposes. The *Canis sp.* specimens therefore support the identification of Level 10 as belonging to the Early Middle Precontact period.

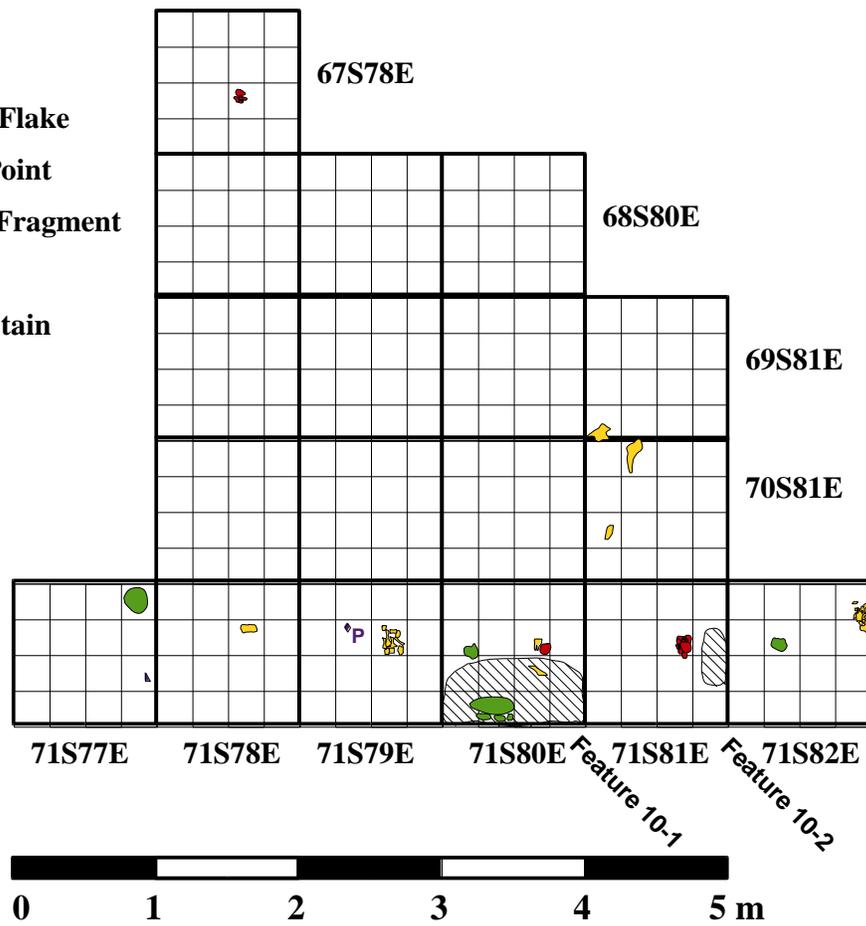
# Cut Arm Site (FbNp-22) - Level 10



## BLOCK 4

### LEGEND:

- Faunal
- Debitage
- R Retouched Flake
- P Projectile Point
- C Core/Core Fragment
- FCR
- Dark Soil Stain
- Rock



(Not representative for unexcavated space)  
 Blocks 1, 2, 3 and 5 not excavated

Figure 13.3: Artifact and feature distribution map for Level 10.

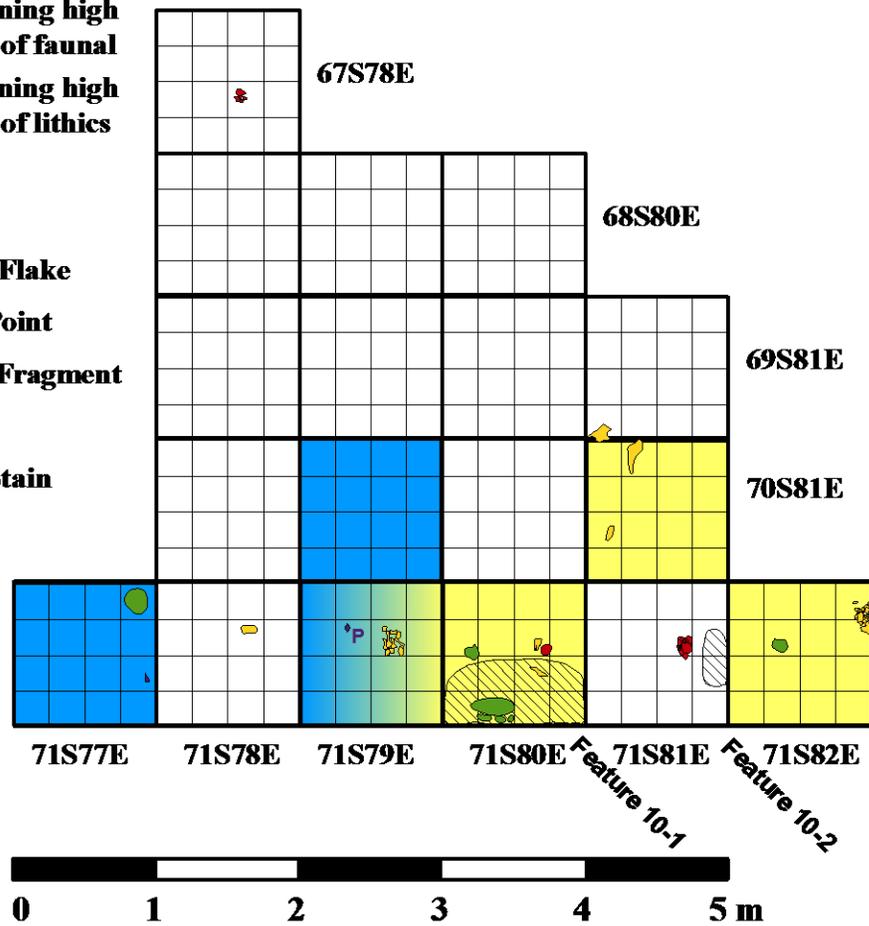
# Cut Arm Site (FbNp-22) - Level 10



## BLOCK 4

### LEGEND:

- Unit containing high percentage of faunal
- Unit containing high percentage of lithics
- Faunal
- Debitage
- R** Retouched Flake
- P** Projectile Point
- C** Core/Core Fragment
- FCR
- Dark Soil Stain
- Rock



(Not representative for unexcavated space)  
Blocks 1, 2, 3 and 5 not excavated

Figure 13.4: Units of artifact concentration for Level 10.

## **CHAPTER 14**

### **Cultural Level 11**

#### **14.1 Introduction**

Cultural Level 11 has a range in depth from 175 cm – 225 cm db. This large breadth is a maximum range and is the result of the slope of the site from the northwest down to the southeast. The average thickness of the level at any given point is roughly 5.5 cm. There are no diagnostic artifacts in the assemblage to allow for the determination of cultural affinity. The level is the oldest and deepest cultural occupation at the Cut Arm site and directly overlies a thick matrix of gravel mixed with sand and clay. This matrix has been interpreted by Rutherford (2004) as the result of a debris flow event extending down to 231 cm below the surface and marks the bottom of the cultural deposits at the Cut Arm site.

#### **14.2 Lithic Assemblage**

##### **14.2.1 Debitage**

The Level 11 debitage assemblage consists of 11 flakes and pieces of shatter (Table 14.1). There are no primary or secondary decortification flakes present. Shatter accounts for 72.73% of the assemblage while secondary flakes account for the other 27.27%. The lithic materials are entirely local and include grey chert (27.27%), quartz (27.27%), miscellaneous cherts (18.18%), quartzite (18.18%) and Swan River Chert (9.09%).

Evidence that the site's occupants were utilizing local materials is further supported by the presence of an orthoquartzite pebble (Cat. #70S80E-118d; Figure 14.1) recovered from unit 70S80E. A small number of flakes were removed from the pebble to expose the interior surface and determine its suitability as a core. The pebble appears to have been discarded, indicating it did not suit the needs of the flintknapper who collected it.

**Table 14.1:** Lithic debitage from Level 11.

<b>Material Type</b>	<b>Primary Decortification Flakes</b>	<b>Secondary Decortification Flakes</b>	<b>Secondary Flakes</b>	<b>Shatter</b>	<b>Total</b>	<b>Percent</b>
Chert	-	-	1	1	2	18.18%
Grey Chert	-	-	1	2	3	27.27%
Quartz	-	-	1	2	3	27.27%
Quartzite	-	-	-	2	2	18.18%
Swan River Chert	-	-	-	1	1	9.09%
Total	-	-	3	8	11	100%
Percent	0.00%	0.00%	27.27%	72.73%	100%	



**Figure 14.1:** Orthoquartzite pebble (Cat. #68S80E-61e).

### 14.2.2 Fire-Cracked Rock

Level 11 contains 9 pieces of fire-cracked rock with a mass of 655.7 g. Roughly 78% of the FCR is gneiss and was recovered from unit 69S80E. The other 22% of the FCR is granite and was recovered from unit 71S78E.

### 14.3 Faunal Assemblage

The faunal assemblage consists of 64 specimens with a mass of 106.3 g (Table 10.4). Unidentifiable remains account for 87.50% of the assemblage and are entirely unburned bone. Identifiable specimens account for 12.50% of the faunal remains in Level 11. Roughly 40% of the identifiable remains are unburned bone, while 60% are unburned tooth enamel. No cut marks or other signs of human modification are present in the assemblage. Taphonomic alterations are limited to root etching on 4.62% of the faunal specimens.

Identification of the taxon or size class was made whenever possible. One taxon, *Bison bison*, and one size class, Very Large Mammal (SC6), were identified in the assemblage. There is a lack of evidence in any of the levels of the Cut Arm site for the presence of species of large or very large mammals other than bison. It is therefore likely that all of the identified specimens are *B. bison* but are simply too fragmented to be identified as such.

**Table 14.2:** Faunal counts for Level 11.

Condition of Faunal	Unidentified Count	Mass (g)	Identified Count	Mass (g)
Burned Bone	-	-	-	-
Calcined Bone	-	-	-	-
Unburned Bone	56	50.4	3	20.0
Burned Tooth Enamel	-	-	-	-
Calcined Tooth Enamel	-	-	-	-
Unburned Tooth Enamel	-	-	5	35.9
Total	56	50.4	8	55.9

**Table 14.3:** Faunal taxa for Level 11.

Taxon/Size Class	NISP	MNI	MNE
<i>Bison bison</i>	4	1	N/A
Very Large Mammal	4	N/A	N/A

#### 14.3.1 Order Artiodactyla

##### *Bison bison*

The Number of Identified Specimens for *Bison bison* is 4 (Table 14.3). The specimens include four fragments that were reconstructed to represent a right maxillary molar (Cat.

#69S78E-116c). The fragmented molar was recovered from unit 69S78E at a depth of 195 cm below the surface. A minimum of one mature individual is represented by the assemblage.

### **14.3.2 Miscellaneous Specimens**

The Very Large Mammal (SC6) size class has an NISP of 4 (Table 14.3). The elements represented include a left petrous temporal fragment (Cat. #69S78E-115a), an indeterminate tooth fragment (Cat. #70S80E-118e), an acetabular fragment (Cat. #69S79E-105a) and a rib fragment (Cat. #69S78E-116c).

### **14.4 Seasonality**

Seasonality cannot be determined for Level 11 at the Cut Arm site due to a lack of floral and faunal remains.

### **14.5 Features and Artifact Distribution**

No features are present in Level 11 and there are an insufficient number of artifacts with three-point provenience data for any spatial pattern to be directly evident (Figure 14.2). Areas of concentration can be seen when the faunal and lithic assemblages are examined by the number of items present in each unit. The unit with the highest concentration of lithic artifacts is 70S79E with 45.45% of the assemblage (Figure 14.3). Unit 69S78E (18.18%) and unit 70S80E (18.18%) contain the second highest concentrations of lithic artifacts. The highest concentration of faunal remains is located in unit 70S80E which contains 35.94% of the assemblage (Figure 14.3). Unit 70S79E contains the next largest concentration with 25.00%, followed closely by unit 69S78E with 23.44%.

While the artifact assemblage is clearly not distributed evenly across the site, no conclusions can be drawn from the concentrations described. The area of the site containing Level 11 deposits is quite small. When this is combined with the small size of the assemblage, discerning meaningful trends in the spatial concentration of artifacts is difficult.

### **14.6 Interpretation of Level 11**

The faunal assemblage in Level 11 represents a single mature *Bison bison*. The majority of the faunal remains are unidentifiable fragments under 2.5 cm in size. All of the identifiable

specimens are from very large mammals, either of indeterminate taxon or *B. bison*, and are dominated by cranial elements.

The lithic materials in the debitage assemblage indicate that the site occupants were reliant on locally obtainable tool stone. The lithic assemblage consists of shatter and secondary flakes with a complete absence of cores, primary decortification flakes, and secondary decortification flakes. This indicates that the lithic activities occurring in Level 11 were all late stages of production or retouch and resharpening activities.

Cultural Level 11 is the lowest layer at the Cut Arm site and represents the earliest cultural occupation in the coulee. This was confirmed with test pits that were dug 5 cm – 10 cm beyond the lowest extent of the level. The bottom of the site is marked by a matrix of sand, clay and gravel resulting from debris flows above buried glacial deposits (Rutherford 2004). The cultural affiliation of Level 11 is unknown. No diagnostic artifacts were recovered and no radiocarbon dates were obtained. The level can be assumed to predate Level 9 which was radiocarbon dated to  $4270 \pm 55$  cal B.P. (Table 3.3) indicating it is an Early Middle Precontact period occupation.

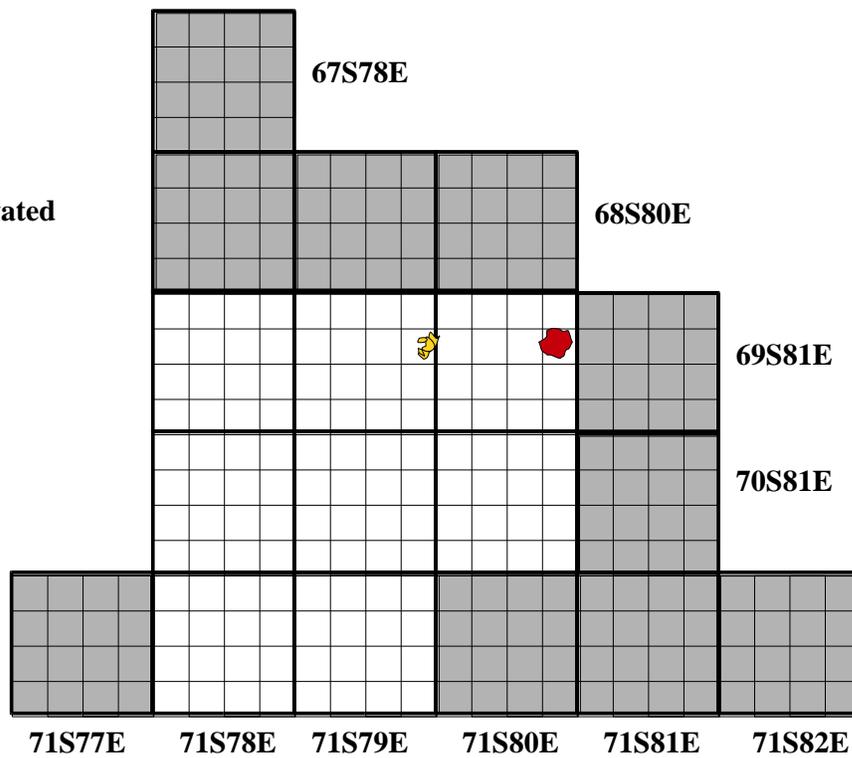
# Cut Arm Site (FbNp-22) - Level 11



## LEGEND:

- Faunal
- Debitage
- FCR
- Rock
- Not excavated

## BLOCK 4

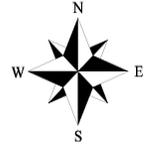


(Not representative for unexcavated space)

Blocks 1, 2, 3 and 5 not excavated

**Figure 14.2:** Artifact and feature distribution map for Level 11.

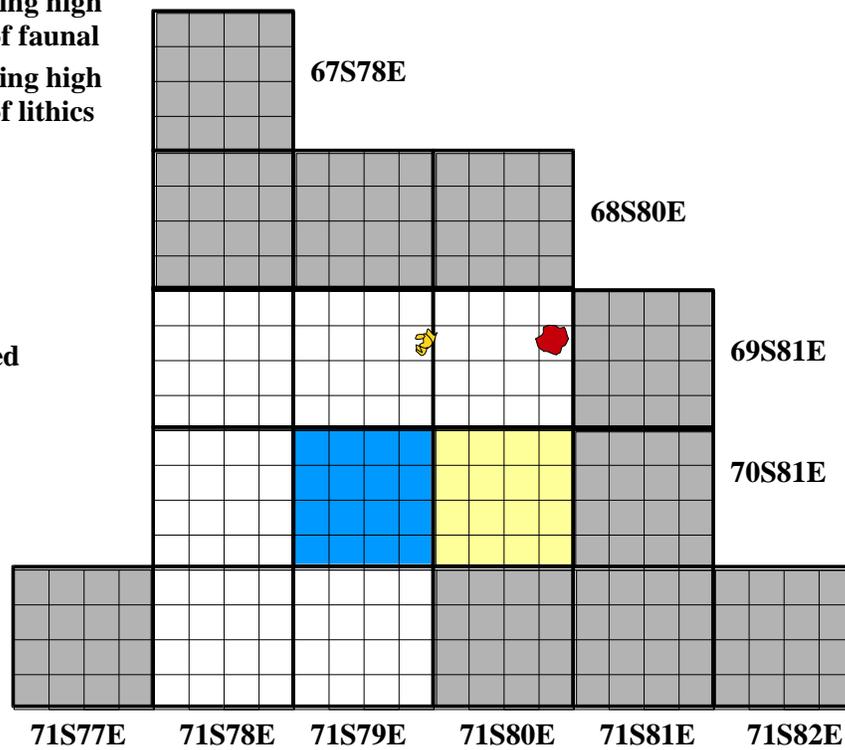
# Cut Arm Site (FbNp-22) - Level 11



## LEGEND:

- Unit containing high percentage of faunal
- Unit containing high percentage of lithics
- Faunal
- Debitage
- FCR
- Rock
- Not excavated

## BLOCK 4



(Not representative for unexcavated space)  
Blocks 1, 2, 3 and 5 not excavated

Figure 14.3: Units of artifact concentration for Level 11.

## Chapter 15

### Wanuskewin Heritage Park: A Terrestrial Island on the Northern Plains

#### 15.1 Terrestrial Islands on the Plains: Theoretical Background

The terrestrial island concept is a theoretical tool in the examination of the human-landscape relationship in plains archaeology. A terrestrial island is a unique area within a homogenous landscape. The specific character of any given island is variable, generally consisting of a combination of topography, vegetation, fauna and other resources that cannot be found in the surrounding landscape. By its nature a terrestrial island is particularly attractive to human occupation, resulting in its intensive utilization. The foundation of this concept can be found in multiple closely related disciplines.

The ecosystems approach is the product of the incorporation of ecological theory into archaeology and anthropology and examines the effects of organisms and landscapes on human behaviour. It is an essential aspect of developments in ecological anthropology and landscape archaeology (Osborn and Kornfeld 2003). Closely related to this are concepts from human evolutionary ecology which applies evolutionary ecological theory to humans. In particular, the principles of optimal foraging theory have been utilized to understand and explain the decision-making behavior of hunter-gatherers. This is done through the extension and application of the principle that humans are designed by natural selection to act optimally in terms of survival and reproduction. By maximizing situation-specific currencies, humans choose the lowest cost option in terms of return that then translates into long-term success (Yesner 2008).

A model central to optimal foraging theory is that of patch choice. This model aims to understand and predict a forager's decisions within a heterogeneous or "patchy" environment. A patch is a methodological construct defined as a "bounded, connected discontinuity in a homogenous reference background" (Levine and Paine 1974:2744). The physical nature of a patch is highly variable with scale, size, shape, content, duration, structural complexity and boundary characteristics (Wu and Loucks 1995:446). The model's primary assumption is that

foragers will make use of a patchy environment in an optimal fashion. This is achieved through net maximization of a chosen currency (Smith and Winterhalder 1992:178), assuming that a forager will choose to remain in a patch only as long as the net gain is greater than the average net return for the environment as a whole (Charnov 1976:132). The length of time a patch will be exploited is therefore dependant on the characteristics of each particular patch and the surrounding landscape.

Use of the patch choice model in conjunction with concepts from island biogeography has been successfully attempted by ecologists and archaeologists. Islands are bounded areas with a specific floral, faunal, geological and climatic composition distinct from their surroundings (Osborn and Kornfeld 2003:5). The concept of a traditional island can be applied to unique patches on the landscape termed “terrestrial islands”. These patches share the same core characteristics with traditional islands but can be further defined as being isolated, and having low resource turnover and abrupt boundaries (Osborn and Kornfeld 2003:11).

Ecological research has found that islands typically have a high degree of biodiversity (Pianka 1988), a pattern that can be explained by optimal foraging theory. As unique areas on the landscape, islands offer a combination of resources not otherwise available. Optimal foraging theory argues that when a factor is not uniformly available in an organism’s environment its presence will exhibit a pull on the organism to that location (Jochim 1976:52). This pull to the area is further increased when the reliability of the resource is high (Jochim 1976:53). Terrestrial islands, as bounded areas with high biodiversity and low resource turnover, are therefore areas that can be expected to be selected for settlement.

There are a variety of natural features on the Northern Plains that can be defined as terrestrial islands including Devil’s Tower, the Black Hills, the Nebraska Sand Hills and Farra Canyon (Osborn and Kornfeld 2003:11-12). These features are ecologically rich and distinct on the Northern Plains landscape, separated by the homogeneity of the prairie (Litwinionek et al. 2003). The application of ecologically based theory and methods to archaeological research questions is not a recent occurrence. Archaeologists have borrowed the concept of terrestrial islands to explain human settlement and subsistence behaviour. One of the earliest attempts in archaeology to understand human behaviour with respect to island patches is Wedel’s (1963) examination of freshwater springs (Osborn and Kornfeld 2003). More recently, archaeologists have used the “Island on the Plains” concept to explain and predict human utilization of playas in

the Southern High Plains, the Killdeer Mountains, the Missouri Badlands and the Black Hills (Kornfeld and Osborn 2003).

The island concept can also be used to examine the significance of religious beliefs on the ordering of human behaviour on the landscape. Sundstrom (2003:258) describes sacred islands as “places that held special and specific religious significance for aboriginal Plains dwellers”. As such they share the core characteristics of an island in that they are unique from the surrounding landscape and spatially bounded. These areas are as variable as terrestrial islands and are contingent on the fact that they are recognized as spiritually significant by the people occupying the area. Sacred islands often coincide with core habitation areas or seasonal hunting grounds but can also be associated with bodies of water, mountain passes, caves, eagle trapping grounds, or areas where wood can be harvested (Sundstrom 2003). The acceptance that landscapes are tied to all aspects of past human life, not purely the economical, is essential for archaeologists to acquire a fuller understanding of past human behaviour (Sundstrom 2003:260). The importance of cultural and social factors as motivation and a type of pay off for certain behaviour is an important consideration in examining the decision-making processes of past peoples.

## **15.2 Middle Precontact Period Occupation of the Opimihaw Creek Valley**

The Opimihaw Creek area is one of the most remarkable natural features in central Saskatchewan. A tributary to the north of the South Saskatchewan River, the creek is an underfit meandering stream in the base of a valley carved from glacial deposits (Acton et al. 1998; Burt 1997). The area is a combination of flat depositional terraces with moderate to steep valley walls and flat prairie uplands. The archaeological potential of the area was recognized early in the twentieth century and as such it has remained largely unaltered by modern agriculture and settlement. The formation of the Wanuskewin Heritage Park which encompasses the Opimihaw Creek area has further ensured its protection and preservation (Walker 1988).

The Opimihaw Creek area is ecologically diverse and encompasses three physiographic vegetative zones each with its own geography, soils and biota. These zones include the Upland Prairie Zone, the Valley Slope Zone and the Lowland Zone. The Upland Prairie Zone consists of gently undulating prairie dominated by native grasses and dense thickets of shrubs. This zone is in direct contact with the prairie surface that dominates the surrounding landscape. The Lowland

Zone occurs only in the valley bottom and is characterized by flora dependent on high levels of ground water and regular creek flooding. Within this single zone the vegetation ranges from ash and maple trees with an herb-gramminoid understory to the cattails, sedges, bulrushes and pond weeds of marsh and creek shore communities. The Valley Slope Zone is transitional between the prairie upland and the creek/river lowland. The stable areas of the Valley Slope Zone are characterized by an overstory of mixed deciduous trees and poplars with an understory of sparse herb-gramminoids. Those areas with higher slope instability are dominated by grasses in association with herbs and shrubs (Landplan Collaborative Ltd. 1983).

The combination of these physiographic zones attracts a diverse range of faunal species to the valley. The biodiversity present in the area has changed over time; however, it is clear that bison were the dominant species on the plains throughout prehistory (Banfield 1974). Elk, mule deer and pronghorn were also present to a lesser degree. Carnivores primarily included wolf, swift fox, grizzly bear and mountain lion while several species of rodents, birds, fish and amphibians would also have been present (Acton et al. 1998; Banfield 1974; Smith 1999). The high biodiversity compared to the surrounding area is understandable as the diversity of vegetation and topography provides food, water, cover, nest sites and shelter for many birds and mammals. This has resulted in an area that is self-contained, geographically distinct and biologically diverse.

The Opimihaw Creek valley has been repeatedly and consistently utilized throughout prehistory as is evidenced by the nineteen precontact period sites identified in the area (Walker 1988). In particular, a larger than average concentration of Middle Precontact period occupations are present. Ten of the area's precontact sites have been subject to excavation, eight of which contain Middle Precontact period components (Figure 15.1; Table 15.1). These sites include Amisk (FbNp-17) (Amundson 1986), Newo Asiniak (FbNp-16) (Kelly 1986), Dog Child (FbNp-24) (Cyr 2006; Pletz 2010), Thundercloud (FbNp-25) (Webster 1999; Mack 2000), Redtail (FbNp-10) (Ramsay 1993; Leilani Williams, personal communication 2012), Meewasin Creek (FbNp-9) (Frary 2009), Wolf Willow (FbNp-26) (Maria Mampe, personal communication 2012) and Cut Arm (FbNp-22). The area offers shelter, fuel, water, food, medicinal plants and natural topographic features for trapping prey. The valley bottom and coulees offer sites for habitation with ideal conditions for short-term occupation, hunting and processing and have therefore been utilized in this manner repeatedly throughout the Middle Precontact period. A



**Figure 15.1:** Sites with Middle Precontact period occupations in the Wanuskewin Heritage Park (Adapted from *GoogleEarth*<sup>TM</sup> 2006).

similar situation has been observed at Farra Canyon in Oklahoma (Banks 2003) and the Bridger Mountain Range in Montana (Byers et al. 2003).

An area exhibiting an equivalent intensity of Middle Precontact period occupation is not known elsewhere within Saskatchewan or anywhere on the Canadian Northern Plains. The sites are all multi-component in nature and are characterized by short-term habitation. Through an examination of these sites it is clear that despite cultural changes having occurred over time on the Northern Plains the choice to exploit the Opimihaw Creek valley has remained strikingly unaffected. It is in this intensity and consistency of occupation that an argument for the Opimihaw Creek valley as a terrestrial island is based. A brief summary of the Middle Precontact period sites in the valley area is presented here to demonstrate this pattern.

### **15.2.1 The Amisk Site**

The Amisk site (FbNp-17) is a multi-component campsite consisting of cultural occupations spanning from the Middle Middle Precontact period to the Historic period. The site was first identified during the 1982 - 1983 survey of the Opimihaw Creek valley and surrounding area (Walker 1983). It is situated at 52° 13' 25" N latitude and 106° 36' 30" W longitude (Amundson 1986:4). It is located on a prominent spur in the bottom of the valley and is directly adjacent to the Opimihaw Creek (Amundson 1986:9). Full-scale excavation of the site was undertaken by graduate student L. J. Amundson under the direction and supervision of Dr. E. G. Walker. The excavations spanned two field seasons over the summers of 1984 and 1985 (Amundson 1986:1) and the total area excavated encompassed 42 m<sup>2</sup> (Amundson 1986:40). Seven cultural occupations were identified extending to a maximum depth of 210 cm below the surface (Amundson 1986:45).

The Amisk site contains eight, or possibly nine, cultural occupations over seven levels. The archaeological cultures represented include the Late Side-Notched complexes and the Oxbow complex (Amundson 1986:184). All of the Oxbow levels have been interpreted by Amundson (1986:18) as habitation occupations dominated by activities related to secondary processing of *B. bison* remains. Over 99% of the faunal assemblages in the Oxbow components were *B. bison* indicating an overwhelming reliance on this species by the site's occupants (Amundson 1986:192).

**Table 15.1:** Radiocarbon ages for sites containing Middle Precontact Period occupations in the Opimihaw Creek valley area.

Site	Sample Number	Cultural Level	Uncalibrated Age (Years B.P.)	Calibrated Age after <sup>13</sup> C Correction
Cut Arm (FbNp-22)	BGS 2381	2	524 ± 40	650 ± 40 cal B.P.
	BGS 2382	6	3178 ± 50	3550 ± 50 cal B.P.
	BGS 2383	8	3387 ± 50	3690 ± 50 cal B.P.
	BGS 2384	8	3448 ± 60	3770 ± 60 cal B.P.
	BGS 2385	9	3802 ± 55	4270 ± 55 cal B.P.
Dog Child (FbNp-24) (Cyr 2006; Pletz2010)	BGS 2659	1b	241 ± 50	300 ± 50 cal B.P.
	BGS2660	2a	3460 ± 45	3700 ± 45 cal B.P.
	BGS 2661	2b	4270 ± 50	4270 ± 50 cal B.P.
	BGS2890	2b	4020 ± 40	4480 ± 40 cal B.P.
	BGS 2662	3a	4597 ± 50	5310 ± 50 cal B.P.
	BGS 2891	3a	4237 ± 40	4830 ± 40 cal B.P.
	BGS 2663	3b	4780 ± 50	5530 ± 50 cal B.P.
Meewasin Creek (FbNp-9) (Frary 2009)	BGS-2742	2	1754 ± 45	1660 ± 45 cal B.P.
	S-2366	3	2130 ± 125	2090 ± 125 cal B.P.
	BGS-2740	3a	2405 ± 50	2360 ± 50 cal B.P.
	BGS-2743	4b	2286 ± 50	2340 ± 70 cal B.P.
	BGS-2741	5a	3750 ± 120	4120 ± 120 cal B.P.
Thundercloud (FbNp-25) (Webster 1999; Mack 2000; Webster 2004)	BGS-2370	4	2570 ± 50	2779 ± 50 cal B.P.
	BGS-2369	5a	3150 ± 50	3381 ± 50 cal B.P.
	BGS-2367	5b	3315 ± 50	3610 ± 50 cal B.P.
	NZA-15749	5b	3382 ± 55 (normalized)	3634 ± 55 cal B.P.
	S-3645	5c	4040 ± 90	4715 ± 90 cal B.P.
Redtail (FbNp-10) (Ramsay 1999; Morlan 1992; Webster 2004)	S-3372	11	3480 ± 80	3762 ± 80 cal B.P.
	S-3373	12(1)	3470 ± 80	3795 ± 80 cal B.P.
	S-3008	12(2)	3660 ± 75	3986 ± 75 cal B.P.
	S-3374	13(2)	3860 ± 70	4292 ± 70 cal B.P.
	S-3375	13(2)	3880 ± 70	4372 ± 70 cal B.P.
	S-3009	13(4)	4280 ± 80	4860 ± 80 cal B.P.
	S-3007	15(2)	5010 ± 90	5735 ± 90 cal B.P.

Site	Sample Number	Cultural Level	Uncalibrated Age (Years B.P.)	Calibrated Age after <sup>13</sup> C Correction
Newo Asiniak (FbNp-16) (Kill area)	S-2763	1	185 ± 190	172 ± 190 cal B.P.
	S2528	2	1540 ± 70	1411 ± 70 cal B.P.
Newo Asiniak (FbNp-16) (Processing/ Habitation area) (Kelly 1986; Morlan 1992)	S-2529	1	750 ± 70	683 ± 70 cal B.P.
	S-2533	2	915 ± 70	828 ± 70 cal B.P.
	S-2530	3	2235 ± 75	2222 ± 70 cal B.P.
	S-2764	4	3025 ± 215	3254 ± 250 cal B.P.
	S-2765	5	2525 ± 210	2722 ± 210 cal B.P.
	S-2532	6	4320 ± 85	4868 ± 85 cal B.P.
	S-2766	7	3455 ± 230	3703 ± 230 cal B.P.
Amisk (FbNp-17) (Amundson 1986; Morlan 1992)	S-2531	1	480 ± 65	519 ± 65 cal B.P.
	S-2770	1	635 ± 85	582 ± 85 cal B.P.
	S-2537	1	905 ± 155	882 ± 155 cal B.P.
	S-2769	2	3055 ± 70	3292 ± 70 cal B.P.
	S-2767	3	3530 ± 110	3835 ± 110 cal B.P.
	S-2546	4	4015 ± 195	4485 ± 195 cal B.P.
	S-2535	5	4120 ± 190	4633 ± 190 cal B.P.
	S-2534	6	3895 ± 195	4361 ± 195 cal B.P.
S-2768	7	5340 ± 120	6140 ± 120 cal B.P.	
Wolf Willow (FbNp-26)	No dates have been obtained			
Cut Arm and Dog Child samples: Calibration based on Stuiver et al. 1998.				
Meewasin Creek BGS samples: Calibration based on Reimer et al. 2004.				
Meewasin Creek S-2366 sample: Calibration based on Stuiver and Reimer 1993.				
Thundercloud samples: Calibration based on Stuiver and Reimer 2000.				
Redtail, Newo Asiniak and Amisk samples: Calibration based on Stuiver and Reimer 1986.				

Level 1 consists of two or possibly three occupations indicated by the presence of Plains Side-Notched, Prairie Side-Notched and Avonlea projectile points. The presence of multiple, indistinguishable occupations is supported by three well-spaced radiocarbon dates: 519 ± 65 cal B.P., 582 ± 85 cal B.P. and 882 ± 155 cal B.P. The features identified within Level 1 include a hearth feature and a faunal processing area (Amundson 1986:58-59). Level 2 does not contain any diagnostic artifacts; however, a stemmed bone projectile point was recovered. Two buried stone circles were recorded that have been interpreted by Amundson (1986) as tipi rings.

Level 2 (Amundson 1986:99) has been radiocarbon dated to 3292 ± 70 cal B.P. indicating a Late Middle or Middle Middle Precontact period occupation (Amundson 1986:58). Level 3 does not contain any diagnostic artifacts but was radiocarbon dated to 3835 ± 110 cal B.P. This

date is consistent with a Middle Middle Precontact period occupation most likely belonging to the Oxbow complex or the McKean series. A possible pit feature was recorded and the Level 3 artifact assemblage was recovered as clusters throughout the site area. Level 4 contains several Oxbow projectile points, a hearth feature and has been radiocarbon dated to  $4485 \pm 195$  cal B.P. (Amundson 1986:57). Level 5 was identified as an Oxbow complex component based on the presence of an Oxbow projectile point fragment. It consists of more substantial cultural deposits than Level 6 and Level 7 as well as a hearth feature. Level 5 has been radiocarbon dated to  $4633 \pm 190$  cal B.P. Level 6 is representative of yet another Oxbow complex component and has a radiocarbon date of  $4361 \pm 195$  cal B.P. Level 7 at the Amisk site has been radiocarbon dated to  $6140 \pm 120$  cal B.P. (Amundson 1986:56). As this date is outside of the standard temporal range for the Oxbow complex, Amundson has suggested that the occupation is representative of the transitional period between the Mummy Cave series and the Oxbow complex (Amundson 1986:190-191).

### **15.2.2 The Newo Asiniak Site**

The Newo Asiniak site (FbNp-16) is a multi-component kill area and associated processing/possible habitation area (Kelly 1986:4). The site was identified as part of the 1982 - 1983 survey of the Opimihaw Creek area (Walker 1983) and lies between the Amisk site (FbNp-17) to the south and the Thundercloud site to the north (FbNp-25). It is situated in the valley bottom directly east of the Opimihaw Creek, at the base of a steep cliff rising roughly 3 meters above the site surface. The site is situated roughly 600 m north of the South Saskatchewan River at  $52^{\circ} 13' 25''$  N latitude and  $106^{\circ} 35' 45''$  W longitude (Kelly 1986:17, 28).

The site was one of the first sites to be excavated in Wanuskewin Heritage Park and was done so by University of Saskatchewan undergraduate students led by D. L. Kelly under the supervision of Dr. E. G. Walker. Excavations took place in the summers of 1984 and 1985 (Kelly 1986:5). A total of  $56 \text{ m}^2$  were excavated in the kill area of the site to a maximum depth of 40 cm below the surface (Kelly 1986:46). Another  $32 \text{ m}^2$  were opened in the processing area and excavated to a maximum depth of roughly 100 cm below the surface (Kelly 1986:36).

The kill area of the Newo Asiniak site represents the termination of a bison jump from the prairie surface to the valley bottom. This area of the site appears to consist of two Late Precontact period components. Unfortunately, the components do not have consistent

stratigraphic separation (Kelly 1986:46); however, the occurrence of two separate kill events is supported by *B. bison* remains indicating both a fall and mid-winter to early spring occupation (Kelly 1986:80). This is further substantiated by the two radiocarbon dates obtained for the kill area ( $172 \pm 190$  cal B.P. and  $1411 \pm 70$  cal B.P.) (Kelly 1986:88).

The processing area of the Newo Asiniak site is located east of the kill area on an old point bar. A total of seven cultural occupations spanning the past 4,800 years are present (Kelly 1986:30). Level 1 has been identified as a Prairie Side-Notched complex component and was dated to  $683 \pm 70$  cal B.P. (Kelly 1986:118). Level 2 has been identified as an Avonlea component radiocarbon dated to  $828 \pm 70$  cal B.P. (Kelly 1986:139). Level 3 consists of a Besant complex occupation which has also been radiocarbon dated to the Late Precontact period ( $2222 \pm 70$  cal B.P.) (Kelly 1986:144, 155).

A single Pelican Lake projectile point was recovered from Level 4 at the Newo Asiniak site. A radiocarbon date of  $3254 \pm 250$  cal B.P. confirms the level is a Late Middle Precontact period occupation (Kelly 1986:170). Level 4 contains several features including evidence of a hearth, a concentration of faunal remains and a lithic debitage concentration (Kelly 1986:169). Level 5 is a small, sporadic deposit with a date of  $2722 \pm 210$  cal B.P. A single hearth feature was recorded and no diagnostics were recovered from the level (Kelly 1986:174). No diagnostics or features were present in Level 6 which was radiocarbon dated to  $4868 \pm 85$  cal B.P. (Kelly 1986:174). Level 7 dates to  $3703 \pm 230$  cal B.P. (Kelly 1986:184) and contains a hearth feature, a concentration of dismembered *Canis sp.* remains and a possible post hole (Kelly 1986:182-183). No projectile points were recovered from Level 6 or Level 7 although the radiocarbon dates indicate that both are Oxbow complex components.

The features and artifact assemblages from the Middle Precontact period occupations at the Newo Asiniak site are consistent with later-stage faunal processing and habitation. Level 6 is the only Middle Precontact period occupation to contain tools including an ovoid biface and a bone awl (Kelly 1986:195). The faunal assemblages are overwhelmingly dominated by *B. bison*. The only non-bison taxon that is consistently represented is *Canis sp.* which is notably absent in Levels 5 and 6 (Kelly 1986:193).

### 15.2.3 The Dog Child Site

The Dog Child site (FbNp-24) is a multi-component habitation site located on a terrace in the Opimihaw Creek valley. It is the most northern site within the park and is roughly 750 m north of the South Saskatchewan River (Cyr 2006:5). It is situated at 52° 14' 35" N latitude and 106° 35' 35" W longitude (Walker et al. 1987). The Dog Child site was first identified as part of the 1982 and 1983 survey of the Opimihaw Creek valley conducted by E. G. Walker (Walker 1983) and was the ninth site within the park to be excavated. Excavations were done by undergraduate field school students from the Department of Archaeology and Anthropology at the University of Saskatchewan and were led by T. J. Cyr in 2004 to 2006 and J. R. Pletz in 2007 to 2009 under the supervision of Dr. E. G. Walker. Over the course of the six field seasons a total of 71 m<sup>2</sup> were excavated to a maximum depth of 1.0 m (Pletz 2010:40, 244).

The Dog Child site contains seven cultural occupations spanning from the Historic period to the Early Middle Precontact period. These occupations do not have clear stratigraphic separation throughout the entire site due to complex site formation processes. In these areas the seven occupations are seen as four levels including surface deposits, Level 1, Level 2 and Level 3. In the southeast area of the site there is better separation of the cultural levels and the occupations are distinctly visible as surface deposits, Level 1a, 1b, 2a, 2b, 3a and 3b (Cyr 2006:26; Pletz 2006:64).

The uppermost deposit at the Dog Child site was found scattered on the surface of the site and consists of *Sus scrofa* bones from the Historic period pig farm located in the area (Cyr 2006:26). The second occupation layer is Level 1a and has been identified as a Plains Side-Notched component based on diagnostic artifacts (Cyr 2006:29). Directly beneath this is Level 1b which has been identified as a Prairie Side-Notched component based on the recovery of Prairie Side-Notched projectile points in combination with a radiocarbon date of 300 ± 50 cal B.P. (Pletz 2010:65).

Levels 2a and 2b have been attributed to the Middle Middle Precontact period. Level 2a is a McKean series component containing Duncan, Hanna and McKean lanceolate projectile points as well as a radiocarbon date of 3700 ± 45 cal B.P. (Cyr 2006:29; Pletz 2010:65). Level 2b has been identified as an Oxbow complex occupation based on diagnostic artifacts and two radiocarbon dates: 4270 ± 50 cal B.P. and 4480 ± 40 cal B.P. (Pletz 2010:67). Level 2b has a very taxonomically diverse faunal assemblage including bison, deer, skunk, birds and fish (Pletz

2006:133, 143). Based on the faunal assemblage the seasonality of occupation was determined to be late spring to summer (Pletz 2010:142).

Level 3a and 3b are both Mummy Cave or transitional Oxbow/Mummy Cave series occupations (Cyr 2006:30). The dates obtained from Level 3a are  $5310 \pm 50$  cal B.P. and  $4830 \pm 40$  cal B.P (Pletz 2010:145). Level 3a was the sparsest occupation at the site. The faunal assemblage included specimens of canid, skunk and ground squirrel but was dominated by bison. Level 3b has been interpreted as a Mummy Cave series occupation based on the presence of multiple Gowen projectile points. The dates obtained from Level 3b were  $5530 \pm 50$  cal B.P. and  $5890 \pm 45$  cal B.P (Pletz 2010:160), supporting the attribution of Level 3b to the Early Middle Precontact period. The level consists of a thick cultural deposit including several areas of dark-stained soil and artifact concentrations. As in Level 2b, the faunal assemblage is diverse including bison, canids, rodents and birds. The occupation was identified as a winter campsite but may have continued into the summer months based on the presence of warm-weather birds (Pletz 2010:214-217).

The artifact assemblages at the Dog Child site are consistent with repeated utilization of the site area for habitation. Features are relatively limited throughout Level 2a to Level 3b. The lithic assemblages are characterized by local materials and a large amount of shatter. *B. bison* remains dominate the faunal assemblages although a range of other species are present and in higher numbers than are seen in most other Middle Precontact period sites on the Northern Plains (Pletz 2010).

#### **15.2.4 The Thundercloud Site**

The Thundercloud site (FbNp-25) is a multi-component habitation site located on a terrace at the bottom of the Opimihaw Creek valley. The site was identified in the original 1982-1983 survey of the Opimihaw Creek area (Walker 1983). The site lies south of the Dog Child site (FbNp-24) and north of the Wolf Willow site (FbNp-16). The Thundercloud site was excavated over the course of six field seasons between 1993 and 1998 by graduate students S. M. Webster and L. Mack with the Department of Anthropology and Archaeology's undergraduate field school under the supervision of Dr. E. G. Walker. A total of  $44.5 \text{ m}^2$  were excavated up to a maximum depth of 120 cm.

The Thundercloud site contains eleven cultural occupations across seven levels. The site has particularly complex stratigraphy which makes distinctions between the occupations difficult. Level 1 consists of a Historic period component mixed with at least one Late Precontact period component. This identification is based on the presence of European trade goods as well as Plains Triangular, Plains Side-Notched and Prairie Side-Notched projectile points (Mack 2000:54-55). Level 2 is a Late Precontact period occupation that has been subject to mixing with the overlying deposits. The level contains Plains Triangular, Plains Side-Notched, Prairie Side-Notched and Avonlea Triangular projectile points (Mack 2000:100). Level 3 is also a Late Precontact period occupation that appears to consist of two components. As with Level 1 and Level 2 no radiocarbon dates were obtained. The diagnostic artifacts from Level 3 include Avonlea pottery as well as Besant and Avonlea Triangular projectile points (Mack 2000:123, 148).

Level 4 was originally believed to belong to the McKean series (Webster 1999:26) but has since been re-identified as a Pelican Lake component based on the presence of a diagnostic projectile point and a radiocarbon date of  $2779 \pm 50$  cal B.P. (Webster 2004). Based on the faunal remains Level 4 represents a spring occupation (Webster 1999:137).

Level 5 consists of three components: Level 5a, Level 5b and Level 5c. These components were distinguishable as separate in the extreme western units only and were analyzed as a single Level 5 component in the remainder of the site (Mack 2000:174). The Level 5 components were all identified as belonging to the McKean series based on diagnostic artifacts and four radiocarbon dates:  $3381 \pm 50$  cal B.P. from Level 5a,  $3610 \pm 50$  cal B.P. and  $3634 \pm 55$  cal B.P. from Level 5b and  $4715 \pm 90$  cal B.P. from Level 5c.

Level 6 consists of two indistinguishable occupations identified to the Middle Middle Precontact period based on the presence of several Oxbow projectile point fragments. No radiocarbon date was obtained for this level. Several features were identified including a hearth and a lithic retouch activity area. Level 7 at the Thundercloud site was interpreted as a heavily eroded occupation of secondarily deposited cultural materials and did not contain any diagnostics. The level has been identified as likely Early Middle Precontact period because it is stratigraphically below the Oxbow occupation in Level 6 (Mack 2000:219).

All of the Middle Precontact period occupations at the Thundercloud site are dominated by local lithic material types and tertiary flakes. The only exception is Level 7 where Knife

River Flint was the most common material type (Mack 2000). The faunal assemblages primarily consist of bison remains but a wide range of other taxa are also present including other artiodactyls, canids, leporids, rodents, birds and amphibians (Webster 1999).

### **15.2.5 The Redtail Site**

The Redtail site (FbNp-10) is a multi-component habitation site with occupations spanning roughly the past 5000 years. The site is situated in the southeast corner of Wanuskewin Heritage Park in a small drainage basin on the bank of the South Saskatchewan River at 52° 13' 8" N latitude and 106° 35' 5" W longitude (Ramsay 1993:1). The Redtail site was identified in the original survey of the Opimihaw Creek area performed in 1982 – 1983 by Dr. E. G. Walker (Walker 1983). Full-scale excavation was undertaken in 1988 and 1989 by graduate student C. L. Ramsay and undergraduate field school students from the Department of Anthropology and Archaeology under the direction of Dr. E. G. Walker. A total of 77 m<sup>2</sup> were excavated to a maximum depth of 2.3 m (Ramsay 1993:9).

The Redtail site contains 26 cultural occupations over fifteen levels (Ramsay 1993:69). The upper ten occupations were not examined in detail by Ramsay (1993) as the focus of his research was on the lower levels of the site. An analysis of the sod layer to Level 8 is currently underway (Leilani Williams, personal communication 2012). No radiocarbon dates, diagnostic projectile points or pottery were recovered from Levels 1-7 with the exception of Level 2. Four projectile points were found in Level 2 including two Besant and two Avonlea projectile points. Several features were identified throughout these upper levels including hearths and a stone-filled pit (Ramsay 1993:79). Levels 8 – 10 have been tentatively attributed to the McKean series. No diagnostic artifacts were recovered from these levels; however, a pithouse was uncovered in Level 8(2) that is reminiscent of those seen in the southern Northern Plains during the Middle Precontact period (Ramsay 1993:80).

Levels 11 – 13(4) have all been confidently attributed to the McKean series based on a combination of projectile points and radiocarbon dates. Level 11 contains a Hanna projectile point and a radiocarbon date of 3762 ± 80 cal B.P. Level 12(1) does not contain any diagnostic artifacts but has been dated to 3795 ± 80 cal B.P, while Level 12(2) produced both a radiocarbon date (3986 ± 75 cal B.P.) and a Hanna projectile point. Level 13 consists of four occupations identified as 13(1), 13(2), 13(3) and 13(4). Diagnostic artifacts and radiocarbon dates were

obtained for two of the four occupations. McKean series projectile points were recovered from 13(2) and 13(4). Level 13(2) was dated to  $4292 \pm 70$  cal B.P. and  $4372 \pm 70$  cal B.P. while Level 13(4) has been dated to  $4860 \pm 80$  cal B.P (Ramsay 1993:90).

The faunal assemblages in Levels 11-13(4) include small numbers of bison, canids and occasionally leporids. There is also evidence for the procurement of birds, mustelids, amphibians and rodents. Evidence of surface hearths is present in each of these McKean occupations and several pit features were also uncovered. Activity areas tend to focus around concentrations of hearth features and include processing of faunal resources as well as a variety of stages of lithic reduction and tool production using local lithic materials. The occupations are consistent with short-term campsites occupied primarily during the spring and summer months (Ramsay 1993; Webster 2004:33).

Level 14 and Level 15 do not contain diagnostic artifacts; however Level 15(2) has been radiocarbon dated to  $5753 \pm 90$  cal B.P. indicating an Early Middle Precontact period occupation (Ramsay 1993:90). The Level 14 and 15 components are dominated by bison remains and debitage from local lithic materials. The archaeological deposits in these lower occupations are sparse and no features were identified (Ramsay 1993:162, 279, 293).

#### **15.2.6 The Meewasin Creek Site**

The Meewasin Creek site (FbNp-9) is a deeply stratified multi-component campsite consisting of cultural occupations spanning from the Middle Middle Precontact period to the Late Precontact period. The site was first identified by Dr. E. G. Walker in the 1982-1983 survey of the Wanuskewin Heritage Park area (Walker 1983). It is situated in a drainage basin on the bank of the South Saskatchewan River, northeast of the Redtail site (FbNp-10) and southwest of the Cut Arm site (FbNp-22) (Frery 2009:5). Full-scale excavation was undertaken in 1999 to 2001 and again in 2003. A total of  $41 \text{ m}^2$  were excavated to a maximum depth of 2.0 m. The excavations were performed by undergraduate field school students under the direction of Dr. E. G. Walker and the site assemblage was analyzed by graduate student H. E. Frary in 2009 (Frary 2009:22).

The surface of the Meewasin Creek site has a moderate slope which is mirrored to varying degrees in the subsurface deposits. The occupational levels have reasonable stratigraphic separation ranging from quite good in the eastern portion of the site to somewhat

compressed in the west (Frary 2009). The Meewasin Creek site contains ten occupations over seven levels. Level 1 consists of a Historic/Contact period component overlying a Late Precontact period component. Diagnostic artifacts include .22 calibre bullets and precontact pottery (Frary 2009:50-51). No radiocarbon date was obtained and no projectile points were recovered. Level 2 is a Late Precontact period occupation based on the presence of Avonlea pottery and a radiocarbon date of  $1660 \pm 45$  cal B.P. The level has been interpreted as a bison pound that utilized the area's natural topography as a trap (Frary 2009:52).

Level 3 and Level 3A are Late Middle Precontact period campsites. Three projectile points were recovered from Level 3 including a Pelican Lake point, an Un-Named or Outlook complex point and a unidentifiable un-notched triangular point (Frary 2009:63). The level has been dated to  $2090 \pm 125$  cal B.P. Level 3A has also been radiocarbon dated ( $2360 \pm 50$  cal B.P.) and contains a Sandy Creek projectile point (Frary 2009:72). Both Level 3 and 3A exhibit signs of later-stage bison processing and a reliance on local lithic materials (Frary 2009).

Level 4 consists of three components: Level 4, Level 4A and Level 4B (Frary 2009:94). Level 4A contains a Pelican Lake projectile point and a basin-shaped hearth. Level 4B does not contain any diagnostic artifacts; however, a large concentration of lithic artifacts was recovered which has been interpreted as a lithic workshop area. The component was radiocarbon dated to  $2340 \pm 70$  cal B.P. (Frary 2009:93,97). The Level 4 component occurs in the areas of the site where Level 4A and Level 4B cannot be differentiated. A single McKean Lanceolate projectile point was recovered in association with a possible hearth feature (Frary 2009:92). All three Level 4 components are dominated by *B. bison* faunal remains and debitage indicative of lithic retouch activities (Frary 2009:91).

Similar to Level 4, Level 5 at the Meewasin Creek site is comprised of Level 5, Level 5A and Level 5B. No diagnostics or radiocarbon dates were obtained for the Level 5 component (Frary 2009:96). Level 5A contains several expended endscrapers, a hearth feature and a radiocarbon date of  $4120 \pm 120$  cal B.P (Frary 2009:99). Level 5B contains a Duncan projectile point, a hammerstone, a large hafted biface and a possible hearth feature. Based on the date from Level 5A in combination with the diagnostic projectile point from Level 5B the two components are likely from the Middle Middle Precontact period (Frary 2009:100-108).

Level 6 and Level 7 are small, discontinuous components; no diagnostic artifacts were recovered and no radiocarbon dates were obtained for either level. As was seen in the other

levels of the site the faunal assemblages were dominated by *B. bison* with a preference for utilization of local lithic materials (Frary 2009:112).

### **15.2.7 The Wolf Willow Site**

The Wolf Willow site (FbNp-26) is a multi-component habitation site and the tenth site to be excavated within the Wanuskewin Heritage Park. It is located in the bottom of the Opimihaw Creek valley on a point bar directly west of the Opimihaw Creek. The site is situated between the Thundercloud site (FbNp-25) to the north and the Newo Asiniak site (FbNp-16) to the south. The Wolf Willow site was originally identified in the 1982 and 1983 survey of the Opimihaw Creek area by Dr. E. G. Walker (Walker 1983). Excavations at the site began in 2010 and continued in 2011. One additional field season is being undertaken during the summer of 2012. The site is being excavated by undergraduate field school students from the Department of Archaeology and Anthropology led by graduate students Maria Mampe (2010 and 2011) and Devon Stumborg (2012) under the direction of Dr. E. G. Walker. To date, 30 m<sup>2</sup> have been excavated to a maximum depth of .70 m (Maria Mampe, personal communication 2012).

The Wolf Willow site contains four cultural occupations spanning the Historic period to the Middle Middle Precontact period. The uppermost occupation is Level 1 which consists of a small number of Historic artifacts intermixed with Late Precontact period materials including four Plains Side-Notched projectile points. Level 2 also appears to be Late Precontact in nature based on the presence of nineteen Prairie Side-Notched projectile points.

Level 3 and Level 4 are poorly separated in the stratigraphic profiles but clearly represent two separate Middle Precontact period occupations. Level 3 has been identified as a McKean series component and contains three McKean Lanceolate and five Duncan projectile points. Level 4 has been identified as an Oxbow Complex component based on the presence of two Oxbow projectile points. At the time of writing no radiocarbon dates have been obtained; however, several samples are currently awaiting analysis. It is hoped that the results will be useful in confirming and further understanding the culture-history of the site (Maria Mampe, personal communication 2012).

### 15.2.8 The Cut Arm Site

The Cut Arm site (FbNp-22) is a multi-component habitation site with occupations spanning from the Historic to the Early Middle Precontact period. The site is situated in a drainage swale on the north bank of the South Saskatchewan River between the Opimihaw Creek to the east and the Redtail site to the west. The site was first identified in the original survey of the Opimihaw Creek area (Walker 1983). In 2001 and 2002 it was excavated by the Department of Anthropology and Archaeology undergraduate field school under the direction of Dr. E G. Walker. A total of 51 m<sup>2</sup> were excavated to a maximum depth of 210 cm below the surface.

The Cut Arm site contains fifteen cultural occupations across eleven levels. Level 1 consists of a Historic component directly overlying a Contact period component. The diagnostics recovered include European ceramics, a metal projectile point and precontact pottery. Level 2 is a Late Precontact period occupation containing a Plains Side-Notched projectile point and Mortlach phase pottery. The level has been radiocarbon dated to 650 ± 40 cal B.P. Levels 3 and 4 are also Late Precontact period occupations and, while neither of these levels has been dated, both contain Prairie Side-Notched projectile points. Level 5 consists of three components identified as Level 5a, Level 5b and Level 5c. The separation between these components is variable across the site and in certain units the components are indistinguishable from one another. None of the Level 5 components have been radiocarbon dated; however, a Besant projectile point was recovered from Level 5a. Based on the archaeological assemblages it appears likely that the other components of Level 5 share a Besant cultural affiliation.

Level 6, Level 7 and Level 8 have all been identified as McKean series components. Level 6 has been radiocarbon dated to 3550 ± 50 cal B.P. but is lacking any diagnostic artifacts. Based on the faunal remains the level is a late fall/winter occupation. The presence of a habitation structure is suggested by the spatial distribution of artifacts and rocks in the southeast portion of the site. Level 7 is a discontinuous cultural occupation that does not contain any diagnostics or radiocarbon dates. Two dark charcoal stain features were identified in this level and an abrader was recovered in association with a concentration of faunal remains. This component is representative of a short-term campsite dominated by faunal processing and late stage tool manufacture/reduction activities. Level 8 can be identified as a McKean series occupation based on the presence of a McKean lanceolate projectile point and two radiocarbon

dates:  $3690 \pm 50$  cal B.P. and  $3770 \pm 60$  cal B.P. The level contains the largest faunal assemblage at the site and represents a secondary processing locale focused on butchering bison.

Level 9 is a short-term Oxbow complex campsite. The level has a radiocarbon date of  $4270 \pm 55$  cal B.P. and contains an Oxbow projectile point. The deposits are incomplete due to erosion by natural hillslope processes. No features are present but several areas of faunal and lithic concentration are identifiable as well as a noticeably higher percentage of immature *B. bison* remains relative to other levels at the site.

Level 10 is an Early Middle Precontact period occupation. This attribution comes from a projectile point fragment identifiable as Early Side-Notched. All activity during this occupation seems to have been concentrated in and around the hearth feature and charcoal stain in the southeastern area of the site. Level 11 does not contain any diagnostics and no radiocarbon dates were obtained. The assemblage is small but indicative of thoroughly processing faunal remains and minor tool resharpening activities.

The faunal assemblages throughout the Cut Arm site consist almost entirely of *B. bison* remains occasionally supplemented by a small number of rodent and *Canis sp.* remains. Level 10 is an exception to this trend as a large percentage of the identified faunal specimens in the level are canid. The dominant lithic materials utilized at the Cut Arm site are locally obtainable. The lithic activities that were occurring appear to have been late stage tool manufacture and resharpening. As a whole, the Cut Arm site was repeatedly utilized as a campsite from the Early Middle Precontact period up to the Late Precontact period but also appears to have functioned as a secondary processing locale during the Middle Middle Precontact period.

### **15.3 The Opimihaw Creek Valley as an Island on the Plains**

The preceding discussion demonstrates that occupants of the Northern Plains chose to exploit the Opimihaw Creek area repeatedly throughout the Middle Precontact period. In order to understand the nature of human settlement and subsistence patterns in central Saskatchewan it is necessary to elucidate the role that the Opimihaw Creek valley played in these systems. It is the argument of this thesis that the area can be understood as a terrestrial island that exerted a pull on the occupants of the plains thereby shaping their behavior in relation to subsistence, settlement and mobility decisions.

### ***Boundedness***

One of the most consistent terms used in describing terrestrial islands is “boundedness”. The Opimihaw Creek area is superficially defined by the confines of the Wanuskewin Heritage Park. This is a modern boundary created by the division of the area for sale and settlement. By examining topographic maps as well as the results of an analysis of the visual barriers of the area (Landplan Collaborative Ltd. 1983:Figure 7, Figure 8) an outline of the terrestrial island can be projected (Figure 15.2). The island encompasses the Opimihaw Creek, the valley slopes and the immediately adjacent uplands that transition into the formerly homogeneous prairie surface. Movement beyond the outlined area quickly results in a loss of visibility of the valley. The environment beyond the valley area does not contain the same topographic or biological diversity.

The Middle Precontact period sites discussed in section 15.2 are situated in a variety of settings within the proposed terrestrial island boundary. The Redtail site, Meewasin Creek site and Cut Arm site occupy the drainage swales on the northern bank of the South Saskatchewan River (Figure 15.2). The dimensions, grade and distribution of vegetation is slightly different within each of these swales; factors that may well have played a role in which swale was chosen for occupation (Landplan Collaborative Ltd. 1983:Figure 5). The Dog Child site, Wolf Willow site, Thundercloud site, Newo Asiniak and Amisk site are situated in the valley bottom on old terraces and point bars (Figure 15.2). All of these sites are in close proximity to the creek on flat topography with good shelter from the high valley walls.

### ***Resource Diversity and Density***

Within the narrow boundaries of the Opimihaw Creek area the diversity and density of resources is considerably higher than the surrounding prairie. There are multiple microenvironments all in immediate proximity to one another that are not seen concentrated within one area elsewhere in the surrounding landscape. These microenvironments include the Upland Zone, the Valley Slope Zone and the Lowland Zone as well as the Opimihaw Creek and the South Saskatchewan River. These physiographic subsections of the island make the area an attractive locale for a wide range of plant and animal life. Faunal remains from the area’s Middle Precontact period sites include but are not limited to bison, mule deer, elk, wolf, coyote, fox, rabbit, skunk, ground squirrel, mouse, duck, grouse, finch, frog, fish and gastropods. While the resources available in the island vary with the season, their predictability is high for any



**Figure 15.2:** Proposed boundaries of Opimihaw Creek valley terrestrial island (Adapted from *GoogleEarth*<sup>TM</sup> 2006; Landplan Collaborative Ltd. 1983:Figure 7).

organism aware of this cycle. This predictability makes the area a “high contingency” patch. As explained by Ebert and Kohler (1988) a high contingency patch has good resource predictability based on typical seasonal and short-term climatic cycles (MacDonell and Wandsnider 2003). Resource predictability combined with resource diversity lowers the risk to organisms choosing to exploit the area by increasing the chance that occupation of the valley will provide sufficient return. For example, small groups of bison are known to have exploited sheltered, wooded and ecologically diverse locations such as the Opimihaw Creek valley and would have been a relatively reliable food source for human occupants of the area (Epp 1988). The consistent presence of small numbers of bison within every Middle Precontact period occupation in the island supports this conclusion.

The Opimihaw Creek area can also be considered a “high density” patch. This patch type is particularly resistant to changes due to climatic variation (Brunswig 2003:45) such as the palaeoclimatic changes that occurred over the Middle Precontact period. Coinciding with the Early Middle Precontact period was a warming and drying trend known as the Altithermal or Atlantic. The Sub-Boreal climatic trend roughly corresponds to the Middle Middle Precontact period and brought cooler temperatures to the plains similar to that seen today (Vance et al. 1995). By the Late Middle Precontact period the climate was shifting yet again to the cooler and wetter climate of the Sub-Atlantic period that continued into the Late Precontact (Geel et al. 1996). This sequence of palaeoclimatic changes affected the entire Northern Plains in a time-transgressive and episodic fashion (Robertson 2011). Regardless of the climatic variations that occurred, humans continued to utilize the Opimihaw Creek valley area as is evidenced by the presence of multiple cultural occupations from each stage of the Middle Precontact period. This indicates that the valley area remained a terrestrial island throughout the climatic changes of the Middle period because of its stable core features including topography, availability of water and resource diversity.

### ***Ceremonial and Spiritual Significance***

The Opimihaw Creek area holds modern spiritual significance for aboriginal people of the area. In an analysis of ceremonial and spiritual sites using ethnographic and archaeological data Sundstrom (2003:259) notes that people will often consider areas as spiritual that are of significance to other groups or were significant in the past. Whether there is a history of utilization of the creek valley for spiritual purposes cannot be determined with certainty;

however, there are natural features as well as archaeological evidence that suggest a history of spiritual use.

The Opimihaw Creek Medicine Wheel (FbNp-2) is the most northerly medicine wheel recorded on the Northern Plains. It is located in the far southeast extent of the Opimihaw Creek area on the prairie uplands east of the Redtail site. The site is a boulder alignment consisting of a central stone cairn with a peripheral ring and three outlying smaller stone cairns. It is an atypical medicine wheel in that there are no radiating spokes connecting the cairns and peripheral ring. Diagnostic artifacts associated with the boulder alignment include a small side-notched projectile point and several sherds of precontact pottery indicating a Late Precontact period cultural affiliation (Walker 1983). Medicine wheels are primarily identified as having been made during the Historic, Contact and Late Precontact periods; however, there are medicine wheels on the Northern Plains without radiocarbon dates that may have older origins. Historical and ethnographic records attest to the spiritual nature of medicine wheel sites. The specific purpose of these features is not known but has been interpreted as being associated with a range of activities including sundance and medicine lodge ceremonies, vision quests, burials, alignment with astronomical phenomena, calendrical purposes, places for prayer and offering and world centre shrines (Bender 2008; Goodjohn 1997). The presence of a medicine wheel within the boundaries of the Opimihaw Creek terrestrial island provides strong evidence for the area having sacred significance.

Birds are important animals in aboriginal plains mythology and Sundstrom (2003:283) identifies eagle trapping grounds as one type of spiritual site. Birds of prey were identified in the faunal remains of Level 3b at the Dog Child site including Bald Eagle (*Haliaeetus leucocephalus*), Red-tailed Hawk (*Buteo jamaicensis*) and Swainson's Hawk (*Buteo swainsonii*) (Pletz 2010:190). A falcon talon (Falconiformes family) was also recovered from Level 8 at the Redtail site (Ramsay 1993:182). These species are not typically chosen for consumption and while their presence is not sufficient to conclude the area is a trapping ground, they likely indicate ceremonial activities were taking place.

Wood is an important resource on the Northern Plains because of its many potential uses and the heterogeneous nature of its availability. Sundstrom (2003:288) identifies locations where wood can be harvested as significant because of ceremonial associations of items made from the material. Precontact uses of wood include fuel, tipi poles, bows, arrow shafts and pipe

stems. Wood was certainly available in the Opimihaw Creek area as is evidenced by a multitude of hearth features and charcoal stains in the valley's archaeological sites. It is likely that reliable availability of wood contributed to the value of the valley for human groups.

Another resource which has archaeological evidence for exploitation is medicinal plants. At least twenty plant species with medicinal properties have been identified in the Wanuskewin Heritage Park (Densmore 1974; Webster 1999:Appendix 1). Several of these have also been recovered from Middle Precontact period occupations in the park including the Redtail site (Ramsay 1993:239) and the Thundercloud site (Ramsay 1993:239; Webster 1999:130, 159). There is no way to definitively determine how the plants entered the assemblages, although it is possible they were intentionally collected for medicinal or ceremonial purposes. Residue analysis of stone tools may lend support to the hypothesis that the presence of these plants is cultural.

Other archaeological indicators of ceremonial or religious activities include perforated elk teeth, shells, awls, beads, items of personal adornment and ochre (Sundstrom 2003:283). Several of these items were found in the Middle Precontact period components in the Opimihaw Creek area. The crown of an elk (*Cervus elaphus*) canine was recovered from Level 6 of the Thundercloud site (Webster 1999:174). The tooth fragment was polished and interpreted as possibly being part of a pendant. No other elk remains were identified, indicating intentional curation of this item that has no apparent utilitarian purpose. Shells from snails (*Gastropoda*), and clams (*Pelecypoda*) were recovered at several sites (Amundson 1986; Pletz 2010; Ramsay 1993; Webster 1999); however, their presence has usually been explained as the result of flooding not cultural factors (Pletz 2010:122; Webster 1999:156). A bone awl and a stone awl were recovered from Level 3b at the Dog Child site (Pletz 2010:182, 207). Bone awls were also recovered from Levels 3 and 6 at the Amisk site (Amundson 1986:114, 149), Level 6 at the Newo Asiniak site (Kelly 1986:195) and Level 6 at the Thundercloud site (Mack 2000:207). Pieces of ochre were recovered from Cut Arm, Dog Child and Redtail. Ochre-stained bone was recovered from Level 3b of the Dog Child site (Pletz 2010:215).

## 15.4 Chapter Conclusion

Archaeology regularly adopts theoretical aspects of other disciplines in an attempt to gain new perspectives on the past. The incorporation of theories from ecology, evolutionary ecology and island biogeography into archaeology has been done from several perspectives with multiple goals over the past 50 years. A particular off-shoot of incorporating other disciplines' theories is the discussion of terrestrial islands and the relationships humans have with these unique locations. This is a discussion that holds considerable potential for human applications ranging from purely economic to more cultural. The terrestrial island concept and underlying theories are useful in understanding human subsistence and mobility. This application can help address questions such as how humans move across and use the landscape as well as how the landscape affects the actions and choices of humans. At the same time, how humans negotiate the landscape in a cultural way and how that is intertwined with mobility and resource exploitation, can be examined. In this particular case, it has been argued that Wanuskewin Heritage Park is a terrestrial island and was recognized as such throughout the Middle Precontact period. The area is one of high resource diversity, density and predictability representing a unique, bounded feature on the region's landscape. The high density of occupations from this time strongly support that the area was viewed as an important location on the landscape. The area was repeatedly utilized for short-term habitation, hunting and processing. This requires intentional planning of movement, hunting and settlement thereby going beyond simple human exploitation of a resource. Instead, the island becomes an influential factor in the decisions and actions of human occupants of the area. As a unique resource on the Northern Plains the Opimihaw Creek area was one factor that shaped human settlement and subsistence decisions.

## **Chapter 16**

### **Summary and Conclusions**

#### **16.1 Summary of the Cut Arm Site**

The Cut Arm site (FbNp-22) is a well-stratified, multi-component site on the Northern Plains. It is situated in a drainage swale on the west bank of the South Saskatchewan River within the boundaries of Wanuskewin Heritage Park. The park is roughly 2.5 km north of Saskatoon and is centered around the Opimihaw Creek valley. While the area has been recognized as one of substantial archaeological importance since the 1930s, it was not until the early 1980s that a complete survey of the area was undertaken. The Cut Arm site is one of the nineteen precontact sites identified within Wanuskewin Heritage Park. The site was excavated in 2001 and 2002 as part of ongoing archaeological research in the area.

The goals of this thesis are centered on the analysis and interpretation of the archaeological materials from the Cut Arm site and can be summarized as four main objectives. The first was the reconstruction of the culture-historical sequence at the Cut Arm site. This was achieved through the identification of diagnostic artifacts, radiocarbon dating and careful examination of the site stratigraphy. The second objective was to better understand the settlement and subsistence strategies through time by determining how and why the site was utilized. The third objective was to employ the data and interpretation gleaned from the Cut Arm site assemblage to understand how these components fit into and further elucidate the trends seen throughout the human occupation of the Northern Plains. The fourth objective was to investigate the role of the Opimihaw Creek area in human mobility, settlement and subsistence patterns during the Middle Precontact period.

The first, second and third objectives were met in Chapters 2 to 14. There are fifteen cultural occupations across the eleven levels of the site representing a total of eight cultural phases. The radiocarbon dates range from  $650 \pm 40$  cal B.P. to  $4270 \pm 55$  cal B.P.; however, the assemblage contains diagnostic materials extending both earlier and later than these dates (Table

16.1). Based on the combined data from radiocarbon dating and diagnostic artifacts, the Cut Arm site was occupied from the Early Middle Precontact to the Historic period.

**Table 16.1:** Cultural chronology of the Cut Arm site with radiocarbon dates and diagnostic artifacts.

<b>Cultural Level</b>	<b>Radiocarbon Age (Calibrated Age after <sup>13</sup>C Correction)</b>	<b>Diagnostic Artifacts</b>	<b>Cultural Affiliation</b>
1	-	20th century European ceramics, .22 calibre bullet, metal projectile point	Historic/Contact
2	650 ± 40 cal B.P.	Plains Side-Notched projectile point, Mortlach phase pottery	Late Precontact
3	-	Prairie Side-Notched projectile points (4), Old Woman's tradition pottery	Late Precontact
4	-	Prairie Side-Notched projectile point, possible Avonlea pottery	Late Precontact
5a	-	-	Late Precontact
5b	-	Besant projectile point (2)	Late Precontact
5c	-	-	Late Precontact
6	3550 ± 50 cal B.P.	-	Middle Middle Precontact
7	-	-	Middle Middle Precontact
8	3690 ± 50 cal B.P.	McKean Lanceolate projectile point	Middle Middle Precontact
	3770 ± 60 cal B.P.		
9	4270 ± 55 cal B.P.	Oxbow projectile point	Middle Middle Precontact
10	-	Early Side-Notched projectile point	Early Middle Precontact
11	-	-	Early Middle Precontact

The stratigraphy of the site has been shaped by its unusual position within a sloped drainage swale. While there is generally good stratigraphic separation of the cultural occupations, differential deposition of sediment from the surrounding hills has had several effects. First, the slope of the surface is mirrored in the subsurface deposits resulting in occupational layers with deceptively large depth ranges across the site. Second, the stratigraphy of the northwestern units of the site is more compressed than the southeastern units, which exhibit better separation. It is the southeastern units that have the largest cultural deposits and where the most complete picture of the site's occupational history can be obtained.

There are a number of trends that can be identified at the Cut Arm site. In regards to stone tools and debitage, the lithic assemblages are consistently dominated by locally obtainable materials. This is to be expected, as site assemblages on the Canadian Plains are typically dominated by local, readily available toolstone. The notable exception to this trend is Level 6, which contains primarily Knife River Flint. Participation in long-distance trade is evidenced by the small numbers of exotics present throughout the occupational layers. While there is a small amount of evidence for tool manufacture in Levels 1, 5 and 10, the dominant lithic activity over time was tool retouch and resharpening based on the large number of secondary flakes and shatter.

The faunal assemblages of each level are overwhelmingly composed of *B. bison* specimens. The most frequent elements recovered were complete or nearly complete *B. bison* distal limb elements. The next most common faunal remains were fragmented axial and proximal limb elements identifiable only to the Very Large Mammal size class. This pattern could indicate that higher-utility items were generally too thoroughly processed to be identifiable but also suggests that the site's occupants were not under sufficient dietary stress to require processing of the low-utility items for marrow. Several exceptions include a predominance of *B. bison* cranial fragments in Levels 6, 8 and 9 as well as a large number of *Canis sp.* specimens in Level 10.

Finally, a trend can be observed in the frequent presence of hearths and cooking features. Hearths or evidence of former hearths are present in Levels 2, 4, 5b, 6, 7, 8 and 10. The features, in combination with the small numbers of *B. bison* and varied lithic assemblages, are consistent with the repeated utilization of the site as a short-term campsite. The only exception to this is in Level 8 where the higher number of vertebra and rib fragments with a lower degree of fragmentation indicates the site was used as a processing locale.

The fourth major objective of this thesis was met in an examination of the terrestrial island concept and subsequent investigation of the Opimihaw Creek valley as an island on the plains. The presence of eight sites each containing multiple Middle Precontact period occupations is a testament to the attraction of this unique feature. The area was repeatedly chosen for short-term habitation, small-scale hunting and secondary animal processing. There is also evidence to suggest that the Opimihaw Creek valley held spiritual significance and was a sacred place on the landscape. As a terrestrial island with unique topographic features, high

resource diversity and predictability the Opimihaw Creek area appears to have exhibited a substantial pull on the occupants of the region throughout the Middle Precontact period; as such, it was a shaping factor in the mobility, settlement and subsistence decisions of the plains precontact people.

## **16.2 Future Research**

In terms of the Cut Arm site, no additional excavation is recommended. A substantial sample of the drainage swale has been excavated and the site's culture-historical sequence has been reconstructed. A detailed re-analysis of the Cut Arm site's lithic assemblage would be worthwhile. The current analysis was intended to provide an overview of the entire site assemblage and only identified debitage to the degree of secondary flakes. Further identification of the debitage and cores may allow for a more in-depth reconstruction of the lithic activities that were occurring.

Continued excavation of the remaining precontact sites in the Wanuskewin Heritage Park is certainly an important aspect of the archaeological research in the area. This is highly recommended as it will help to develop a more detailed understanding of human occupation of the Northern Plains. Whether or not the Opimihaw Creek area has acted as a terrestrial island in the Late Precontact period as well as the Middle Precontact period is a question that can hopefully be investigated once more has been learned about additional sites in the valley and beyond.

It is the opinion of the author that the terrestrial island concept holds promise for predicting other areas of high archaeological potential on the Northern Plains. Targeting areas for archaeological survey that match the characteristics of a terrestrial island could be an excellent way to identify other landscape features that were intensively occupied. Additionally, consideration of the effect these unique areas on the landscape have on the decisions of precontact people is an important step in the broader reconstruction of settlement and subsistence patterns on a regional scale.

## References Cited

- Acton, D. F. and J. G. Ellis  
1978 *The Soils of the Saskatoon Map Area 73-B Saskatchewan*. Saskatoon Institute of Pedology, Saskatoon.
- Acton, D. F., G. A. Padbury and C. T. Stushnoff  
1998 *The Ecoregions of Saskatchewan*. Canadian Plains Research Center/Saskatchewan Environment and Resource Management, Regina.
- Amundson, L. J.  
1986 The Amisk Site: A Multi-Component Campsite in South-Central Saskatchewan. Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.
- Antevs, E.  
1955 Geologic-Climatic Dating in the West. *American Antiquity* 20(4):317-335.
- Banfield, A. W. F.  
1974 *The Mammals of Canada*. University of Toronto Press, Toronto
- Banks, W. E.  
2003 Catchment Basins as Islands in West-Central Oklahoma: Farra Canyon. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.67-88. University of Utah Press, Salt Lake City.
- Bender, H. E.  
2008 Medicine Wheels or "Calendar Sites": Indian Time or the Space/Time Continuum. *Time & Mind: The Journal of Archaeology, Consciousness & Culture* 1:195-206.
- Bradley, B.  
2010 Paleoindian Flaked Stone Technology on the Plains and in the Rockies. In *Prehistoric Hunter-Gatherers of the High Plains and Rockies*, edited by M. Kornfeld, G. C. Frison and M. L. Larson, pp. 463-498. Left Coast Press, Walnut Creek, California.
- Bradley, B. and D. Stanford  
2004 The North Atlantic Ice-Edge Corridor: A Possible Paleolithic Route to the New World. *World Archaeology* 36(4):459-478.

Brink, J. and S. J. Baldwin

1988 The Highwood River Site: A Pelican Lake Phase Burial from the Alberta Plains. *Canadian Journal of Archaeology* 12:109-139.

Brunswig, R. H.

2003 Prehistoric Utilization of Patch Environments and Culture Change in Colorado's Central High Plains. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.167-192. University of Utah Press, Salt Lake City.

Buchner, A. P.

1980 *Cultural Responses to Altithermal (Atlantic) Climate Along the Eastern Margin of the North American Grasslands 5500 to 3000 B.C.* National Museum of Man, Ottawa.

Burt, A. K.

1997 Landscape Evolution at Wanuskewin Heritage Park, Saskatoon, Saskatchewan. Unpublished Master's thesis, Department of Geography, University of Saskatchewan, Saskatoon.

Byers, D. A., W. Allen and J. W. Fisher, Jr.

2003 Investigations in the Bridger Mountain Range, Montana: A Backyard Archaeology Project. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.167-192. University of Utah Press, Salt Lake City.

Charnov, E. L.

1976 Optimal Foraging, the Marginal Value Theorem. *Theoretical Population Biology* 9:129-136.

Christiansen, E. A. and E. K. Sauer

1998 Geotechnique of Saskatoon and Surrounding Area, Saskatchewan, Canada. In *Urban Geology of Canadian Cities*, edited by P. F. Karrow and O. L. White, pp. 117-145. Geological Association of Canada, St. John's, Newfoundland.

Cloutier, R.

2004 Testing Contemporaneity: The Avonlea and Besant Complexes on the Northern Plains. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Corbeil, Marcel R.

1995 The Archaeology and Taphonomy of the Heron Eden Site, Southwestern Saskatchewan. Unpublished Master's Thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

- Cyr, Talina J.  
 2006 The Dog Child Site (FbNp-24): A 5500 Year-Old Multicomponent Site on the Northern Plains. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.
- Dawson, S. M. and E. G. Walker  
 1988 The Bethune Site: An Avonlea Burial from Saskatchewan. *Saskatchewan Archaeology* 9:3-14.
- Densmore, F.  
 1974 *How Indians Use Wild Plants for Food, Medicine and Crafts*. Dover Publications Inc., New York.
- Dyck, Ian  
 1970 Two Oxbow Settlement Types in Central Saskatchewan. *Na'pao* 2(2):1-29.
- 1983 The Prehistory of Southern Saskatchewan. In *Tracking Ancient Hunters*, edited by H. T. Epp and I. Dyck, pp. 63-139. Saskatchewan Archaeological Society, Regina.
- Dyck, Ian and Richard E. Morlan  
 1995 *The Sjøvold Site: A River Crossing in the Northern Plains*. Mercury Series, No. 151. Archaeological Survey of Canada, Canadian Museum of Civilization, Hull, Quebec.
- Ebell, S. Biron  
 1980 *The Parkhill Site: An Agate Basin Surface Collection in South Central Saskatchewan*. Saskatchewan Department of Culture and Youth, Regina.
- Ebert, J. I., and T. A. Kohler  
 1988 The Theoretical Basis of Archaeological Predictive Modeling and a Consideration of Appropriate Data-Collection Methods. In *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling*, edited by J. W. Judge and L. Sebastian, pp.97-171. U.S. Department of the Interior, Bureau of Land Management, Denver.
- Ellis, J. G. and H. B. Stonehouse  
 1970 Pedology. In *Physical Environment of Saskatoon, Canada*, edited by E.A. Christiansen, pp. 19-20. Saskatchewan Research Council in Cooperation with the National Research Council of Canada, Ottawa.
- Epp, H. T.  
 1988 Way of the Migrant Herds: Dual Dispersion Strategy Among Bison. *Plains Anthropologist* 33(121):309-320.
- 1991 *Long Ago Today: The Story of Saskatchewan's Earliest Peoples*. Saskatchewan Archaeological Society, Saskatoon.

- Finnigan, J.T. and E. Johnson  
 1984 The Elma Thompson Site: A Besant Phase Tipi Ring in the West-Central Saskatchewan Plains. *Saskatchewan Archaeology* 5:27-35.
- Fladmark, K. R.  
 1979 Alternate Migration Corridors for Early Man in North America. *American Antiquity* 44(1):55-69.
- Frary, H. E.  
 2009 The Meewasin Creek Site (FbNp-9): A Re-Examination of the Terminal Middle Precontact Period. Unpublished Master's thesis, Department of Archaeology and Anthropology, University of Saskatchewan, Saskatoon.
- Frison, G. C.  
 1975 Man's Interaction with Holocene Environments on the Plains. *Quaternary Research* 5(2):289-300.
- 1978 *Prehistoric Hunters of the High Plains*. Academic Press, New York.
- 1991 *Prehistoric Hunters of the High Plains*. Second edition, Academic Press, San Diego.
- 1993 North American High Plains Paleo-Indian Hunting Strategies and Weaponry Assemblages. In *From Kostenki to Clovis: Upper Paleolithic – Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Pruslov, pp. 237-249.
- Frison, G. C. and B. Bradley  
 1980 *Folsom Tools and Technology at the Hanson Site, Wyoming*. University of New Mexico Press, Albuquerque.
- Frison, G. C. and D. J. Stanford  
 1982 *The Agate Basin Site: A Record of the Paleoindian Occupation of the Northwestern High Plains*. Academic Press, New York.
- Frison, G. C. and L. C. Todd  
 1987 *The Horner Site: The Type Site of the Cody Cultural Complex*. Academic Press, Orlando.
- Fung, K (editor)  
 1999 *Atlas of Saskatchewan*. 2nd edition. University of Saskatchewan, Saskatoon.
- Geel, B. V., J. Buurman, and H. T. Waterbolk  
 1996 Archaeological and Palaeoecological Indications of an Abrupt Climate Change in the Netherlands, and Evidence for Climatological Teleconnections Around 2650 BP. *Journal of Quaternary Science* 11(6):451-460.

Goodjohn, M. T.

1997 Sacred Sites and Secular Reasoning: Managing the Majorville Medicine Wheel Area. Unpublished Master's thesis, Department of Resources and the Environment, University of Calgary.

Google Earth

2006 Map of Saskatoon area. Electronic document, accessed January, 2010 and April, 2012.

Hanna, Margaret G.

1976 *The Moose Bay Burial Mound: EdMq-1*. Anthropological Series No. 3. Saskatchewan Museum of Natural History, Saskatchewan Department of Tourism and Natural Resources, Regina.

Hare, F. K. and M. K. Thomas

1979 The Prairie Region. In *Climate Canada*, pp. 100-103. 2nd edition. John Wiley & Sons Canada Limited, Toronto.

Harty, J. L.

2005 An Examination of Late Plains Period Occupations as Seen from FbNp-1. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Haynes, C. V.

1964 Fluted Projectile Points: Their Age and Dispersion. *Science* New Series 145:1408-1413.

2005 Pre-Clovis, Climate Change and Extinction. In *Paleoamerican Origins: Beyond Clovis*, edited by R. Bonnicksen, B. T. Lepper, D. Stanford and M. R. Waters, pp. 113-133. Centre for the Study of the First Americans, Department of Anthropology, Texas A&M University, College Station, Texas.

Hurt, W. R.

1966 The Altithermal and the Prehistory of the Northern Plains. *Quaternaria* 8:101-13.

Irwin, H. T. and J. O. Brew

1968 Archaeological Investigations at the Hell Gap Site near Guernsey, Wyoming, 1963. In *National Geographic Society Research Reports, 1963 Projects*, edited by P. H. Oehser, pp. 151-156. National Geographic Society, Washington D.C

Jennings, J. D.

1957 *Danger Cave*. University of Utah, Anthropological Papers 27. University of Utah Press, Salt Lake City.

Jochim, M. A.

1976 *Hunter-Gatherer Subsistence and Settlement Strategies*. Academic Press, New York, New York.

Johnson, E. A.

1998 Properties and Sources of Some Saskatchewan Lithic Materials of Archaeological Significance. *Saskatchewan Archaeology: The Journal of the Saskatchewan Archaeological Society* Vol. 19.

Kehoe, Thomas F.

1973 *The Gull Lake Site: A Prehistoric Bison Drive Site in Southwestern Saskatchewan*. Milwaukee Public Museum Publications in Anthropology and History, No. 1. Milwaukee Public Museum, Milwaukee, Wisconsin.

1974 The Large Corner-notched Point System of the Northern Plains and Adjacent Woodlands. In *Aspects of Upper Great Lakes Anthropology: Papers in Honor of Lloyd A. Wilford*, edited by Elden Johnson, pp. 103-114. Minnesota Historical Society, St. Paul.

Kehoe, Thomas F. and B. A. McCorquodale

1961 Avonlea Point-Horizon Marker for the Northwestern Plains. *Plains Anthropologist* 6:179-188.

Kelly, D. L.

1986 The Newo Asiniak Site: A Multicomponent Bison Procurement Site in Central Saskatchewan. Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

King, D.R.

1961 The Bracken Cairn: A Prehistoric Burial. *The Blue Jay* 19(1): 45-53.

Kooyman, B. P.

2000 *Understanding Stone Tools and Archaeological Sites*. University of Calgary Press, Calgary.

Kornfeld, M., G. C. Frison and M. L. Larson (editors)

2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies*. 3<sup>rd</sup> edition. West Coast Press, Walnut Creek, California.

Kornfeld, M. and A. J. Osborn (editors)

2003 *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*. University of Utah Press, Salt Lake City.

Landplan Collaborative Ltd.

1983 Tipperary Creek Master Plan Study. Meewasin Valley Authority, Saskatoon.

Lehmer, D. J. and W. W. Caldwell

1966 Horizon and Tradition in the Northern Plains. *American Antiquity* 31(4):511-516.

Lemmen, D. and L. Dale-Burnett

1999 The Palliser Triangle. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 40-41.

Levine, S. A. and R. T. Paine

1974 Disturbance, Patch Formation, and Community Structure. *Proceedings of the National Academy of Science* 71:2744-2747.

Litwinionek, L., E. Johnson, and V. T. Holliday

2003 The Playas for the Southern High Plains: An Archipelago of Human Occupation for 12,000 Years on the North American Grasslands. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.21-43. University of Utah Press, Salt Lake City.

Longley, R. W.

1972 *The Climate of the Prairie Provinces*. Climatological Studies Number 13, Atmospheric Environments Services, Environment Canada, Toronto.

Lyman, R. L.

1994 Quantitative Units and Terminology in Zooarchaeology. *American Antiquity* 59(1):36-71.

Mack, L.

2000 The Thundercloud Site (FbNp-25): An Analysis of a Multi-Component Northern Plains Site and the Role of Geoarchaeology in Site Interpretation. Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

Mandryk, C.A.S., H. Josenhans, D.W. Fedje and R.W. Mathewes

2001 Late Quaternary Paleoenvironments of Northwestern North America: Implications for Inland versus Coastal Migration Routes. *Quaternary Science Reviews* 20:301-314.

Maybank, J. and J. Bergsteinsson

1970 Climate of Saskatoon. In *Physical Environment of Saskatoon, Canada*, edited by E.A. Christiansen, pp. 22-36. Saskatchewan Research Council in Cooperation with the National Research Council of Canada, Ottawa.

MacDonell, G. H. and L. Wandsnider

2003 The Western Niobrara River: An Inter-Island Passage on the Plains. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.167-192. University of Utah Press, Salt Lake City.

McDonald, J. N.

1981 *North American Bison: Their Classification and Evolution*. University of California Press, Berkeley.

McKern, W. C.

1939 The Midwestern Taxonomic Method as an Aid to Archaeological Cultural Study. *American Antiquity* 4(4):301-13.

Meyer, D.

1985 A Composite of the Scottsbluff Tradition: Excavations at the Niska Site. *Canadian Journal of Archaeology* 9:1-37.

1999 Precontact Archaeology of Northern Saskatchewan. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 23-24. University of Saskatchewan, Saskatoon.

Meyer, D. and M. Rollans

1990 The Case for (Canadian) Besant Pottery. Paper presented at the 31st Annual Meeting of the Western Association of Sociology and Anthropology. Morley, Alberta.

Meyer, D. and D. Walde

2009 Rethinking Avonlea: Pottery Wares and Cultural Phases. *Plains Anthropologist* 54(209):49-73.

Millar, J.F.V., H. Epp, T.W. Foster, J.S. Wilson, and G. Adams

1971 The Southwestern Saskatchewan Archaeological Project Preliminary Report. *Na'pao* 3(2):13-21.

Morlan, R. E.

1992 A Compilation and Evaluation of Radiocarbon Dates in Saskatchewan. *Saskatchewan Archaeology* 13:3-84.

1994 Oxbow Bison Procurement As Seen From the Harder Site, Saskatchewan. *Journal of Archaeological Science* 21:757-777.

Mulloy, W. B.

1954 The McKean Site in Northeastern Wyoming. *Southwestern Journal of Anthropology* 10(4): 432-460.

1958 *A Preliminary Historical Outline for the Northwestern Plains*. University of Wyoming Publications 22 University of Chicago, Chicago.

Nero, Robert W. and Bruce A. McCorquodale

1958 Report of an Excavation at the Oxbow Dam Site. *The Blue Jay* 16(2):82-90.

Osborn, A. J. and M. Kornfeld

2003 Biogeographical Islands and Ecological Patches: Seeing the Great Plains From the Inside Out. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.1-18. University of Utah Press, Salt Lake City.

Park, Robin J.

2010 A Culture of Convenience? Obsidian Source Selection in Yellowstone National Park. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Peck, T. R.

2011 *Light from Ancient Campfires: Archaeological Evidence for Native Lifeways on the Northern Plains*. AU Press, Athabasca University, Edmonton.

Peck, T. and J. Ives

2001 Late Side-Notched Projectile Points on the Northern Plains. *Plains Anthropologist* 46(176):163-193.

Phillips, P. and G. R. Willey

1953 Method and Theory in American Archaeology: An Operational Basis for Culture-Historical Integration. *American Anthropologist* 55(5):615-633.

Pianka, E.

1988 *Evolutionary Ecology*. 4<sup>th</sup> edition. Harper and Row, New York.

Pletz, J. R.

2010 Archaeological Investigations at the Dog Child Site (FbNp-24): An Evaluation of Mummy Cave Subsistence Patterns. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Ramsay, C. L.

1993 The Redtail Site: A McKean Habitation in South Central Saskatchewan. Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

Reeves, B. O. K.

1973 The Concept of the Altithermal Cultural Hiatus in Northern Plains Prehistory. *American Anthropologist* 75(5):1221-1253.

Reimer, P. J., M. G. L. Baillie, E. Bard, A. Bayliss, J. W. Beck, C. Bertrand, P. G. Blackwell, C. E. Buck, G. Burr, K. B. Cutler, P. E. Damon, R. L. Edwards, R. G. Fairbanks, M. Friedrich, T. P. Guilderson, K. A. Hughen, B. Kromer, F. G. McCormac, S. Manning, C. Bronk Ramsey, R. W. Reimer, S. Remmele, J. R. Southon, M. Stuiver, S. Talamo, F. W. Taylor, J. van der Plicht, and C. E. Weyhenmeyer

2004 IntCal04 Terrestrial Radiocarbon Age Calibration, 0–26 Cal K yr BP. *Radiocarbon* 46:1029-1058.

Robertson, E. C.

2011 Reassessing Hypsithermal Human-Environment Interaction on the Northern Plains. *Geological Society, London, Special Publications* 352:181-194.

- Russell, D.  
1999 Fur Trade Journeys 1961 – 1808. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 32-33.
- Russell, D. and D. Meyer  
1999 The History of the Fur Trade ca 1682 - Post 1821. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 33.
- Rutherford, J. S.  
2004 Hillslope Sediment and Landscape Evolution in Wanuskewin Heritage Park: A Geoarchaeological Interpretation. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.
- Smith, A.  
1999 Birds. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 154. University of Saskatchewan, Saskatoon.
- Smith, B. J.  
1986 The Leuret Site. Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.
- Smith, E. A. and B. Winterhalder  
1992 *Evolutionary Ecology and Human Behavior*. Aldine de Gruyter, New York, New York.
- Stephenson, R. L.  
1965 Quaternary Human Occupation of the Plains. In *The Quaternary of the United States*. H. E. Wright, Jr. and D. G. Frey, Eds. Princeton: Princeton University Press. pp. 685-696.
- Stuiver, M. and P. Reimer  
1986 A Computer Program for Radiocarbon Age Calibration. *Radiocarbon* 28(2B):1022-1030.
- 1993 Extended C14 Data Base and Revised Calib 3.0 C14 Age Calibration. *Radiocarbon* 35(1): 215-230.
- 2000 Radiocarbon Calibration Program, CALIB Rev. 4.3.
- Stuiver, M., P. J. Reimer, E. Bard, J. W. Beck, G. S. Burr, K. A. Hughen, B. Kromer, F. G. McCormac, J. V. D. Plicht, and M. Spurk  
1998 INTCAL98 radiocarbon age calibration 24,000-0 cal BP. *Radiocarbon* 40(3):1041-1083.
- Sundstrom, L.  
2003 Sacred Islands: An Exploration of Religion and Landscape in the Northern Great Plains. In *Islands on the Plains: Ecological, Social, and Ritual Use of Landscapes*, edited by Marcel Kornfeld and Alan J. Osborn, pp.258-300. University of Utah Press, Salt Lake City.

- Thorpe, J.  
1999 Dominant Soils. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, ed., pp. 130-137. University of Saskatchewan, Saskatoon.
- Vance, R. E., A. B. Beaudoin, and B. H. Luckman  
1995 The Paleoeological Record of 6 ka BP Climate in the Canadian Prairie Provinces. *Geographie Physique et Quaternaire* 49(1):81-98.
- Walde, D. D. Meyer, and W. Unfreed  
1995 The Late Period on the Canadian and Adjacent Plains. *Journal of American Archaeology* 9:10-66.
- Walker, E.G.  
1982a Saskatchewan Archaeological Resource Record: FbNp-22. Saskatchewan Culture and Youth, Regina.  
  
1982b The Bracken Cairn: A Late Middle Archaic Burial from Southwestern Saskatchewan. *Saskatchewan Archaeology* 3: 8-35.  
  
1983 *Archaeological Resource Assessment: The Tipperary Creek Project*. Westek Consulting Limited, Saskatoon.  
  
1984 The Graham Site: A McKean Cremation from Southern Saskatchewan. *The Plains Anthropologist* 29(104):139-150.  
  
1988 The Archaeological Resources of the Wanuskewin Heritage Park. In *Out of the Past: Sites, Digs and Artifacts in the Saskatoon Area*, edited by Urve Linnamae and Tim E.H. Jones, pp.75-90. Saskatoon Archaeological Society, Saskatoon.  
  
1992 *The Gowen Sites: Cultural Responses to Climatic Warming on the Northern Plains (7500-5000 B.P.)*. Archaeological Survey of Canada Mercury Series Paper 145. Canadian Museum of Civilization, Hull, Quebec.  
  
1999 Precontact Archaeology of Southern Saskatchewan. In *Atlas of Saskatchewan*, 2<sup>nd</sup> edition, edited by K. Fung, pp. 25-27. University of Saskatchewan, Saskatoon.
- Walker, E. G., R. E. Morlan, and L. J. Amundson  
1987 Archaeological Field Investigations at the Wanuskewin Heritage Park 1986 Field Season Interim Report. Archaeological Resource Management Section, Saskatchewan Parks, Recreation, and Culture, Regina.

Webster, S. M.

1999 Interpreting Northern Plains Subsistence Practices: An Analysis of the Faunal and Floral Assemblages from the Thundercloud Site (FbNp-25). Unpublished Master's thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

2004 *A Re-Evaluation of the McKean Series on the Northern Plains*. Occasional Papers in Archaeology No. 1. Saskatchewan Archaeological Society and Department of Archaeology and Anthropology, Saskatoon.

Wettlaufer, Boyd N.

1955 *The Mortlach Site in the Besant Valley of Central Saskatchewan*. Department of Natural Resources, Regina.

Wettlaufer, Boyd N. and W. J. Meyer-Oakes

1960 *The Long Creek Site*. Anthropological Series No. 2, Saskatchewan Museum of Natural History, Regina.

Willey, G. R. and P. Phillips

1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.

1967 *Method and Theory in American Archaeology*. Fifth Impression. University of Chicago Press, Chicago.

Wilson, J. C.

1983 Artifacts. In *Tracking Ancient Hunters*, edited by H. T. Epp and I. Dyck, pp. 23-34. Saskatchewan Archaeological Society, Regina.

Wu, J. and O. L. Loucks

1995 From Balance of Nature to Hierarchical Patch Dynamics: A Paradigm Shift in Ecology. *Quarterly Review of Biology* 70(4):439-466.

Yansa, Catherine H.

2007 Lake Records of the Northern Plains Paleoindian and Early Archaic Environments: The "Park Oasis" Hypothesis. *Plains Anthropologist* 52(201):109-144.

Yesner, D. R.

2008 Ecology in Archaeology. In *Handbook of Archaeological Theories*, edited by Alexander R. Bentley, Herbert D. G. Maschner and Christopher Chippindale, pp.39-57. AltaMira Press, Plymouth, United Kingdom.

Zurburg, Suzanne Caroline

1991 *The Norby Site: A Mummy Cave Complex Bison Kill on the Northern Plains*. Unpublished Master's thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.