Variability in Thule Inuit Subsistence Economy: A Faunal Analysis of OkRn-1, Banks Island, N.W.T.

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Graduate Program in Anthropology  
A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts  
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Abstract

This thesis presents a zooarchaeological analysis of animal remains recovered from a late Thule qarmaq at the OkRn-1 archaeological site (ca. 1450 – 1650 AD) on Banks Island, N.W.T. The main objectives were to: 1) document animal exploitation in the qarmaq; 2) determine the season of occupation of the qarmaq; 3) assess change in Thule subsistence strategies on Banks Island over time; 4) identify similarities/differences between OkRn-1 and contemporary sites in the western Canadian Arctic. Ringed seal was the dietary staple of the qarmaq and Arctic fox were exploited for their pelts. The presence of migratory species and the demographic profile of ringed seals suggest that the qarmaq was occupied in the late winter, spring, and fall. Comparisons between early and late Thule assemblages on Banks Island, and between OkRn-1 and contemporary sites, reveal variability in subsistence driven by local landscape/climate, season of occupation, variability in settlement organization, and social change.

Keywords

Banks Island, Canadian Arctic, zooarchaeology, Thule, faunal, consumption.
Acknowledgements

To my supervisor, Dr. Lisa Hodgetts, meow meow meow meow.

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Table of Contents

Abstract.........................................................................................................................ii
Acknowledgements.........................................................................................................iii
Table of Contents............................................................................................................iv
List of Tables..................................................................................................................viii
List of Figures................................................................................................................ix
List of Appendices.........................................................................................................xi
Chapter 1.......................................................................................................................1
  1 Introduction...............................................................................................................1
    1.1 Research Questions...............................................................................................2
    1.2 The Cultural History of Banks Island.................................................................3
      1.2.1 Pre-Dorset......................................................................................................3
      1.2.2 Lagoon Phase...............................................................................................4
      1.2.3 Thule.............................................................................................................6
        1.2.3.1 Nelson River...........................................................................................6
        1.2.3.2 Cape Kellet.............................................................................................9
        1.2.3.3 OkRn-1...................................................................................................9
          1.2.3.3.1 OkRn-1 Seasonality.................................................................12
      1.2.4 Ancestral Inuvialuit.......................................................................................13
      1.2.5 Summary of Banks Island Subsistence.......................................................14
    1.3 Recent Archaeological Research in the Mackenzie Delta....................................15
    1.4 Recent Archaeological Research on Victoria Island...........................................18
    1.5 Summary and Thesis Structure...........................................................................20
Chapter 2.......................................................................................................................22
2 Environmental Context and Methodology…………………………………………………22
  2.1 Environmental Context: Banks Island…………………………………………………22
    2.1.1 Marine, Terrestrial, and Avian Resources on Banks Island………………22
      2.1.1.1 Mammals……………………………………………………..22
      2.1.1.2 Birds………………………………………………………….23
      2.1.1.3 Fish…………………………………………………………...24
  2.2 The Excavation at OkRn-1……………………………………………………….24
    2.2.1 Recovery……………………………………………………………….24
    2.2.3 Identification…………………………………………………………...25
    2.2.4 Recording………………………………………………………………27
  2.3 Quantification…………………………………………………………………………30
    2.3.1 NISP and MNI…………………………………………………………30
    2.3.2 MNE and MAU………………………………………………………...32
  2.4 Utility Indexes………………………………………………………………………33
  2.5 Determining the Age Distribution of Ringed Seals……………………………..34
    2.5.1 Ringed Seal Epiphyseal Fusion………………………………………..35
    2.5.2 Long Bone Measurements……………………………………………..36
  2.6 Statistical Tests and Analysis……………………………………………………..37
    2.6.1 Spearman’s Rho………………………………………………………..37
  2.7 Summary…………………………………………………………………………39

Chapter 3……………………………………………………………………………………..40

3 Results……………………………………………………………………………………...40

  3.1 Relative Abundance of Bird/Fish/Mammal Classes…………………………….40
  3.2 Main Fish Taxa………………………………………………………………………..43
3.3 Main Bird Taxa........................................................................................................45
3.4 Main Mammal Taxa.................................................................................................46
3.5 Skeletal Part Representation of Ringed Seal and Caribou.................................49
   3.5.1 Representation of Ringed Seal Skeletal Elements.................................49
   3.5.2 Representation of Caribou Skeletal Elements.................................51
3.6 Age Distribution of Ringed Seals........................................................................54
   3.6.1 Ringed Seal Epiphyseal Fusion.................................................................55
   3.6.2 Ringed Seal Metric Data........................................................................57
3.7 Seasonality.............................................................................................................59
3.8 Bone Processing and Taphonomy.........................................................................62
   3.8.1 Bone Length...............................................................................................63
   3.8.2 Burning and Cut Marks...........................................................................64
   3.8.3 Acid Corrosion and Carnivore Gnawing............................................65
3.9 Summary and Conclusion....................................................................................66
Chapter 4..................................................................................................................68
4 Discussion................................................................................................................68
   4.1 Consumption Activities at OkRn-1.................................................................68
      4.1.1 Dwellings 1 and 5................................................................................71
      4.1.2 Comparison of Dwelling 2 Fauna with that of Dwellings 1 and 5......74
   4.2 Consumption Activities on Banks Island.......................................................75
      4.2.1 Nelson River (OhRh-1)...........................................................................75
         4.2.1.1 Nelson River Faunal Assemblage...................................................76
         4.2.1.2 Nelson River Seasonality...............................................................78
         4.2.1.3 Comparison of Dwelling 2 and Nelson River............................82
4.3 Consumption Activities in the Western Canadian Arctic.................................84
  4.3.1 Wasout.................................................................87
  4.3.2 Iglualuit...............................................................91

4.4 Summary and Conclusion.................................................................95

Chapter 5.........................................................................................................98

5 Conclusion.....................................................................................................98
  5.1 Subsistence Practices at OkRn-1.........................................................98
  5.2 Comparisons with other Thule Sites.......................................................101
  5.3 Contributions............................................................................................102
  5.4 Future Research.........................................................................................103

References.......................................................................................................105

Appendices.......................................................................................................121

Curriculum Vitae...............................................................................................140
List of Tables

Table 1.1: Relative Abundance of Species (% of NISP) from Umingmak (Taylor 1976)……4
Table 1.2: Relative Abundance of Species (% of NISP) from the Lagoon site (Arnold 1980)..........................................................................................................................................5
Table 1.3: Relative Abundance of the Minimum Number of Individuals (% of MNI) from Nelson River (Arnold 1986).........................................................................................................................8
Table 1.4: Chronological Information for Mackenzie Delta and Victoria Island Sites, Nelson River, and OkRn-1…………………………………………………………………………...19
Table 2.1: Units Sampled for Contexts 5 and 25.................................................................27
Table 2.2: Fusion Sequence for Ringed Seals from the Baltic Sea (Stora 2001)..............35
Table 3.1: Number of Specimens and Minimum Number of Individuals from Dwelling 2, OkRn-1........................................................................................................................................42
Table 3.2: Rates of Fusion of Ringed Seal Epiphyses in Dwelling 2, OkRn-1..............55
Table 4.1: Comparison of Relative Abundance of Taxa between a Unit in Dwelling 2 (112N336E) and the Entire Dwelling 2 Assemblage.................................................................70
Table 4.2: Taxonomic Abundance of Species from Test Pits at D1, D5 (Arnold 2010), and Dwelling 2...........................................................................................................71
Table 4.3: Age Estimates of Ringed Seals from D1, OkRn-1, Based on Epiphyseal Fusion.................................................................................................................................73
Table 4.4: Taxonomic Abundance of Specimens from the Nelson River Site (OhRh-1) Compared to Dwelling 2, OkRn-1...........................................................................................................76
Table 4.5: Age Estimations of Ringed Seals from Nelson River Based on Thin Sections of Canine Teeth............................................................................................................................81
Table 4.6: Faunal Frequencies from Washout House 3 (Friesen and Hunston 1994) Compared to Dwelling 2, OkRn-1...........................................................................................................88
Table 4.7: Faunal Frequencies from Iglulualuit Houses 11 and 20 (Morrison 1990) Compared to Dwelling 2, OkRn-1..................................................................................................................92
List of Figures

Figure 1.1: Map of Known Archaeological Sites on Banks Island……………………………………….2

Figure 1.2: OkRn-1 Dwelling 2 Matrix…………………………………………………………………….11

Figure 1.3: Western Canadian Arctic Sites Mentioned in Text………………………………………18

Figure 2.1: Location of Sampled Contexts Relative to Dwelling 2……………………………………26

Figure 2.2: Illustration of Binford’s (1978) Transport Strategies (Metcalfe and Jones 1988)…………………34

Figure 2.3: Greatest Depth of Diaphysis vs. Smallest Breadth of Diaphysis of Ringed Seal Femora from a Modern Population (Stora 2002a)…………………………………………………………37

Figure 2.4: Smallest Breadth of Diaphysis vs. Smallest Height of Diaphysis of Ringed Seal Humeri from a Modern Population (Stora 2002b)…………………………………………………………38

Figure 3.1: Relative Abundance of Classes from Dwelling 2, OkRn-1 (% of NISP)………………41

Figure 3.2: Relative Abundance of Fish Taxa from Dwelling 2, OkRn-1 (% of Fish NISP)………………..44

Figure 3.3: Relative Abundance of Bird Taxa from Dwelling 2, OkRn-1 (% of Bird NISP)………………..45

Figure 3.4: Relative Abundance of Mammal Taxa from Dwelling 2, OkRn-1 (% of Mammal NISP)………………..46

Figure 3.5: Representation of Ringed Seal Skeletal Parts (%MAU), Dwelling 2, OkRn-1………………..49

Figure 3.6: Representation of Ringed Seal Parts Against the Meat Utility Index (%MAU/MUI), Dwelling 2, OkRn-1…………………………………………………………………………………………50

Figure 3.7: Representation of Caribou Skeletal Parts (%MAU), Dwelling 2, OkRn-1…………………..51

Figure 3.8: Representation of Caribou Skeletal Parts Against the Food Utility Index (%MAU/%FUI), Dwelling 2, OkRn-1…………………………………………………………………………………………52

Figure 3.9: Representation of Caribou Skeletal Parts Against the Meat Drying Index (%MAU/%MDI), Dwelling 2, OkRn-1…………………………………………………………………………………………54

Figure 3.10: Seasonal and Spatial Distribution of Ringed Seals from around Uluhaktok, NWT (Smith 1987) Compared to Dwelling 2, OkRn-1…………………………………………………………………57
Figure 3.11: Greatest Depth of Diaphysis versus Smallest Breadth of Diaphysis of Ringed Seal Femora in a Modern Population (Stora 2002a) Compared to Dwelling 2, OkRn-1……58

Figure 3.12: Smallest Breadth of Diaphysis versus Smallest Height of Diaphysis of Ringed Seal Humeri in a Modern Population (Stora 2002b) Compared to Dwelling 2, OkRn-1……59

Figure 3.13: Greatest Length of Faunal Remains (% of NISP)……………………………………63

Figure 4.1: Map and Dwellings and Features at OkRn-1…………………………………………………………69

Figure 4.2: Relative Frequencies of Ringed Seal Age Classes From Nelson River (Cooper 1981)………………………………………………………………………………………………………………79

Figure 4.3: Thin Section of Ringed Seal Tooth……………………………………………………………80

Figure 4.4: Location of Archaeological Contexts from the Mackenzie Delta and Victoria Island Mentioned in Text……………………………………………………………………………………………………………………………………………………………………………………………………..84

Figure 4.5: Bird/Fish/Mammal frequencies from western Canadian Arctic sites (% of NISP)……………………………………………………………………………………………………………..85
List of Appendices

Appendix A: Bone Recording Zones by Element .......................................................... 121
Chapter 1

1 Introduction

Thule Inuit populations migrated into the Canadian Arctic from Alaska around the thirteenth century and quickly spread eastwards (McGhee 2000; Friesen and Arnold 2008). They replaced existing Dorset populations in the region, which disappeared for reasons that are poorly understood either shortly before or soon after the arrival of the Thule Inuit (Friesen 2004; Park 2000, 2014; Raghavan et al. 2014). The Thule are ancestors of modern Inuit who brought with them sophisticated bowhead whale hunting technology from Alaska (Mathiassen 1978; Rasmussen 1999). Despite a generous body of knowledge about Thule lifeways in much of the Canadian Arctic (e.g., Mackenzie Delta, Alaska, central and eastern Canadian Arctic), little is known about Thule life on Banks Island and other western Arctic islands (Betts 2005; Moody and Hodgetts 2013). These areas are, however, crucial in understanding the Thule migration from Alaska into Canada, as they represent the first locations occupied by migrating groups (Morrison 1999; Friesen and Arnold 2008). It remains uncertain whether early groups settled permanently on Banks Island or whether they simply passed through, returning to the region later from the eastern Arctic or the Mackenzie Delta.

This thesis will analyze animal remains from the Agvik (OkRn-1) archaeological site (ca. 1450 – 1650) on Banks Island, N.W.T. (Figure 1.1), and compare them to other assemblages from Banks Island and the surrounding region in order to examine temporal and regional variability in subsistence practices during the Thule period (ca. 1250 – 1650) in Canada’s western Arctic. In addition, the OkRn-1 qarmaq (a semi-subterranean structure with sod walls and a skin roof) is one of the few excavated Thule qarmat in the western Canadian Arctic and this study will help resolve uncertainties about their seasonal use.

The animal bones examined in this thesis were recovered during the 2014 fieldwork of the Ikaahuk Archaeology Project (IAP), a 5 year SSHRC-funded research project lead by Dr. Lisa Hodgetts of Western University. This research will contribute to broader IAP
goals of integrating diverse lines of evidence in order to reconstruct the human history of
Banks Island over the last 4000 years.

Figure 1.1: Map of Known Archaeological Sites on Banks Island
Note: Sites mentioned by name in the text are labelled.

1.1 Research Questions

The primary objective of my project is to document late Thule food procurement
strategies on Banks Island and situate them within broader temporal and regional trends
in order to illustrate Thule subsistence strategies and modes of occupation in the western Canadian Arctic. Specifically, I will answer the following questions: 1) Which animals did the occupants of OkRn-1 hunt and what strategies did they use to exploit them? 2) In what season was the OkRn-1 qarmaq occupied? 3) How did the Banks Island subsistence economy change from early to late Thule times? 4) Does OkRn-1 represent a local subsistence adaptation or is it part of broader regional trends documented in the Mackenzie Delta or on Victoria Island?

1.2 The Cultural History of Banks Island

Agvik (OkRn-1) was occupied relatively late in the history of human occupation on Banks Island. A consideration of earlier sites and their faunal compositions will situate OkRn-1 within previous subsistence trends on the island. Recent archaeological research has clarified the cultural history of Banks Island by indicating a fairly continuous Indigenous presence from the Thule Inuit period to present day (Nagy 1999; Hodgetts 2013b). This stands in contrast to previous, Eurocentric narratives that describe Banks Island as deserted upon the arrival of European whaling vessels (Usher 1966). Prior to Thule Inuit times, archaeological findings suggest that human hunters settled Banks Island beginning 4000 years ago. Intermittent occupations then followed until the Thule migration reached the island ca. 1200 AD (Taylor 1967; Wilkinson and Shank 1975; Arnold 1980, 1986; Friesen and Arnold 2008; Hodgetts and Eastaugh 2010; Hodgetts 2013a, 2013b; Hodgetts et al. 2015).

1.2.1 Pre-Dorset

Presently, the earliest known archaeological sites on Banks Island are attributed to the Pre-Dorset culture. The best known is Umingmak (PjRa-2) in the northern interior, first described by Taylor (1967) and excavated by a crew from the National Museum of Canada (Table 1.1). Umingmak was soon revisited by a team from the University of Tübingen. Their radiocarbon dates indicate that the site was occupied at approximately 3400 BP, making it the earliest known site on Banks Island (Müller-Beck et al. 1971; Müller-Beck 1977).
Table 1.1: Relative Abundance of Species (% of NISP) from Umingmak (Taylor 1976) (n = 1245)

<table>
<thead>
<tr>
<th>Taxon</th>
<th>% of NISP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muskox</td>
<td>85</td>
</tr>
<tr>
<td>Caribou</td>
<td>6</td>
</tr>
<tr>
<td>Bird</td>
<td>6</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>1.5</td>
</tr>
<tr>
<td>Arctic hare</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Follow-up excavations by Müller-Beck et al. (1971) and Müller-Beck (1977) confirmed that approximately 80% of the recovered faunal remains were muskox. Münzel’s (1987, 1988) faunal analysis documented consistent hunting and butchering techniques during repeated summer occupations of the site, when the muskox meat was dried for the winter ahead. She noted that Peary caribou remains were present and used as tools, and fox were exploited for their pelts. She also identified ten different species of bird, including snow goose (the most common taxon), old squaw, ptarmigan, and jaeger.

Wilkinson and Shank (1975) supplemented the research of Taylor (1967) and Müller-Beck (1971; 1977) by identifying ten new Pre-Dorset archaeological sites along the Thomsen River in the northern interior. They include muskox kill sites, base camps with repeated occupations, and single occupation camp sites. Wilkinson and Shank (1975) noted surface evidence of settlement structures (e.g., tent rings) and surface faunal remains including abundant muskox and to a lesser degree caribou crania.

1.2.2 Lagoon Phase

In 1976, Arnold (1980) discovered the Lagoon site (OjRI-3), dated to approximately 2400 BP, during survey of the lower Masik River Valley and adjacent coastline of southwestern Banks Island. He commenced investigation of the site immediately and
continued the following year. Excavations were conducted at three clusters of above-ground cultural debris and unearthed a variety of artifacts, lithics, and faunal remains.

A small sample of animal bones (n = 846) from one area of the Lagoon site contained a preponderance of bird remains (Table 1.2; Arnold 1980). The presence of medullary deposits in the long bones of geese suggests an early summer occupation. The most common mammalian taxon was ringed seal. The high proportion of immature seals indicates a late spring and early summer occupation (Arnold 1980; Smith 1987). Other species present include muskox, Arctic fox, Arctic hare, and caribou. Unfortunately, the Lagoon site faunal assemblage was lost in the years post-excavation and thus a larger, more representative, sample was never analyzed.

Table 1.2: Relative Abundance of Species (% of NISP) from the Lagoon site (Arnold 1980) (n = 846).

<table>
<thead>
<tr>
<th>Taxon</th>
<th>% of NISP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goose</td>
<td>37.4</td>
</tr>
<tr>
<td>Ptarmigan</td>
<td>22.3</td>
</tr>
<tr>
<td>Ringed seal</td>
<td>21.5</td>
</tr>
<tr>
<td>Muskox</td>
<td>9.2</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>5.8</td>
</tr>
<tr>
<td>Arctic hare</td>
<td>1.6</td>
</tr>
<tr>
<td>Caribou</td>
<td>0.5</td>
</tr>
<tr>
<td>Lemming</td>
<td>0.5</td>
</tr>
<tr>
<td>Canid</td>
<td>0.4</td>
</tr>
<tr>
<td>Snowy owl</td>
<td>0.3</td>
</tr>
<tr>
<td>Beaded Seal</td>
<td>0.1</td>
</tr>
<tr>
<td>------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Fish sp.</td>
<td>0.1</td>
</tr>
<tr>
<td>Sandhill crane</td>
<td>0.1</td>
</tr>
<tr>
<td>Whistling swan</td>
<td>0.1</td>
</tr>
</tbody>
</table>

The artifacts recovered from all three clusters were roughly consistent and included traits characteristic of both Pre-Dorset and Dorset assemblages, although their strongest similarities were with Pre-Dorset. The Lagoon assemblage also displayed cultural influences from both the eastern Canadian Arctic and the Norton culture in Alaska. Arnold (1980, 1981) concluded that the Lagoon site may represent an in situ regional development of Pre-Dorset culture in the western Canadian Arctic prior to the apparent abandonment of Banks Island during the Dorset period. The absence of Dorset sites could also relate to the limited coverage of archaeological survey on the island, which has focussed along the southern and eastern coasts and in the northern interior (Figure 1.1).

Recent radiocarbon dating of QaPv-5 on the north coast of Banks Island, within Aulavik National Park, indicates that it is another Lagoon phase site. A range of taxa are represented on the surface of the site, including ringed seal, caribou, muskox and goose (Hodgetts and Munizzi 2015). Alongside the Lagoon site fauna, these remains suggest that occupants of Banks Island practiced a mixed subsistence strategy, exploiting a range of marine and terrestrial mammals and birds during the Lagoon phase.

1.2.3 Thule

1.2.3.1 Nelson River

Following the Lagoon Complex, archaeological findings along the south coast of Banks Island suggest a reoccupation of the island during the Thule period. In 1980, these discoveries included five Thule sites located around Nelson River (Arnold 1986, 1994; Arnold and McCullough 1990). Two of these sites (OgRi-1; OhRh-4) consisted of
multiple tent rings and boulder caches, probably representing summer occupations, and
two others contained multiple Thule winter houses (OhRh-2; OhRh-3). In 1981, Arnold
returned to a third site, Nelson River (OhRh-1), where he excavated part of a winter
dwelling.

Recent radiocarbon dates from Nelson River indicate occupation during the thirteenth
century AD, suggesting that OhRh-1 is among the earliest known Thule sites east of
Alaska (Friesen and Arnold 2008). Arnold’s 1981 excavations unearthed part of a single
Thule winter dwelling with two distinct rooms joined by a shared entrance tunnel (Arnold
1986). The main structural components were driftwood support posts, beams for the roof,
and planks for the walls. The excavation produced over 1400 artifacts, including
knapping debitage and finished objects fabricated from a variety of materials (e.g., bone,
ivory, metal), as well as more than 20,000 animal bones. The high investment of time and
materials into the house, in addition to the homogenous assemblage of artifacts and
faunal remains, suggest that the dwelling represents a single occupation lasting several
winters.

Arnold (1986) selected a 10% sample of faunal remains from all areas within the
excavation in order to generate a representative assemblage of 2176 specimens (Arnold
1986). More of the collection was studied by graduate and undergraduate students at the
University of Toronto (Cooper 1981; Austin 1985; Da Rosa 1985; Thomsen 1985). The
compositions of these additional samples are very similar to that of Arnold (Table 1.3;

The abundance of ringed seal remains shows that hunting sea mammals was of
paramount importance. The large number of fetal and newborn seals suggests that seal
hunting took place in late winter and early spring (Arnold 1986). The small amount of
bowhead whale bone could indicate that hunted whales were butchered elsewhere or that
whale remains were scavenged from stranded whales. Regardless, Arnold (1986) stresses
the importance of bowhead whales to the occupants of OhRh-1 as indicated by the large
quantities of baleen recorded during excavation (Cooper 1981). Polar bear, another
marine mammal, is represented in small quantities.
Lower frequencies of land mammals are dominated by fox. Arnold (1986) describes a preponderance of articulated fox skeletons, suggesting that they were skinned and discarded, rather than consumed. In contrast, the bones of Arctic hare, a species that is present in smaller amounts, were disarticulated and scattered around the site, indicating that they were taken apart and eaten. The lemmings likely represent animals that burrowed into the dwelling after it was abandoned, rather than animals consumed by the site’s occupants. Wolf (which may include some dog remains), caribou and muskox also make small contributions to the assemblage.

The avian remains support a winter occupation at the site, since ptarmigan, a year-round resident of the island, is the most abundant bird. Summer migrants are poorly represented. Snow geese breed on the island from May to October (Manning et al. 1956) but constitute only a small proportion of the total MNI (minimum number of individuals).

Table 1.3: Relative Abundance of the Minimum Number of Individuals (% of MNI) from Nelson River (Arnold 1986) (n = 2176)

<table>
<thead>
<tr>
<th>Taxon</th>
<th>% of MNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ringed seal</td>
<td>60</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>9.5</td>
</tr>
<tr>
<td>Ptarmigan</td>
<td>6.3</td>
</tr>
<tr>
<td>Lemming</td>
<td>4.8</td>
</tr>
<tr>
<td>Arctic hare</td>
<td>3.2</td>
</tr>
<tr>
<td>Polar bear</td>
<td>3.2</td>
</tr>
<tr>
<td>Wolf</td>
<td>3.2</td>
</tr>
<tr>
<td>Snow goose</td>
<td>1.6</td>
</tr>
<tr>
<td>Bowhead whale</td>
<td>1.6</td>
</tr>
<tr>
<td>Animal</td>
<td>Score</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>Bearded seal</td>
<td>1.6</td>
</tr>
<tr>
<td>Caribou</td>
<td>1.6</td>
</tr>
<tr>
<td>Muskox</td>
<td>1.6</td>
</tr>
</tbody>
</table>

### 1.2.3.2 Cape Kellet

Cape Kellet (OlRr-1) is another south coast site comprised of nine Thule winter houses. New radiocarbon dates show that the early phase of occupation at the site dates to approximately 1200 AD (Calibrated dates AD at 2 sigma: 1143-1275 and 1185-1281 AD), which makes it contemporaneous with the Nelson River site. A later phase of occupation at the site dates to approximately 1350 AD (Calibrated dates AD at 2 sigma: 1263-1423 and 1285-1469) (Hodgetts et al. 2015).

### 1.2.3.3 OkRn-1

The bulk of IAP efforts during the 2014 field season were concentrated at yet another Thule site on the south coast. Agvik (OkRn-1) consists of 11 clearly defined dwellings with at least four possible additional dwellings east of the main settlement (Manning 1956; Arnold 2010; Hodgetts et al. 2015). Radiocarbon dates from OkRn-1 indicate two phases of occupation at the site, one around 1400 AD and a second around 1550 AD (Hodgetts et al. 2015). In 2009, Arnold (2010) conducted test excavations in two of these dwellings and an associated midden. He recovered several artifacts and a small sample of faunal remains.

In 2014, the IAP excavated a portion of Dwelling 2, which was in use during the later of the two OkRn-1 occupations. This period of Thule presence in the western Canadian Arctic is poorly understood outside of the Mackenzie Delta and therefore our excavation was intended to clarify late Thule subsistence strategies on Banks Island and their relationship with those from Nelson River and the mainland. Additionally, Dwelling 2 is situated along the edge of a gully, which cuts inland from the Beaufort Sea, and was
imminently threatened by damage through erosion. Our excavations were intended to “salvage” a portion of the dwelling before it was destroyed.

We opened a 5.5 x 10 m excavation area across the portion of Dwelling 2 that was farthest away from the gully (Figure 1.2). We maintained a 50 cm wide baulk through the centre of the dwelling, running east-west, in order to document the stratigraphic profile. Our intention was to remove it upon completing the excavation, but time ran short. Excavation proceeded stratigraphically and we recorded all contexts using a single context recording system adapted from the Museum of London Archaeology Service (MoLAS). We unearthed a series of deposits in the following order:

- Underneath the surface turf we exposed a layer of medium brown peat that represented soil development following the abandonment and collapse of Dwelling 2 (deposits 6, 7, 8, 9).
- We then exposed the collapsed sod walls (deposits 5, 21, 22, 23) and the dwelling entrance tunnel (deposits 12, 17, 18, 24). The circular dwelling had an internal diameter of roughly 5m and the entrance tunnel was approximately 4m long.
- The removal of these layers revealed deposits associated with the occupation of Dwelling 2, including a berm (deposits 3, 13, 16, 25, 30) and middens located outside of the dwelling (deposits 4, 10, 11, 14, 15, 19, 20).
- We also unearthed the living floor (deposit 52) with a shallow central depression approximately 25 cm deep and 2.5 m in diameter. There was a flat area between the central depression and the sod walls that we interpreted as a sleeping platform. It ranged in width from 85cm to 180cm depending on its location within the house.
- We also identified a kitchen area within the structure (deposits 35, 38, 43), although the majority of the feature appeared to be situated under the baulk, which we did not have time to remove at the end of the excavation.
- We also identified and excavated multiple pit features (deposits 47, 32, 39, 41, 49, 45) and their fills (46, 27, 31, 40, 48, 44 respectively) outside of the dwelling.
Figure 1.2: OkRn-1 Dwelling 2 Matrix
We excavated for thirty days, concentrating our work on the northern half of the
dwelling, in order to document dwelling architecture, unearth a wide variety of Thule
artifacts, and recover approximately 30,000 animal bones and bone fragments. These
faunal remains formed the basis of this thesis and I analyzed a representative sample of
them for comparison with Nelson River and contemporary assemblages from the
surrounding Canadian Arctic.

1.2.3.3.1 OkRn-1 Seasonality

Prior to our excavation, we took Arnold’s (2010) position that all dwellings at OkRn-1
were Thule winter houses. However, as we exposed Dwelling 2, many characteristic
winter house features were absent, including whalebone supports and a paved flagstone
floor. The central depression was shallow (30 cm in depth) with a compacted earth floor.
The few whale bone and wooden supports that we unearthed were located around the
entrance tunnel for structural support. The depth of the Dwelling 2 central depression was
similar to that of two “relatively light winter houses” excavated at the Pembroke site on
Victoria Island (Norman and Friesen 2010: 265). These structures were only partially
paved with flagstones, with very shallow entrance tunnels. Dwelling 2 contained no
evidence of paving, but a fairly substantial entrance tunnel. It stands in contrast to the
substantial winter houses at OkRn-1, characterized by their large size and evidence of
whale bone supports protruding through the surface (Hodgetts et al. 2015).

Thule *qarmat* were first described by Mathiassen (1927) as autumn dwellings that were
occupied when the weather became too cold for skin tents but before the snow became
sufficient for the construction of snow houses. However, he also noted that historic
period *qarmat*, located in southern Baffin Island, were occasionally used throughout the
entire winter (Mathiassen 1927). Further research in the same area confirmed that both
*qarmat* and snow houses were utilized as winter residences (Boas 1964; Schledermann
1976), problematizing the assumption that *qarmat* only functioned as transitional
dwellings.
Park (1988) concluded that our methods for distinguishing between winter houses and *qarmat* in the archaeological record (e.g., roof construction and the depth of the central depression) were insufficient and called for some flexibility when defining the two settlement types, rather than rigidly enforcing tenets of construction and occupation. Dwelling 2 clearly illustrates this flexibility, as the structure itself is shallow and lightly built like other *qarmat*, but the entrance tunnel is more substantial. We characterize it as a *qarmaq* rather than a winter house because it stands in sharp contrast to the very substantial winter houses at OkRn-1. As one of few excavated *qarmat* in the Canadian Arctic, determining the season of occupation of Dwelling 2 at OkRn-1 will contribute to a better understanding of their seasonal use in prehistory.

### 1.2.4 Ancestral Inuvialuit

Due to the direct ancestor-descendant relationship between Thule and ancestral Inuvialuit groups, any division between the two is purely arbitrary. Recent research acknowledges that the ethnogenesis of contemporary Inuvialuit cultures occurred between the Thule period and the arrival of Europeans in the 19th century (Betts 2009; Lyons 2009, 2014), rather than treating Thule populations as a distant and static ancestor. Additionally, recent investigations of Thule and ancestral Inuvialuit sites, as well as oral histories, indicate a more continuous Indigenous presence on Banks Island from the Thule period to the present day – further problematizing arbitrary categorizations of the island’s cultural history. For the sake of clarity in this thesis, “ancestral Inuvialuit” will denote the groups inhabiting Banks Island from the 17th to the early 20th century, although they may have travelled to the island from different locations (e.g., the Mackenzie Delta or Victoria Island).

It is widely accepted that ancestral Inuvialuit groups from Victoria Island occupied Banks Island in the mid- to late-19th century in order to exploit wood and metal from the ill-fated *HMS Investigator* (Hickey 1979, 1984). Hickey’s (1984) survey documented associated sites along the northeastern coast and into the northern interior that are tentatively dated from shortly after 1853 (when the *Investigator* was abandoned) until the
end of the century, when the supply of game and desirable goods was supposedly exhausted.

In 2008 and 2009, the Aulavik Archaeology Project, a collaboration between Western University and Parks Canada, conducted two field seasons of archaeological survey in the southern portion of Aulavik National Park (Hodgetts 2013a). They expanded upon Hickey’s (1979, 1984) research, identifying 75 previously unrecorded sites. The majority of these discoveries were dated to the ancestral Inuvialuit period based on diagnostic artifacts and architectural similarities to known ancestral Inuvialuit sites. A recent program of radiocarbon dating of sites from the south coast and northern interior of Banks Island indicates more continuous occupation of Banks Island from Thule times into the ancestral Inuvialuit period (Hodgetts et al. 2015; Hodgetts and Munizzi 2015; Hodgetts unpublished data). It demonstrates that the island was not abandoned prior to the stranding of the *HMS Investigator* as suggested by Stefansson (1921) and Hickey (1984).

The majority of northern interior ancestral Inuvialuit sites identified by Hodgetts (2013a) and her team contained few or no faunal remains. Muskox dominate the animal remains that were observed. All recorded dwellings were tent rings which, along with abundant snow goose remains, support previous interpretations (Hickey 1979, 1984; Will 1985) that these sites represent short-term summer occupations.

### 1.2.5 Summary of Banks Island Subsistence

The earliest occupations of Banks Island, Pre-Dorset sites in the northern interior, show subsistence strategies dominated by the pursuit of muskox (Taylor 1967; Wilkinson and Shank 1975; Müller-Beck et al. 1971; Müller-Beck 1977). After an apparent occupational hiatus, the island was again occupied during the Lagoon phase, represented at the Lagoon site (OjRI-3) on the south coast (Arnold 1980) and QaPv-5 on the north coast (Hodgetts and Eastaugh 2010). Limited available faunal evidence from these sites indicates a mixed subsistence strategy, utilizing both marine and terrestrial species and a range of birds.
(Arnold 1980; Hodgetts & Munizzi 2015). To date, there is no evidence that Banks Island was occupied during the Dorset period (Hodgetts 2013a).

Following the migration of the Thule into the Canadian Arctic, Banks Island was once again occupied along the south coast, and perhaps elsewhere. Faunal analyses from the early Thule site of Nelson River (OhRh-1) indicate that ringed seal was the foremost dietary staple (Cooper 1981; Austin 1985; Da Rosa 1985; Thomsen 1985; Arnold 1986). Recent archaeological and ethnographic research has suggested a largely continuous Indigenous presence on Banks Island from early Thule times to present day, including a number of ancestral Inuvialuit groups from the Mackenzie Delta and Victoria Island. Known ancestral Inuvialuit occupations (post-1600 AD) concentrate in the northern interior and around Mercy Bay, in the southeast around DeSalis Bay, and along the northern part of the east coast. They contain faunal assemblages that are again dominated by muskox (Hickey 1979, 1984; Will 1985; Hodgetts 2013a).

The OkRn-1 archaeological site is a late Thule occupation that post-dates Nelson River (Arnold 1986, 2010; Friesen and Arnold 2008; Hodgetts et al. 2015). Presently, very little is known about this period on Banks Island. An examination of faunal remains collected during our 2014 field season will position OkRn-1 within over-arching subsistence trends on Banks Island in order to elucidate change in subsistence practices over the course of the Thule occupation of the island. I will also situate the OkRn-1 fauna within larger, regional subsistence patterns to determine how the late Thule subsistence economy on Banks Island relates to contemporary faunal assemblages from the surrounding western Arctic.

1.3 Recent Archaeological Research in the Mackenzie Delta

In contrast to the limited number of faunal assemblages recovered from the entirety of Banks Island, the relative abundance of archaeological work in the Mackenzie Delta region has generated the largest regional subsistence record in the Canadian Arctic. McGhee (1974) conducted the first systematic investigations of the Delta in 1968. Beginning in the 1980s, the Northern Oil and Gas Action Plan (NOGAP) and the
In the early 19th century, European contact with Inuit populations living in the Mackenzie Delta produced ethnographic accounts of approximately 2500 people organized into at least six territorial groups spread from the Alaskan border to Cape Bathurst (McGhee 1974; Morrison 1990; Morrison and Arnold 1994; Betts and Friesen 2004). Each region was well-defined, defended, and its inhabitants perceived themselves as culturally distinct from their neighbours. Most importantly, each group had a unique seasonal round based upon the resources available in that territory (Betts and Friesen 2004). Most focussed intensively on one or a handful of “focal resources,” taxa that were locally abundant, often during seasonal aggregations. These focal resources included ringed and harbour seals, caribou, beluga and bowhead whales, and a variety of fish and migratory waterfowl.

This settlement-subsistence strategy of focal economies and seasonal movement across the landscape was not unique to the early contact period. Betts (2005) sought to clarify its origin by synthesizing zooarchaeological data from 24 faunal assemblages spanning three time periods within the Delta (Thule [ca. 1250 – 1400 AD], Mackenzie Inuit [ca. 1400 – 1850 AD], and Early Historic [1850 – 1890 AD]). He performed a correspondence analysis to produce clusters of similar faunal collections and, when comparing his results to the available resources in each territory, concluded that differences in the local resource base were driving diversity within the archaeological remains (Betts 2005). He identified seven focal economies that were each focussed on a particular resource or suite of resources (e.g., ringed seal, caribou, beluga).

This thesis aims to document similarities and differences between Banks Island and Mackenzie Delta subsistence economies in order to determine potential causes of diversity aside from varying resource availability, and speak to possible social connections between the two areas. To do so, it compares the faunal assemblage from Dwelling 2 of OkRn-1 to contemporary collections from the Mackenzie Delta (Figure
1.3). These collections include: Washout (NjVi-2; Yorga 1980; Friesen and Hunston 1994), Kuukpak (NiTs-1; Balkwill and Rick 1994; Friesen and Arnold 1995), Pauline Cove (NjVi-3; Friesen 2013), McKinley Bay (OaTi-1; Arnold 1992), Gutchiak (NhTn-1; Morrison 2000), Avadlek Spit (NjVj-1; Betts and Friesen 2013) and Iglulualuit (NlRu-1; Morrison 1990).

I have selected settlements that are radiocarbon dated to the Mackenzie Inuit period (ca. 1450 – 1850 AD), as well as one sites dated stylistically to ca. 1400 – 1850 AD. Inhabitants of the Delta during this time period have traditionally been referred to by archaeologists as the Mackenzie Inuit (e.g., Betts 2005), whereas archaeologists refer to sites from the same time period on Victoria Island as Thule Inuit (e.g. Norman and Friesen 2010; Howse and Friesen 2016). Despite differences in nomenclature, these populations are all descended from the initial Thule migrants from Alaska.

The Mackenzie Delta faunal assemblages were all recovered from winter houses, with the exception of Gutchiak (Morrison 2000). Gutchiak is interpreted as a warm season procurement site with a heavy emphasis on fish species. It was likely occupied from ca. 1400 AD – 1850 AD based on artifact style (Morrison 2000). The Avadlek Spit (ca. 1650 AD) assemblage possessed a similar emphasis on fish, in addition to numerous bird remains (Betts and Friesen 2013). Likewise, the Pauline Cove House 7 (ca. 1650 – 1850 AD) and McKinley Bay (ca. 1433 – 1659 AD) assemblages were dominated by fish, with substantial contributions from other taxa, such as caribou, cetaceans, birds, and phocids (Friesen 2013; Arnold 1992).

Kuukpak is a large archaeological site that contains 19 extant semi-subterranean winter houses (Balkwill and Rick 1994; Friesen and Arnold 1995). House 1 (ca. 1442 – 1642 AD) and an associated midden (ca. 1302 – 1649 AD) were excavated and produced a faunal assemblage dominated by beluga whale. Finally, both the Washout and Iglulualuit assemblages contained a majority of ringed seal (Yorga 1980; Friesen and Hunston 1994; Morrison 1990). Salvage excavations at Washout have investigated four dwellings, among which House 3 (ca. 1467 – 1649 AD) is contemporary to Dwelling 2 at OkRn-1. Iglulualuit is another extensive site with at least 30 winter houses present; House 11 (ca.
1495 – 1905 AD) and House 20 (ca. 1340 – 1640 AD) were both excavated by Morrison (1990) and fall within the period of interest.

Figure 1.3: Western Canadian Arctic Sites Mentioned in Text

![Map of Western Canadian Arctic Sites](image)

1.4 Recent Archaeological Research on Victoria Island

Victoria Island was occupied after Banks Island during the eastward Thule migration across the Canadian Arctic (Friesen and Arnold 2008). Subsequent ancestral Inuvialuit groups travelled between Victoria Island and Banks Island by traversing the sea ice (Condon 1996). A comparison of subsistence strategies between Dwelling 2 and contemporary dwellings on Victoria Island has the potential to illustrate social relationships between their occupants. Differences between the faunal assemblages will also clarify the role of local resource base and settlement-subsistence strategies in the formation of subsistence economies.

The focus of my comparisons with late Thule sites on Victoria Island will be the Bell site (NiNg-2) which represents a large amalgamation of occupations ranging from the Pre-Dorset to the Thule periods (Taylor 1967, 1972; Ryan 2003; Howse 2008; Norman and
Friesen 2010; Howse and Friesen 2016). The Bell site has produced the only faunal assemblage from Victoria Island that is published and contemporary to Dwelling 2. Other Thule sites on the island lack precise dates (e.g., Taylor 1965), were occupied during the early Thule period (e.g., Le Mouel and Le Mouel 2002), or during the later historic period (e.g., McGhee 1972; Brink 2005).

During the first decade of the 21st century, the Bell site became the focus of the Iqaluktuuq Project – a collaborative research project between the Kitikmeot Heritage Society and the University of Toronto. One house feature and two middens excavated during the course of this project yielded dates from the late Thule period (ca. 1600 – 1700 AD). The faunal assemblages from each context will be compared to the animal bones recovered from OkRn-1 Dwelling 2 (Howse and Friesen 2016).

Table 1.4: Chronological Information for Mackenzie Delta and Victoria Island Sites, Nelson River, and OkRn-1

<table>
<thead>
<tr>
<th>Site</th>
<th>Date Range (AD)</th>
<th>Method of Dating</th>
<th>Inferred Time Period/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washout</td>
<td>1467 – 1649</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit, ca. 1450 - 1650</td>
</tr>
<tr>
<td>Kuukpak</td>
<td>House 1: 1442 – 1642</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit, ca. 1450 – 1650</td>
</tr>
<tr>
<td></td>
<td>Midden: 1302 – 1649</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit, ca. 1400 – 1650</td>
</tr>
<tr>
<td>Pauline Cove</td>
<td>1650 – 1850</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit, ca. 1650 - 1850</td>
</tr>
<tr>
<td>McKinley Bay</td>
<td>1433 – 1659</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit, ca. 1450 - 1650</td>
</tr>
<tr>
<td>Gutchiak</td>
<td>1400 – 1850</td>
<td>Artifact distribution</td>
<td>Mackenzie Inuit,</td>
</tr>
<tr>
<td>Location</td>
<td>Date Range</td>
<td>Carbon-14 dating</td>
<td>Culture</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------</td>
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</tr>
<tr>
<td>Avadlek Spit</td>
<td>1685 – 1950</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ca. 1650 - 1850</td>
</tr>
<tr>
<td>Iglulualuit</td>
<td>House 11: 1495 – 1905</td>
<td>Carbon-14 dating</td>
<td>Mackenzie Inuit,</td>
</tr>
<tr>
<td></td>
<td>House 20: 1340 – 1640</td>
<td></td>
<td>ca. 1450 – 1850</td>
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<td></td>
<td></td>
<td>Mackenzie Inuit,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Bell site</td>
<td>1600 – 1700</td>
<td>Carbon-14 dating</td>
<td>Thule Inuit, ca.</td>
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<td></td>
<td></td>
<td></td>
<td>1400 - 1850</td>
</tr>
<tr>
<td>Nelson River</td>
<td>1030 – 1300 AD</td>
<td>Carbon-14 dating</td>
<td>Thule Inuit, ca.</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>1100 - 1400</td>
</tr>
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<td>OkRn-1</td>
<td>1450 – 1650</td>
<td>Carbon-14 dating</td>
<td>Thule Inuit, ca.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1400 - 1850</td>
</tr>
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### 1.5 Summary and Thesis Structure

My primary research aim is to determine the subsistence strategies practiced at Dwelling 2 of OkRn-1. Chapter 2 provides background on the Banks Island resource base, our excavation of Dwelling 2, and my faunal analysis. Chapter 3 examines subsistence within the dwelling through the identification and analysis of faunal remains recovered from the dwelling, including an examination of species and skeletal part abundance. The chapter also examines the season of occupation of Dwelling 2 in order to help clarify the seasonal use of *qarmat* in prehistory. I will consider the presence or absence of seasonally migratory bird species (e.g., snow goose), anadromous fish species (e.g., Arctic char), the demographic profile of my ringed seal sample, and ringed seal long bone measurements.
Additional research questions involve the positioning of the Dwelling 2 subsistence economy within temporal and regional trends. Chapter 4 presents the comparison of my faunal assemblage to that from Nelson River in order to document how Banks Island Thule Inuit subsistence practices changed from the early to late Thule period. This chapter also includes further comparisons with contemporary sites in the Mackenzie Delta and on Victoria Island that have the potential to elucidate causes for diversity between subsistence strategies, as well as speak to possible social connections between the regions. Finally, Chapter 5 is a summary of my thesis and recommendations for future research.
2 Environmental Context and Methodology

2.1 Environmental Context: Banks Island

Banks Island is the westernmost island in the Canadian Arctic Archipelago. It is also the fourth largest island in the Canadian Arctic with an area of 70,197 square km (roughly the size of New Brunswick). OkRn-1 is situated on the south coast of Banks Island, located within a landscape characterized by undulating lowlands and a multitude of small lakes (Arnold 2010). In contrast, rolling hills and plateaus from 240 – 365 metres high are a common feature in the central and eastern parts of the island. In the northeast, a hard rock plateau is interspersed with deep ravines, and their resulting valleys, which generally drain towards the lower west coast (Manning and Macpherson 1958). Our excavation at OkRn-1 revealed medium brown and sandy peat that covered the permafrost.

2.1.1 Marine, Terrestrial, and Avian Resources on Banks Island

2.1.1.1 Mammals

Nutrient-rich waters from the western Beaufort Sea flow into Amundsen Gulf and attract migratory marine mammals, including bowhead whales (*Balaena mysticetus*), beluga whales (*Delphinapterus leucas*), and walruses (*Odobenus rosmarus*). Ringed (*Phoca hispida*) and bearded seals (*Erignathus barbatus*) are sedentary and year-round residents in most of the Banks Island coastal waters (Manning and Macpherson 1958). These two species are the principle pinniped taxa in this area of the Beaufort Sea and their availability, dependent on fast and pack ice distribution, affects the abundance and productivity of other arctic species, including polar bear (*Ursus maritimus*) and Arctic fox (*Vulpes lagopus*) (Stirling et al. 1977; Smith and Stirling 1978).

Ringed seals in particular are the most abundant marine mammal in the western Canadian Arctic, with present day population estimates reaching 650,000 in the Beaufort Sea and
Amundsen Gulf (Stirling and Oritsland 1995; Harwood et al. 2000). Ringed seals live along the floe-edge when open water is present and maintain breathing holes through sea ice during the winter. These holes provide access to snow drifts for the construction of subnivean lairs, which provide warmth and protection from predators, where female ringed seals birth their pups in late March and early April (Smith 1987).

The most abundant terrestrial mammals on Banks Island are muskox (*Ovibos moschatus*), Peary caribou (*Rangifer tarandus pearyi*), and Arctic fox. Banks Island muskox and Peary caribou populations grow and decline in complementary boom and bust cycles (when muskox numbers are high caribou numbers drop and vice versa) that occur every 25 – 30 years (Caughley and Gunn 1993; Nagy 1999). These natural cycles may provide an alternate explanation for the long-held belief, introduced by Stefansson (1913), that muskox in the northern interior were hunted to extinction by ancestral Inuvialuit groups visiting the *HMS Investigator*.

### 2.1.1.2 Birds

Banks Island is one of the primary breeding areas of the lesser snow goose (*Chen caerulescens*) with warm season populations consisting of more than 90% of all snow geese breeding in the western Canadian Arctic (Kerbes et al. 1999). The population fluctuates depending upon the timing of their springtime arrival from their wintering grounds in the south (Manning et al. 1956), but the colony numbers as many as 450,000 nesting geese during any given year (Samelius et al. 2008).

The island is also home to smaller populations of migratory birds. In spring, several thousand black brant geese (*Branta bernicla nigricans*), king eiders (*Somateria spectabilis*), and long-tailed ducks (*Clangula hyemalis*), as well as smaller numbers of tundra swans (*Cygnus columbianus*), Ross’s geese (*Chen rossii*) and sandhill cranes (*Grus canadensis*) will nest on Banks Island (Manning et al. 1956). Some bird species are resident populations and remain available year-round, such as rock (*Lagopus muta*) and willow ptarmigan (*Lagopus lagopus*). Other migratory birds breed in the area in the summer months including: loons (*Gavia sp.*), sandpipers (Family *Scolopacidae*), jaegers
(Stercorarius sp.), gulls (Larus sp.), terns (Sterna sp.), falcons (Falco sp.), snowy owls (Bubo scandiacus), and horned larks (Eremophila alpestris).

2.1.1.3 Fish

An island-wide survey in 1976 provides the most information about the overall distribution of fish on Banks Island (Sutherland and Golke 1978). In the southern Sachs River, the researchers caught Arctic char (Salvelinus alpinus), lake trout (Salvelinus namaycush), least cisco (Coregonus sardinella), ninespine stickleback (Pungitius pungitius) and lake whitefish (Coregonus clupeaformis). All of these species, with the exception of whitefish, were also captured from Thomsen River in the northern interior. The salmonids (e.g., Arctic char and lake trout) occur in anadromous populations, which migrate from salt water to fresh water in order to spawn, and year-round resident populations in lakes (Manning 1953; Knopp 2010).

2.2 The Excavation of OkRn-1

2.2.1 Recovery

As discussed in Chapter One, the faunal remains examined in this thesis were recovered from Dwelling 2 at OkRn-1. A portion of the dwelling was excavated by the Ikaahuk Archaeology Project in summer 2014. Excavation proceeded stratigraphically and faunal remains were documented to a particular 25x25 cm quadrant of each 1 x 1 m unit on the site grid within each discrete context. In this thesis, I performed bone frequency calculations (e.g., NISP, MNI, and MNE) at the dwelling-level, rather than the level of individual contexts, since the deposits likely represent a single occupation of the dwelling.

All excavated material from cultural deposits was screened through 4 mm mesh from which faunal remains were handpicked. Following excavation, the remains were washed and sorted by undergraduate volunteers working in the zooarchaeology laboratory at Western University, under the supervision of lab manager Edward Eastaugh. It became apparent that an analysis of the entire collection was unfeasible due to the large quantity of bone.
Amorosi et al. (1996) examined the effect of sample size on the relative abundance of major taxa (those species which combine to form 60-80% of the total) in midden assemblages from the Norse western settlement of Greenland. They demonstrated that after a level of 300 – 400 NISP is reached for the major taxa, the addition of more faunal remains does not significantly alter the existing pattern of relative abundance. The dominant taxon at Dwelling 2 was ringed seal, therefore, a minimum sample size of 400 identified ringed seal specimens was sought for this analysis. The final count of ringed seal bones included in this analysis was 3616. The other two main taxa, Arctic fox and caribou, also exceeded this limit with NISP values of 1976 and 590, respectively.

Friesen and Betts (2004) investigated patterns of discard at an early Mackenzie Inuit semi-subterranean winter house located at Cache Point in the Mackenzie Delta. They examined faunal assemblages from six separate contexts associated with the dwelling: the kitchen, bench, floor, hearth, entrance tunnel, and midden. Their results indicated that no single part of an occupation can be taken as representative of the whole, and that their midden context in particular presented a drastic departure from the remainder of their faunal assemblage. The authors encouraged sampling of the entire site in order to generate a truly representative sub-assemblage. I therefore selected a sample of bones from a range of deposits associated with Dwelling 2: one occupational deposit (4) of five, the roof/wall collapse (5, 8), one midden context (20) of three, and all four pit fills (40, 44, 46, 48) to accurately depict faunal exploitation at the dwelling (Figure 2.1).

2.2.3 Identification

During the summer of 2015, I began my identification and analysis of the Dwelling 2 faunal material using the comparative collection of the zooarchaeology laboratory at Western University, supplemented by a variety of osteological guides and the Virtual Zooarchaeology of the Arctic (VZAP) online database. These supplementary resources were used to fill any gaps in the Western reference collection. Arctic taxa are generally well-represented in the collection, but we do not possess a complete caribou or any ptarmigan.

1 www.vzap.iri.isu.edu
Whenever possible, I identified specimens to species or to the nearest taxonomic category. In some cases, due to fragmentation, weathering, or other taphonomic factors, I was only able to identify bones to a class (i.e., bird, fish, mammal). I also recorded the likely size of the animal when bones were categorized as “mammal.” Large mammals included possible caribou, muskox, and polar bear. Medium mammals were Arctic hare, Arctic fox, seal, and canid (dog/wolf). Only lemmings would have been put into a small
mammal category, but remains of this size were combined with the medium classification to become general “unidentified mammal.”

Remains from the above contexts were analyzed in their entirety with the exception of contexts 5 and 25, which contained large amounts of bone. In these cases, I randomly selected 1 x 1 m units that had bones recovered from all four quadrants. Prior to beginning my analysis, I had NISP goals for each context in mind (an NISP of 2000 for context 5 and 1000 for context 25). I continued to randomly select units and identify all the animal remains within that unit until my initial NISP goals were met (Table 2.1). The total NISP count of my representative sample assemblage is 9329, which includes 6851 bones identifiable to species and 2480 unidentifiable bone fragments.

Table 2.1: Units Sampled for Contexts 5 and 25

<table>
<thead>
<tr>
<th>Context 5</th>
<th>Context 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>N111E338</td>
<td>N111E337</td>
</tr>
<tr>
<td>N112E335</td>
<td>N111E338</td>
</tr>
<tr>
<td>N112E336</td>
<td>N112E336</td>
</tr>
<tr>
<td>N112E338</td>
<td>N112E337</td>
</tr>
<tr>
<td>N113E336</td>
<td>N112E338</td>
</tr>
</tbody>
</table>

2.2.4 Recording

I recorded the characteristics of each specimen in a Microsoft Access database during my faunal analysis. Every entry included the following categories:

**Specimen Number**

A sequential count of the number of entries in the database, beginning at 1.
Site Number

All of the faunal remains were recovered during our excavation at OkRn-1.

Catalogue Number

Volunteers at the Western University zooarchaeology laboratory sorted the washed animal bone into discrete groups according to context, coordinates of the 1 x 1m unit, and the 25 x 25cm quadrant within that unit. Bones with the same contextual information were bagged together and given a unique number within our catalogue.

Context

This number denotes which context the bone was collected from during excavation. I chose to focus my analysis on remains from contexts 5, 4, 8, 20, 25, 40, 44, 46, and 48.

Coordinates

This category identifies the southwest corner of the 1 x 1 m unit from which the bone was collected. Coordinates were measured relative to the site datum.

Quadrant

The 25 x 25 cm quadrant in the 1 m unit from which the bone was collected. Each unit had four quadrants: NE, NW, SE, SW.

NISP

NISP indicates the Number of Identifiable Specimens. This number was usually “1” to denote a unique specimen and its particular contextual information. However, bones with the same characteristics from the same location were grouped together into a single entry.

Class

This category records taxonomic class: Bird, Fish, or Mammal.

Taxon

The most precise taxonomic category that I could determine for each specimen. I identified most bones to species and some fish and birds to either family or genus.
Element

The skeletal element represented by each bone or bone fragment.

Side

This category denotes whether the bone is from the left or right side, or could not be determined (in the case of paired skeletal elements). Elements of the axial skeleton were recorded as such.

Zones (1 – 9 and Unzoned fragments) (Appendix A)

Zones indicate which portions of the bone are present. Each skeletal element is divided into a series of discrete zones. Mammal bones were divided according to morphological characteristics (Appendix A), while the zones for bird remains were taken from *A Manual for the Identification of Bird Bones from Archaeological Sites* (Cohen and Sergeantson 1996) which simply divides the bone into equal sections. Skeletal zones were not used for fish remains; instead, they were only recorded when 50% of the bone was present. For mammals and birds, I recorded a zone in my database only when 50% or more was present. This practice prevents counting the same broken bone twice when calculating minimum number of individuals (MNI) and minimum number of elements (MNE) for each taxon.

Fusion

A combination of letters was used to denote the state of fusion of skeletal elements. The first character represents the fusion of the anterior/proximal epiphysis and the second indicates the fusion of the posterior/distal epiphysis. Innominate fusion in mammals was coded using three letters representing the fusion of the ilium, ischium, and pubis. The ilium-ischium suture was represented by the first letter in the sequence, followed by the ischium-pubis suture, and then the pubis-ilium suture. The letter codes were defined as follows:

U – Unfused shaft and epiphysis

S – Unfused shaft
V – Unfused vertebral centrum
C – Unfused cranial element
E – Unfused epiphysis
G – Fusing (fusion line still visible)
F – Fused
B – Baby
N – Unknown (usually due to missing segments of the bone)

**Length (cm)**

The maximum length in centimetres (recorded to the nearest centimetre) of each bone or bone fragment.

**Fracture**

I recorded the fracture type of broken long bones whenever applicable. The categories were taken from *Vertebrate Taphonomy* (Lyman 1994), and included Longitudinal, Spiral, V-shaped, Perpendicular/Transverse, Oblique, and Columnar/Stepped fractures.

**Modification**

I noted pre- and post-depositional modifications to the bones, such as: Acid corrosion/Digestion, Burning (Black/White), Carnivore Gnawing, Cut Marks, Rodent Gnawing, Root Etching, and Weathering.

**Comments**

Any additional comments regarding the state of the bone. For example, articulations, pathologies, and possible refits with other specimens.

**2.3 Quantification**

**2.3.1 NISP and MNI**

I utilized several quantification techniques to analyze the OkRn-1 faunal assemblage; NISP and MNI to quantify taxonomic abundance and MNE and MAU to quantify
skeletal part abundance. The most straightforward of these calculations was NISP, the number of identifiable specimens, which is a count of all specimens identified for each taxonomic category, including unidentifiable specimens. Expressing NISP values as a percentage of the total identified sample (% of NISP) is an effective way of comparing the relative taxonomic abundance of species between archaeological assemblages with different sample sizes.

The strengths of NISP include its simplicity and consistency across multiple zooarchaeological investigations. This is especially useful during my synthesis of zooarchaeological studies in the western Canadian Arctic. In contrast, perceived weaknesses of NISP include the over-representation of species with very fragmented remains and a bias towards small-bodied taxa which are not butchered before transport to a living site (Grayson 1979, 1984; Gilbert and Singer 1982; Marshall and Pilgram 1993; Ringrose 1993).

MNI, the minimum number of individuals, was developed to counteract issues of fragmentation and the possible multiple counting of animals. It considers the most frequently represented discrete element of each taxon in order to determine the smallest number of individuals that could have generated the assemblage. For example, a collection of complete ringed seal bones with 7 left femora, 5 right femora, 2 left tibiae, and 4 ribs would have an MNI value of 7.

Unfortunately, MNI is statistically and theoretically linked with NISP and shares many of the same issues regarding fragmentation (Grayson 1979). It also tends to over-emphasize the importance of rare taxa and does not consider the economic value of different species (Davis 1987). For instance, a single bowhead whale provides a much greater quantity of meat than multiple ringed seals. Critiques of MNI by Ringrose (1993) and Grayson (1979) also mention how un-sided or axial elements are often problematic when calculating MNI. Additionally, MNI values will vary depending on how archaeological contexts are grouped prior to calculation, an issue known as the problem of aggregation. For example, if MNI values are calculated separately for two adjacent dwellings on a site (on the assumption that they were occupied sequentially so the same animals could not be
shared among the two households) MNI totals for the site will be higher than if the 2 dwellings are aggregated for MNI calculation (on the assumption that both dwellings were occupied at the same time, so animals were likely shared between them). Above all, problems with this frequency metric stem from archaeologists being inconsistent and unclear regarding their calculation methods.

With these issues in mind, I primarily used NISP and % of NISP when comparing between different taxa and archaeological sites. However, I occasionally did not have access to raw data during my synthesis of published research and could only use the measures provided. I calculated MNI for the OkRn-1 assemblage to facilitate comparisons with published studies that utilized MNI and % of MNI values. I based these MNI values on the most frequent zone for each skeletal element (for paired elements the two sides were considered separately - e.g., left humeri). The best represented skeletal element (from a particular side, if relevant) indicated the MNI value for each taxon. As discussed previously, MNI and all other frequency metrics were calculated at the dwelling-level, rather than at the level of individual contexts, since any given animal was likely disposed of in multiple contexts associated with the occupation of the dwelling.

2.3.2 MNE and MAU

Analyses of body part representation can elucidate patterns of butchery and consumption (Marshall and Pilgram 1993). MNE, minimum number of elements, and MAU, minimum animal units, were developed as quantitative measures to investigate the transport of large-bodied taxa (Binford 1978).

The calculation of MNE requires the use of skeletal part zones. Those elements with non-overlapping zones may be bone fragments originally from the same complete element. As such, they are not counted as separate specimens. In this thesis, I calculated MNE values by taking the most frequent zone for each skeletal element (for paired elements, the MNEs for lefts and rights were summed) for any given taxon.

Although MNE effectively prevents bias due to bone fragmentation, certain elements are still over-represented because they occur more frequently in the animal skeleton. For
instance, ringed seals possess 30 ribs and only two of any given long bone. MAU accounts for this difference by dividing MNE values by the number of that element in a complete individual skeleton (e.g., 323 ringed seal ribs are divided by 30 to produce a MAU of 10.77). As such, it accounts for both fragmentation and the differing number of bones in mammal skeletons. This frequency metric can then be normed to %MAU by dividing each MAU value by the greatest MAU value and subsequently multiplying by 100. The normed measure is thus an effective way of comparing skeletal element counts between archaeological collections with disparate sample sizes.

2.4 Utility Indexes

Beginning with Binford’s (1978) derivation of a modified general utility index (MGUI) for caribou (Rangifer tarandus) and domestic sheep (Ovis aries), zooarchaeologists have derived utility indices for many additional species, usually by calculating the average amount of meat, marrow, and grease per skeletal element, as per Binford’s (1978) original methodology (Metcalfe and Jones 1988). More recent studies have also considered further variables, such architectural usefulness, taste preference, and ease of storage (e.g., Savelle 1997; Diab 1998; Friesen 2001).

These indices are considered alongside the relative abundance of skeletal elements in order to aid in the interpretation of these frequencies, with the underlying assumption that hunter-gatherers did not usually transport whole carcasses and made choices about which skeletal portions of large-bodied animals to transport. For example, an assemblage characterized by low-utility elements may be interpreted as a kill site, where the least desirable elements were left behind, while a base camp would demonstrate the opposite trend. These idealized relationships are known as transport models (Binford 1978) (Figure 2.2). Deviations from this pattern can also signal periods of feast or famine when hunter-gatherers could or could not afford to be “picky.”

In this thesis, I used utility indices to examine the representation of skeletal parts of the two most common large-bodied taxa (i.e., ringed seal and caribou). For caribou, I employed the food utility index (FUI) derived by Metcalfe and Jones (1988). Lyman et al. (1992) developed a Phocid seal utility index and Diab (1998) subsequently developed
one exclusively for ringed seal. I used the latter during my analysis of the relative abundance of ringed seal skeletal elements.

**Figure 2.2: Illustration of Binford’s (1978) Transport Strategies (Metcalfe and Jones 1988)**

*(a) Relative frequency of body parts removed from kill-butchering sites in relation to their FUI values; (b) Relative frequency of body parts remaining at kill-butchering sites in relation to their FUI values.*

### 2.5 Determining the Age Distribution of Ringed Seals

Creating a demographic profile of the ringed seal population recovered from Dwelling 2 will clarify the *qarmaq’s* season of occupation. Female ringed seals give birth in a short period between late March and early April each year (Smith 1987). As a result, there are distinct age cohorts within the population at any given time. For example, by August, seal groups contain individuals aged 5 months, 17 months, 29 months, etc (Hodgetts 2002). A consideration of the youngest individuals within a zooarchaeological assemblage, those in their first year of life or “yearlings”, will provide a rough estimation of their season of death and, therefore, the seasonality of the occupation. Several techniques use skeletal remains in order to approximate the age of specimens, including the state of epiphyseal fusion of long bones, an examination of dentinal annuli in teeth, and measurements of long bone growth. Thin sections of teeth were outside the scope of this thesis due to time constraints, so the two other methods were used.
2.5.1 Ringed Seal Epiphyseal Fusion

The state of epiphyseal fusion may be used to estimate age when the fusion sequence of a particular taxon is known. Subadult proximal and distal longbone epiphyses (articular surfaces at the ends of longbones) are attached to their diaphyses (shafts) by cartilage and, as the individual ages and experiences long bone growth, the cartilage ossifies, fusing the shaft to its respective ends. The age at which individual epiphyses fuse is relatively constant within a given species. The precision of epiphyseal fusion for age estimation decreases as an individual matures and more epiphyses are fused, until it can only provide a minimum age estimate for a fully fused individual.

Stora (2001) determined the sequence of epiphyseal fusion for Baltic Sea ringed seals by studying a collection of 177 ringed seal skeletons housed at the Swedish Museum of Natural History. His work demonstrates considerable intraspecies variation which means that age estimates based on ringed seal skeletal fusion are less precise than those derived from incremental tooth growth. Any examination of disarticulated elements rather than complete individuals will only produce very general age estimations based on epiphyseal fusion, but they can reinforce demographic trends determined through other means. Stora (2001) defined four age classes that correspond more closely to the life history of seals than chronological ages: yearling (under one year), juvenile (1-5 years), young adult (5-7 years), and old adult (7+ years). These groups encompass one or more skeletal ages, which are signalled by the fusion of particular epiphyses (Table 2.2).

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Skeletal Age Group</th>
<th>Skeletal Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling</td>
<td>1</td>
<td>Anterior phalanges 1-2 distal epiphysis</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Metacarpal I distal epiphysis</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td><strong>Scapula – supraglenoid tubercle</strong>&lt;br&gt;<strong>Humerus – Head and tubercle of the proximal epiphysis</strong>&lt;br&gt;Anterior phalanges 3&lt;br&gt;<strong>Pelvic bone – Acetabulum</strong>&lt;br&gt;Metatarsal I distal epiphysis</td>
</tr>
</tbody>
</table>

Table 2.2: Fusion Sequences for Ringed Seals from the Baltic Sea (Stora 2001).
Note: Elements used in this analysis are in bold type.
<table>
<thead>
<tr>
<th>Age Group</th>
<th>Development Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Juvenile</strong></td>
<td>Posterior phalanges 1-2 distal epiphysis</td>
</tr>
<tr>
<td></td>
<td>Crural bone – the tibial and fibular part of the proximal epiphysis</td>
</tr>
<tr>
<td></td>
<td><strong>Humerus distal epiphysis</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Radius proximal epiphysis</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Femur proximal epiphysis – the head and the greater trochanter</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Calcaneal tuber</strong></td>
</tr>
<tr>
<td></td>
<td>Posterior phalanges 3</td>
</tr>
<tr>
<td></td>
<td>Sacrum</td>
</tr>
<tr>
<td><strong>Young Adult</strong></td>
<td><strong>Humerus proximal epiphysis – epiphysis to diaphysis</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Ulna proximal – olecranon</strong></td>
</tr>
<tr>
<td></td>
<td>Anterior phalanges 1-2 proximal epiphyses</td>
</tr>
<tr>
<td></td>
<td><strong>Femur distal epiphysis</strong></td>
</tr>
<tr>
<td></td>
<td>Crural bone proximal epiphysis – epiphysis to diaphysis</td>
</tr>
<tr>
<td><strong>Old Adult</strong></td>
<td><strong>Radius distal epiphysis</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Ulna distal epiphysis</strong></td>
</tr>
<tr>
<td></td>
<td>Metacarpal I proximal epiphysis</td>
</tr>
<tr>
<td></td>
<td>Metacarpals II-V distal epiphyses</td>
</tr>
<tr>
<td></td>
<td>Crural bone distal epiphysis – tibia and fibula</td>
</tr>
<tr>
<td></td>
<td>Metatarsal I proximal epiphysis</td>
</tr>
<tr>
<td></td>
<td>Metatarsals II-V distal epiphyses</td>
</tr>
<tr>
<td></td>
<td>Posterior phalanges 1-2 proximal epiphyses</td>
</tr>
<tr>
<td></td>
<td>All epiphyses of limb bones fused</td>
</tr>
</tbody>
</table>

### 2.5.2 Long Bone Measurements

Other measures of long bone growth can also be used in age estimation. Measures of certain elements can be graphed to reveal age cohorts within a seasonally hunted population of a species that gives birth within a restricted period of the year. In the case of OkRn-1 seals, I plotted smallest breadth of diaphysis versus greatest depth of diaphysis of ringed seal femora, as well as smallest breadth of diaphysis versus smallest height of diaphysis of humeri. I then compared these measurements to data from modern Baltic Sea populations of ringed seals that were captured throughout the year between 1970 and 1997 and are currently housed at the Swedish Museum of Natural History (Figures 2.3 and 2.4) (Stora 2002a; 2002b). The youngest age cohort will be represented by the smallest cluster of measurements, separated from the rest of the measurement distribution by a gap since, in a seasonally hunted population, yearlings will only be taken during a...
limited period of development within their first year of life. The body size of this yearling cohort can provide an approximation of their age at death, thereby indicating their season of death, since Beaufort Sea ringed seals give birth in late March and early April (Smith 1987).

**Figure 2.3: Greatest Depth of Diaphysis vs. Smallest Breadth of Diaphysis of Ringed Seal Femora from a Modern Population (Stora 2002a)**

2.6 Statistical Tests and Analysis

2.6.1 Spearman’s Rho

Spearman’s rank order correlation coefficient (Spearman’s rho) is used to evaluate whether the similarities and differences between the Dwelling 2 assemblage and those from surrounding sites in the western Canadian Arctic are statistically significant. Spearman’s rho measures the strength of association between two ranked variables. It is a non-parametric statistical test that does not assume that the data are normally distributed. The coefficient can take values between +1 and -1, with +1 indicating a strong positive
correlation, -1 demonstrating a strong negative correlation, and 0 suggesting no association between the two variables. P-values generated for Spearman’s rho indicate the possibility of obtaining the same result, using the same sample size, from a collection of random numbers with no association.

**Figure 2.4: Smallest Breadth of Diaphysis vs. Smallest Height of Diaphysis of Ringed Seal Humeri from a Modern Population (Stora 2002b)**

In this thesis, Spearman’s rho is calculated by ranking each taxon according to taxonomic abundance (% of NISP). For example, in the Dwelling 2 assemblage, ringed seal would be ranked “1”, Arctic fox would be “2”, etc. Data from surrounding sites were ranked in the same way so that similarities and differences in the rankings could be considered. In the event that two taxa are tied in terms of relative abundance, they are assigned the average of the ranks that they would have otherwise occupied (e.g., ranks 3 and 4 become rank 3.5).
2.7 Summary

This chapter provided a brief overview of the environment and local resource base of Banks Island. I also detailed the recovery and identification methods used during my faunal analysis, and discussed the quantitative techniques employed to determine taxonomic abundance, the frequency of skeletal parts, and the age profile of ringed seals. Finally, I described which statistical test will be utilized to compare the Dwelling 2 assemblage to other sites from around the western Canadian Arctic. In the next chapter, I use all of these methods to examine the faunal assemblage from Dwelling 2 and reconstruct subsistence patterns of the dwelling’s occupants and its season of occupation.
Chapter 3

3 Results

The primary objective of this thesis is to document late Thule food procurement strategies on Banks Island, as well as determine the season of occupation of the OkRn-1 qarmaq. As such, this chapter presents the results of my faunal analysis from Dwelling 2 at OkRn-1. I determine the subsistence strategies practiced by the occupants of Dwelling 2 by examining the relative frequencies of bird, fish, and mammal classes, and subsequently describe the taxonomic abundance of taxa within those classes. I also consider the exploitation and transport of the two most common large-bodied taxa, ringed seal and caribou, through an examination of their skeletal element frequencies. Determining the season of occupation of Dwelling 2 will help to clarify the seasonal use of OkRn-1 qarmaq in prehistory. My discussion of seasonality at Dwelling 2 is informed by the age distribution of ringed seals, which can be approximated using measurements of seal humeri and femora, as well as the state of fusion of epiphyses. Finally, I investigate both human and non-human taphonomic effects to reconstruct site formation processes. I review bone fragment size distributions, the frequency of burnt bone compared to unburnt bone, cut marks, and the prevalence of carnivore gnawing and acid corrosion.

3.1 Relative Abundance of Bird/Fish/Mammal Classes

Figure 3.1 represents the frequency of fish, bird, and mammal remains recovered from our excavation. The relative abundance of each class is shown as a percentage of the total sampled NISP (n = 9329), including all bone fragments that could only be identified to class and not to a more specific taxon.

Mammals clearly dominate the faunal assemblage from Dwelling 2. A total of 8468 mammalian bones and bone fragments were identified, with 6452 of those assigned below class. The 2016 remaining elements only identified to class consist of 1503 “unidentified mammal” bone fragments and 513 “large terrestrial mammal” remains. The latter category was merged with the “Caribou” total throughout all analysis at the species
level, as they most likely represent broken caribou long bones. Caribou is almost the only large mammal present in the assemblage; it is the third most common taxon compared to very small amounts of polar bear and muskox.

**Figure 3.1: Relative Abundance of Classes from Dwelling 2, OkRn-1 (% of NISP)**

\[(n = 9329)\]

The fish and bird categories are represented by NISPs of 215 and 646, respectively. They may be underrepresented when compared to mammal remains because they do not preserve as well. The consumption of fish and bird bone by both humans and canines has been recorded ethnographically (e.g., Stefansson 1914; Jenness 1922; Binford 1978). These elements are more likely than mammal bone to be completely destroyed during the digestion process (Whitridge 2001) and the Dwelling 2 assemblage does show signs of acid corrosion (discussed below) indicating that some bones have been through the digestive tract of an unknown species, likely dog. Aside from possible consumption, the arctic environment of OkRn-1, the permafrost, and the collapse of the qarmaq atop the faunal remains all promote excellent preservation. However, we did note increased weathering of bones from deposits close to the surface. The quality of preservation
increased with depth as we got closer to and then into the permafrost. The deepest deposits, which were removed from melting permafrost, contained very well-preserved organic remains (e.g., skin, fur, and feathers).

The scarcity of fish in particular from Thule and Inuit faunal assemblages has often been attributed to taphonomic processes, including consumption (reviewed by Whitridge 2001). However, Whitridge (2001) suggests that their relative absence in Classic Thule assemblages is due to an economic focus on open-water sea mammal hunting. The pursuit of sea mammals, such as bowhead whales, conflicted with the most productive fishing periods and rendered their relatively small dietary contribution inconsequential. In contrast, later Thule sites and historical Inuvialuit warm weather sites, such as those in the Mackenzie Delta and on Victoria Island, do contain abundant fish remains reflecting diversified economies based upon the local resource base, perhaps in part a result of changing weather patterns (Balkwill and Rick 1994; Friesen and Arnold 1994; Friesen 1995, 2015; Morrison 2000; Norman and Friesen 2010; Friesen and Howse 2016). It therefore seems likely that the paucity of fish in Dwelling 2 is an accurate reflection of subsistence strategies at the dwelling, suggesting that either fish were primarily exploited at a time of year when the dwelling was unoccupied or that the subsistence economy of southern Banks Island involved minimal consumption of fish.

Mammals were indisputably the dietary staple of this occupation. The emphasis is on marine mammals, as opposed to terrestrial mammals, a pattern that is also documented at Nelson River (Arnold 1986; Cooper 1981; Austin 1985; Da Rosa 1985; Thomsen 1985) and some Mackenzie Inuit sites in the northern Mackenzie Delta region (e.g., Friesen and Hunston 1994; Morrison 1990; Friesen 1995).

Table 3.1: Number of Specimens and Minimum Number of Individuals from Dwelling 2, OkRn-1

<table>
<thead>
<tr>
<th>Taxon</th>
<th>NISP</th>
<th>%NISP</th>
<th>MNI</th>
<th>%MNI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FISH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic char (Salvelinus alpinus)</td>
<td>46</td>
<td>0.6</td>
<td>9</td>
<td>6.9</td>
</tr>
<tr>
<td>Lake trout (Salvelinus namaycush)</td>
<td>25</td>
<td>0.3</td>
<td>8</td>
<td>6.2</td>
</tr>
<tr>
<td>Family Salmonidae</td>
<td>56</td>
<td>0.8</td>
<td>9</td>
<td>6.9</td>
</tr>
<tr>
<td>Unidentified Fish</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Class subtotal</strong></td>
<td>215</td>
<td>1.7</td>
<td>26</td>
<td>20</td>
</tr>
</tbody>
</table>
3.2 Main Fish Taxa

The analyzed OkRn-1 faunal sample contained 215 fish bones (Table 3.1). All 127 specimens that could be assigned below class were attributed to the family *Salmonidae*. Of these, 46 bones belonged to Arctic char and 25 were from lake trout (Figure 3.2). Those specimens categorized as “Family *Salmonidae*” were too fragmented for a confident determination of species, although they are likely either Arctic char or lake trout, the two most abundant salmonid species in Arctic waters.
Arctic char is a notable anadromous species that migrates to fresh water from the sea in order to spawn. There are populations of sea-run char in lakes and rivers on Banks Island, alongside groups of resident char that stay year-round (Knopp 2010). In contrast, lake trout is often considered the least tolerant of salt water among the *Salmonidae* family. It is primarily a fresh water species that is a common presence in lakes throughout the entire year. However, a 2010 study of anadromy in lake trout populations produced the first detailed record of lake trout migrating inland from coastal waters around Nunavut (Swanson et al. 2010). They have also been obtained from the coastal areas surrounding Banks Island (Manning 1953), signalling that at least some lake trout are anadromous.

**Figure 3.2: Relative Abundance of Fish Taxa from Dwelling 2, OkRn-1 (% of Fish NISP) (Fish NISP = 215)**

Upstream runs of Arctic char and lake trout in the late summer/early fall are considered more important than their downstream runs in late June or early July, as the fish are larger and more abundant (Whitridge 2001). They are often in poor condition during the spring downstream run (Fisheries and Oceans Canada 2004). Therefore, the presence of these species will inform my discussion of seasonality of Dwelling 2, although some
specimens may have come from year-round resident populations in lakes or have been cached for consumption during the winter.

### 3.3 Main Bird Taxa

A total of 646 bird bones and bone fragments were recorded from the Dwelling 2 sample assemblage. Of these, 272 specimens were assigned below class to a family, genus, or species. The most abundant taxa, defined as any category more specific than class with an NISP greater than 10, are illustrated in Figure 3.3.

**Figure 3.3: Relative Abundance of Bird Taxa from Dwelling 2, OkRn-1 (% of Bird Taxa) (Bird NISP = 646)**

Snow goose is clearly the dominant avian resource within Dwelling 2, followed distantly by rock/willow ptarmigan. Both ptarmigan species are year-round residents of Banks Island and a lack of reference material precluded identification to species. The high relative abundance of snow goose in the collection is unsurprising due to the large extant population on Banks Island. The residents of Sachs Harbour still participate in a springtime snow goose hunt, when the fattened birds return from wintering in the United States. Canada goose and Ross’s goose populations also breed on Banks Island, although
in much smaller numbers (Manning et al. 1956). Snowy owls are another summer breeding population on the island, especially when lemmings are abundant (Manning et al. 1956; Wilkinson and Shank 1975).

3.4 Main Mammal Taxa

Mammal bone comprises the large majority of the Dwelling 2 faunal assemblage. The analyzed sample includes 8468 mammal specimens, 1503 of which could not be identified below class. A total of 513 skeletal fragments, mostly composed of broken long bones, were classified as “large terrestrial mammal” and subsequently added to the total NISP of caribou remains. The shattered long bones are almost certainly caribou bones that were purposefully broken in order to obtain marrow. Other large mammals within the assemblage, such as a polar bear and muskox, are much less common and have a combined NISP of 28 compared to 590 identified caribou bones. The most common mammalian taxa, defined as those with a % of Mammal NISP greater than 1, are illustrated in Figure 3.4.

**Figure 3.4: Relative Abundance of Mammal Taxa from Dwelling 2, OkRn-1 (% of Mammal Class) (Mammal NISP = 8463)**
Ringed seal clearly dominates the identified mammal remains and the assemblage as a whole, suggesting that these marine mammals were the main dietary staple at Dwelling 2. The emphasis on seal in particular is seen elsewhere in the Mackenzie Delta (e.g., Washout [Friesen and Huntson 1994; Yorga 1980] and Iglulualuit [Morrison 1990]) and it follows the trend noted at OkRn-1 during test excavations of Dwelling 1 by Arnold (2010). The abundance of ringed seal at coastal late Thule sites indicates that it was an important source of food. Caribou occurs in lower frequencies and was consumed by the Thule as well, as illustrated at Dwelling 2 by the shattered and disarticulated remains.

In contrast, the high frequency of Arctic fox bones was somewhat surprising, as smaller mammals like fox and Arctic hare do not represent a substantial caloric contribution when compared to ringed seal or caribou. However, there are ethographic references to winter consumption of fox being common among Inughuit in Greenland (Rasmussen 1921) and accounts from the Canadian Arctic indicate that Arctic foxes were considered “palatable” when fat, although they were undesirable when lean (Jenness 1970). Multiple ethnographies of ancestral Inuvialuit groups stress that any variation in diet would be welcomed during the winter months, when only ringed seal and resident populations of fish were available (e.g., Stefansson 1922; Jenness 1922).

We noted during excavation that many portions of the fox skeleton were still articulated, such as the skull (cranium and mandible), vertebral column, and fore/rear limbs, signalling that the carcasses were discarded with intact soft tissue. We also recovered over 90 slate uluit, triangular knives traditionally used by women to skin and butcher animals, prepare and clean the skins, and subsequently cut them for sewing. The uluit may have been used to gather and process fox pelts before the carcasses were thrown away. As a result, I suggest that the fox from Dwelling 2 were exploited primarily for their pelts and were not cooked and consumed as frequently as ringed seal and caribou, which were not commonly found articulated.

Another notable characteristic of this faunal assemblage is the near absence of muskox remains. Today, Banks Island hosts most of the world’s muskox population (Parks Canada 2003; Gunn et al. 2013). My sample included one piece of a muskox horn that
had been worked by humans. It may have been brought into Dwelling 2 as a tool, rather than a portion of an animal carcass to be butchered and/or consumed. As mentioned previously, the caribou and muskox populations of Banks Island exist in complementary boom-and-bust cycles and the occupation of Dwelling 2 may have coincided with an increase in caribou, which is the third most abundant species in my assemblage, and a decrease in the number of muskox on the island. Alternatively, the relative abundance of the two species may reflect preferred Thule Inuit foods and hunting strategies, rather than the relative abundance of these species in the area at the time the site was occupied.

Finally, there were 14 bones from the Dwelling 2 sample that could only be classified as *Canis* sp. (dog/wolf). It is difficult to distinguish between domesticated dog and wolf skeletons in the archaeological record without the presence of complete bones. The morphological changes that are characteristic of domesticates include overall size reduction, shortening of the snout and, as a result, large crowded teeth (reviewed by Morey 1992), but adult female wolves overlap in size with adult male dogs (cf. Møhl 1986). Unfortunately, the Dwelling 2 assemblage contained only fragmented elements that could not be confidently assigned to either species.

Ethnohistoric evidence suggests that ancestral Inuvialuit groups often used dogs primarily as pack and sled animals (Jenness 1922; Rasmussen 1999), and archaeological evidence indicates this practice from the early Thule period onward (MacRury 1991). It seems plausible that the canid remains recovered from Dwelling 2 were from domesticated dogs. I observed cut marks on a lumbar vertebra, two cranial fragments, and a mandible. The consumption of dog meat has been recorded by Arctic ethnographers, but usually only in periods of desperation and famine (Laugrand and Oosten 2002). In contrast, the faunal assemblage from Dwelling 2 indicates that food was relatively plentiful. Therefore, the butchered individual(s) may represent a dog consumed during an infrequent food shortage, a deceased dog that was butchered to bait traps or to feed the other dogs at the site, or an Arctic wolf.
3.5 Skeletal Part Representation of Ringed Seal and Caribou

In this section, I present an analysis of animal body-part representation in order to clarify the patterns of butchery, transport, and consumption of large-bodied taxa. Small bodied species such as fox are generally transported whole from a kill site to a living site. However, there may be some purposeful selection of skeletal elements of larger-bodied ringed seal and caribou skeletal elements.

3.5.1 Representation of Ringed Seal Skeletal Elements

Here, I use %MAU and utility indices (both outlined in Chapter 2) to document and interpret skeletal part frequencies in order to reconstruct the butchery and transport of ringed seal and caribou to Dwelling 2.

Figure 3.5: Representation of Ringed Seal Skeletal Parts (%MAU), Dwelling 2, OkRn-1 (Ringed Seal NISP = 3616)

I grouped ringed seal skeletal elements together to facilitate comparisons with the seal meat utility index (MUI) derived by Diab (1998) (Figure 3.5). The front flipper and rear
flipper categories include all carpals, tarsals, and fore/hind phalanges. They were the two most abundant groupings. Figure 3.5 indicates that all portions of the skeleton are present and that individuals were probably transported whole to Dwelling 2 to be butchered. This practice was common throughout the Thule period in the Canadian Arctic and Greenland (Lyman et al. 1992; Diab 1998; Darwent and Foin 2010).

A comparison of ringed seal %MAU and Diab’s (1998) %MUI values did not produce a trend similar to any of Binford’s (1978) transport models and the correlation between these variables was statistically insignificant ($r_s = -0.3080, p = 0.2839$) (Figure 3.6). This pattern of seal skeletal element frequency can be attributed to density-mediated attrition rather than selective transport. For example, the compact size and high density of bones found in seal flippers makes them resistant to density-mediated attrition, whereas ribs and some vertebrae are more susceptible to degradation because of their thin cortical walls and low bone density (Lyman 1985, 1992; Faith and Gordon 2007). The lack of correspondence with any idealized transport models supports the interpretation that ringed seals were brought whole to Dwelling 2.

**Figure 3.6: Representation of Ringed Seal Parts Against the Meat Utility Index, Dwelling 2, OkRn-1 (%MAU/%MUI)**
3.5.2 Representation of Caribou Skeletal Elements

The selective transport of caribou skeletal parts by arctic hunter-gatherers has been noted in ethnographic and archaeological records. For example, Binford’s (1978) original derivation of utility indices included a study of caribou butchery and transport by the Nunamiut of Alaska. Figure 3.7 illustrates a paucity of many caribou axial elements in Dwelling 2 at OkRn-1. The tibia and tarsals are the most abundant elements, with the phalanges and metatarsals following closely behind. To determine whether this pattern matched any transport model, I compared my caribou specimens with Metcalfe and Jones’ (1988) food utility index (FUI) for caribou skeletal parts (Figure 3.8).

Figure 3.7: Representation of Caribou Skeletal Parts (%MAU), Dwelling 2, OkRn-1 (Caribou NISP = 590)

The %FUI and %MAU values illustrated in Figure 3.8 are not significantly correlated when considering all skeletal elements ($r_s = -0.1079$, $p = 0.6802$). Upon the removal of “Metatarsals”, “Tibia + Tarsals”, and “Femur” as outliers, the distribution roughly...
resembles a weak negative correlation, also known as a reverse utility curve ($r_s = -0.4158$, $p = 0.1392$). This distribution would be expected at kill sites, where the less desirable elements are left behind while the choicest elements are transported to a residential site. However, zooarchaeological analyses from known base camps have also produced reverse utility curves (Grayson 1989; Lyman 1985, 1992; Frey and Marean 1997). In such cases, investigators attribute the correlation not to selection and transport by hunters, but to density-mediated attrition. Given the documented inverse relationship between bone density and utility, it is difficult to tease apart the relative contributions of human transport behaviour and post-depositional diagenesis to observed transport profiles (Lyman 1985).

**Figure 3.8: Representation of Caribou Skeletal Part Against the Food Utility Index, Dwelling 2, OkRn-1 (%MAU/%FUI)**

Note: Skeletal elements with red data points represent marrow-bearing bones.

Due to the excellent preservation at Dwelling 2, I hesitate to attribute the utility curve to non-human taphonomic processes alone. Bones closer to the surface would be subject to
more attrition and weathering, but the majority of this faunal assemblage was adjacent to or within the permafrost and therefore recovered in excellent condition. The negative correlation between element frequencies and their respective utility therefore requires further examination.

Frey and Marean (1997) posited that reverse utility curves were methodological artifacts resulting from an over-emphasis on long bone ends rather than the stronger medial portions. They also suggested that the comparison between element frequencies and utility indices should be limited to marrow-bearing bones. Metcalfe and Jones’ (1988) FUI values for complete long bones were used in order to include the entire long bone, rather than focussing on the proximal and distal ends. Marrow-bearing bones have been denoted by red data points in Figure 3.8. When considered alone, if “Femur” is again removed as an outlier, the correlation between their %MAU and %FUI values is strongly positive with a high p-value due to small sample size ($r_s = 0.7143$, $p = 0.1108$).

Nevertheless, a focus on bones containing marrow produces the positive curve that is expected at base camps (Binford 1978), suggesting that these bones were preferentially selected and transported to Dwelling 2.

Figure 3.9 compares caribou skeletal part abundance with the meat drying index (MDI) derived by Friesen (2001). It shows a strong negative correlation ($r_s = -0.5991$, $p = 0.0110$) between the two variables; elements least appropriate for drying and storage occurred in the greatest numbers in the Dwelling 2 assemblage. This is especially true for tibias, metatarsals, phalanges, mandibles, and the cranium. Elements which are better for drying, namely most of the axial skeleton, are poorly represented at Dwelling 2. It appears that these portions may have been dried, cached, or both, for later consumption.

My analysis of caribou skeletal element frequency demonstrates that some elements were deliberately brought back to OkRn-1, such as the lower hind leg, starting below the patella and including the tibias, metatarsals, and phalanges. The hide of this portion of the caribou skeleton was used ethnohistorically and continues to be used today for making clothing and footwear, while sinew from caribou legs was also used as thread (Mathiassen 1927; Boas 1964; Jenness 1970; Morrison 1988; Stenton 1991). The
preferential selection of caribou parts most appropriate for hide working is supported by the number of *uluit* and the amount of animal fur unearthed at Dwelling 2, as well as the intensity of fox skinning and hide working that took place there. However, the preponderance of crania and mandibles requires an additional explanation. It is possible that the present-day regard for caribou heads as a delicacy was also mirrored in the past (Sinclair 1953; Geist 1998; Sharp and Sharp 2015), or that the associated antler and teeth were used for tools, weapons, decorations, or amulets.

**Figure 3.9: Representation of Caribou Skeletal Parts Against the Meat Drying Index, Dwelling 2, OkRn-1 (%MAU/%MDI)**

3.6 Age Distribution of Ringed Seals

The section uses age estimations of ringed seals from Dwelling 2 to understand the seasonality of ringed seal hunting at the site. The techniques used to create a demographic profile of ringed seals, examination of epiphyseal fusion and measurements of long bone growth, are described in Chapter Two.
3.6.1 Ringed Seal Epiphyseal Fusion

Table 3.2 displays the number of fused versus unfused/fusing bones in the assemblage for each skeletal age class. A total of 78.13% of ringed seals in the Dwelling 2 assemblage are older than one year based on fusion stage, while only 32% are older than the juvenile age class.

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Epiphyses</th>
<th>Number Fused</th>
<th>Number Unfused</th>
<th>Number Fusing</th>
<th>Percent Fused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling (Under 1 year)</td>
<td>Scapula – Supraglenoid Tubercle</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humerus – Head and Tubercle of Proximal Epiphysis</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pelvis – Acetabulum</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>25</strong></td>
<td><strong>6</strong></td>
<td><strong>1</strong></td>
<td><strong>78.13%</strong></td>
</tr>
<tr>
<td>Juvenile (1 – 5 years)</td>
<td>Humerus – Distal Epiphysis</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radius – Proximal Epiphysis</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Femur – Head and Greater Trochanter</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calcaneal Tuber</td>
<td>9</td>
<td>14</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>16</strong></td>
<td><strong>32</strong></td>
<td><strong>2</strong></td>
<td><strong>32%</strong></td>
</tr>
<tr>
<td>Young Adult (5 – 6 years)</td>
<td>Humerus – Proximal Epiphysis</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ulna – Proximal Epiphysis</td>
<td>7</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Femur – Distal Epiphysis</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>12</strong></td>
<td><strong>23</strong></td>
<td><strong>0</strong></td>
<td><strong>34.39%</strong></td>
</tr>
<tr>
<td>Old Adult (7+ years)</td>
<td>Radius – Distal Epiphysis</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ulna – Distal Epiphysis</td>
<td>3</td>
<td>9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6</strong></td>
<td><strong>17</strong></td>
<td><strong>0</strong></td>
<td><strong>26.09%</strong></td>
</tr>
</tbody>
</table>
Smith (1987) recorded the spatial segregation of ringed seal age classes (yearling, subadult, adult) based upon the season and corresponding ice conditions. There are two types of ice habitat that occur between autumn and spring: fast ice, which is firmly anchored to the shore, and pack ice/floe edge, which is less stable and floats freely over deeper waters. The former is the preferred winter habitat for ringed seals because it represents the best feeding grounds and provides stable ice on which to build birthing lairs. Competition for the favoured inshore habitats results in a predominance of large sexually mature adults close to shore, whereas smaller subadults are pushed into the less desirable pack ice habitat (Smith 1987). In contrast, there is much less competition for territory during the warm, open-water season and therefore all age groups of ringed seals are distributed more evenly inshore and offshore.

Smith (1987) documented the age structure of ringed seal populations in various seasons and ice habitats using demographic information from net catches over a three year period near Ulukhaktok, NWT (Figure 3.10), located on the west coast of Victoria Island, immediately east of Banks Island (Figure 1.3). There are distinct differences in the relative abundance of age classes (yearling, juvenile, adult) depending upon season and location. I considered the number of fused/unfused seal calcanei (n = 24) in order to categorize the Dwelling 2 ringed seal assemblage into these age classes for comparison. I selected the calcaneus because of its relative abundance within the assemblage and because it fuses at the onset of adulthood (Stora 2001). Fused calcanei were considered adult specimens and unfused calcanei were attributed to juvenile individuals. Yearling/fetal calcanei were flagged during the identification process based upon their small size, juvenile (rough) cortex, and limited feature development. Epiphyses of yearling/fetal elements, if present, were still completely unfused.

The Dwelling 2 distribution is most similar to Smith’s (1987) data from the spring floe edge/pack ice, primarily due to the emphasis on juveniles. If Dwelling 2 was occupied solely during the winter we would expect a majority of adults, followed by juveniles, with very few yearlings present (Moody and Hodgetts 2013). This distribution corresponds most closely to the demographic profiles of seals exploited from inshore, fast ice habitats. The preponderance of juveniles also suggests that individuals were not
hunted during the open water season, when all age classes would occur in equal proportions (McLaren 1958; Smith 1987). In contrast, the pattern illustrated at Dwelling 2 suggests that hunters from OkRn-1 pursued seals in the springtime when the pack ice at the floe edge was breaking up. The aggregation of juvenile seals in these areas created many opportunities for exploitation, rather than hunting individual adult seals and their pups at breathing holes. Nevertheless, the presence of young and old adult specimens and yearling/fetal elements indicates that at least some hunting was carried out at breathing holes, on the fast ice, or in birthing lairs during the spring breeding season.

Figure 3.10: Seasonal and Spatial Distribution of Ringed Seals From Around Uluhaktok, NWT (Smith 1987) Compared to Dwelling 2, OkRn-1

3.6.2 Ringed Seal Metric Data

Measurements of ringed seal long bone growth also represent seal age distribution and inform discussions of site seasonality. A more detailed account of the associated methods can be found in Chapter Two. Figure 3.11 displays measurements of smallest breadth of
diaphyses versus greatest depth of diaphyses for all ringed seal femora (n = 8) in the Dwelling 2 assemblage compared to a modern day sample from Baltic Sea ringed seal populations (Stora 2002a). The Dwelling 2 sample size is small, but almost all of the femora fall within the range of modern juveniles. The remaining two elements are smaller than recorded yearlings and were probably fetal seals that were killed in the late winter.

**Figure 3.11: Greatest Depth of Diaphysis versus Smallest Breadth of Diaphysis of Ringed Seal Femora in a Modern Population (Stora 2002a) Compared to Dwelling 2, OkRn-1**

Ringed seal humeri measurements were also compared to metric data from the same modern population (Stora 2002b). The sample size of humeri from Dwelling 2 is likewise small (n = 5), but their measurements similarly fall within the juvenile and older yearling (7-12m) size range (Figure 3.12). These young seals would be situated at the floe edge when sea ice covered the Beaufort Sea. There are also two adult specimens that correlate with conclusions drawn from femora measurements, that is, mostly juveniles were hunted on the pack ice with the addition of some, possibly pregnant, adults located around fast
ice birthing lairs. Therefore, the metric data from ringed seal elements also supports a late spring hunting season, but the presence of two fetal femora indicates that some seal hunting occurred in the late winter during the gestation period of female ringed seals.

**Figure 3.12: Smallest Breadth of Diaphysis versus Smallest Height of Diaphysis of Ringed Seal Humeri in a Modern Population (Stora 2002b) Compared to Dwelling 2, OkRn-1**

3.7 Seasonality

In addition to the age distribution of ringed seals, my discussion of Dwelling 2 seasonality will include other indicator species – those taxa identified in the Dwelling 2 assemblage that are only available at specific times of the year. However, nearly every major avian and mammalian species, aside from seals, aggregate only during the brief warm period from late spring to early fall (Betts 2005). This creates an over-abundance or a “bottleneck” where the majority of resources obtained during this period will be cached for later consumption during the winter. As a result, it is possible that a winter
occupation will produce a faunal assemblage with the remains of warm season species (e.g., caribou). This is probably not the case for Dwelling 2, as the entrance tunnel to the qarmaq must have been constructed while the ground was soft and free of snow. This suggests an construction period in summer/late summer or early fall. Other seasonal indicators, discussed below, support an occupation during spring and fall that is consistent with earlier understandings of qarmat as transitional dwellings (e.g., Dawson 2001). In short, Dwelling 2 could not have been a solely winter occupation where cached “warm weather” food was consumed.

Snow geese are the best seasonal indicator among the birds identified in the Dwelling 2 assemblage, in part because of their large relative abundance when compared to other avian taxa. Snow geese are present on Banks Island from early spring until late fall when they return south for the winter. They are particularly vulnerable during a three to four week period in June following the beginning of egg incubation (Manning et al. 1956). I did not observe any medullary bone, which is developed by female birds prior to and during their spring reproductive period, within the broken long bones of the Dwelling 2 sample. Nevertheless, its apparent absence in this collection does not rule out a spring hunting period. Snow geese could have been hunted at any time from late spring through early fall.

Much smaller amounts of other migratory bird species also occur in the Dwelling 2 assemblage, including: snowy owl, Ross’s goose, Arctic loon, and tundra swan (Manning et al. 1956). These are warm season resources that likewise indicate an occupation some time between late spring and early fall.

The small sample size of fish from Dwelling 2 precludes any definite conclusions regarding their season of death. As previously mentioned, Arctic char and perhaps lake trout move between the sea and inland lakes during the spring and again in the late summer/early fall (Manning 1953). The latter migration is considered more important due to the better condition, larger size and greater abundance of fish (Whitridge 2001). Similar to snow geese, these fish seem to indicate a spring or fall hunting period during
their migrations, but the relatively small quantities of fish could have also been caught from year-round resident populations in lakes.

Similar conclusions may be drawn from the considerable numbers of caribou remains recovered from Dwelling 2. Ethnographically, caribou are primarily hunted in the fall, when both the animals and their hides are in prime condition (Stenton 1989). During the Thule period, Barren ground caribou migrated between forests on the mainland and their calving grounds on the Arctic coast during the spring and fall (McGhee 1996). Thule groups could lay an ambush by predicting where a herd would hesitate or aggregate at difficult open water channels. A good hunting location would provide a significant amount of food for multiple families and the winter ahead (McGhee 1996). Peary caribou are much smaller than their barren ground relatives, and are year-round, non-migratory residents of Banks Island (Manning and Macpherson 1958). They would have been available for exploitation during any season, although ethnographic accounts of ancestral Inuvialuit groups indicate that Peary caribou were most commonly hunted in the fall as well (e.g., Condon 1996). The marked variability in size of the caribou remains from Dwelling 2 indicates that both species of caribou were present within the Dwelling 2 assemblage.

The species present in the Dwelling 2 faunal assemblage potentially support its occupation in the fall, late winter, spring, or some combination of all three. There is also no evidence that completely disqualifies a summer occupation. There are ethnohistoric and archaeological examples indicating that ringed seal-dominated assemblages like the one from Dwelling 2 represent cold season occupations, primarily because ringed seals are one of the few resources available throughout the entire winter. Ringed seals are abundant in the western Canadian Arctic and can be hunted on the sea ice and at the floe edge, thereby providing a basis for a stable coastal economy (Maxwell 1979). For example, Boas (1964) described a dependence on ringed seal during his study of Inuit winter settlement patterns and Stefansson (1913) reported the subsistence practices of groups on Victoria Island, which consumed primarily ringed seal in the winter.
However, as outlined above, the demographic profile of ringed seals recovered from Dwelling 2 suggests a late winter and spring occupation. The emphasis on juveniles in the OkRn-1 assemblage indicates that hunting intensified when ringed seals were segregated according to age class and sexual maturity. This pattern occurs between autumn and spring when there is competition for favoured, fast ice territory (Smith 1987). The dominance of juveniles among the Dwelling 2 ringed seals indicates a spring hunting season at the floe edge or on the pack ice while it was breaking up, where juvenile seals aggregate in the available open water. The presence of fetal remains, yearlings, and adults demonstrates that hunting also took place on the fast ice during the late winter and spring birthing season.

Given this ringed seal demographic evidence, and the fact that other abundant species within the Dwelling 2 assemblage, such as Arctic fox, Arctic hare, and ptarmigan, are year-round residents that could have been exploited at any time, I suggest that the Dwelling 2 qarmaq was occupied in the late winter, spring, and fall. Though I cannot rule out summer occupation it seems unlikely given the importance in Inuvialuit ethnography of fish as a warm season resource (e.g., Condon 1996) and its limited representation in Dwelling 2.

The limited numbers of adult ringed seals suggest that seals were not hunted throughout the entire winter, when we would expect hunters to harvest primarily adult ringed seals through breathing hole sealing. It is possible that the residents of Dwelling 2 moved into one of the adjacent cold season dwellings at OkRn-1 between the fall and late winter. This qarmaq therefore represents the better-known use of these structures during transitional seasons, rather than their less common use through the entire winter (Mathiassen 1927; Boas 1964; Schlerdermann 1976; Park 1988).

3.8 Bone Processing and Taphonomy

This section documents bone fragmentation and the prevalence of cut marks, burnt bone, acid corrosion, and carnivore gnawing to investigate both human and non-human taphonomic effects on the Dwelling 2 faunal remains.
3.8.1 Bone Length

The bone length distribution of an assemblage can elucidate how bones were processed and/or how differential preservation affected the faunal remains. Figure 3.13 shows that over 50% of bones in the analyzed sample from Dwelling 2 were between 0.1 and 2.4 cm in length. Bone abundance dropped to approximately half that (25.74%) at the next size interval of 2.5 – 4.4 cm. This trend continued until the 18.5 – 20.4 cm size bracket, when only 9 bones in the assemblage remained. The negative correlation between greatest fragment length and bone abundance is very common in zooarchaeological assemblages.

**Figure 3.13: Greatest Length of Faunal Remains (% of NISP) (n = 9329)**

The greatest length of 42.5% (n = 840) of fox remains and 47.8% (n = 1731) of ringed seal remains was 2.4 cm or less. However, as outlined earlier, foxes appear to have been harvested primarily for their pelts and there is little evidence of deliberate processing of their bones for marrow. The small size of ringed seal remains likewise does not appear
to result from deliberate processing. The majority (1057 of 1731; 61.1%) of seal specimens that were 2.4 cm or less were carpals, tarsals, metacarpals, metatarsals, and phalanges – elements that are small without being fragmented. Unlike terrestrial mammal remains, seal bones cannot be processed to extract marrow or grease by shattering or boiling them since seal fat is liquid rather than solid at room temperature (Shahidi et al. 1984; Outram 1998). The above discussion regarding ringed seal element frequency demonstrated that fore and hind flippers were the most abundant seal skeletal part recovered from Dwelling 2 (Figure 3.5). The relatively compact body size of Arctic fox likewise means that the majority of bones (from the paws and vertebrae) are smaller than 2.4 in maximum dimension when complete.

Conversely, the abundance of shattered caribou long bones, metapodials, and phalanges in the Dwelling 2 assemblage indicates more thorough processing to obtain marrow. This practice is well-documented in the ethnographic literature (e.g. Jenness 1922; Binford 1978, 2002). Only 28.6% (n = 314) of caribou and large terrestrial mammal remains were 2.4 cm or less, but this pattern can be attributed to their larger body size when compared to fox and ringed seal. As a result, it appears that the size distribution of this assemblage is not due to processing or preservation, but rather the mean size of the most common elements.

### 3.8.2 Burning and Cut Marks

Documenting the prevalence of burnt bone and cut marks can further clarify how animal carcasses were processed in Dwelling 2. Cut marks are evidence of butchery and skinning practices, while burnt bone can represent those elements that were cooked before consumption. Burning bones at lower temperatures will produce a black colour and higher temperatures result in a bluish-white or white appearance. Signs of burning can also indicate bones that were deposited near a heat source or those that were burned as a means of discard.

Only 415 bones or 4.45% of the sample assemblage (n = 9329) showed any signs of burning, including those burnt black and those calcined. Nearly one fifth of these animal
remains (n = 79) were identified to a particular species. A total of 64 were ringed seal elements, followed in abundance by eight fox bones. This small sample size argues against systematic cooking of meat for consumption purposes. It is more likely that these specimens were discarded or accidentally deposited near a heat source (perhaps a cooking lamp) and became charred.

I recorded even fewer bones with cut marks (n = 88), although they were present on a wider variety of species. Ringed seal was still the most abundant taxon (n = 48 of 3616; 1.33%) which is to be expected considering they were transported whole to Dwelling 2 and were the main dietary staple. The seals would have been butchered and eaten on site. Caribou (n = 23) shows the next highest prevalence of cut marks at 2.09% of all caribou remains, suggesting that skeletal parts unsuitable for drying were transported to the site in a group (e.g., an entire hind leg) and then further butchered to be consumed or otherwise used before discard. Finally, only nine fox bones possessed cut marks (0.45% of fox NISP), which is unsurprising due to the number of articulated fox remains noted at Dwelling 2. The limited proportion of fox remains with cutmarks supports the interpretation that the majority of Arctic fox were exploited solely for their pelts.

3.8.3 Acid Corrosion and Carnivore Gnawing

A total of 25 skeletal elements displayed carnivore gnawing, including puncture marks from sharp canine teeth, and/or acid pitting that is associated with digestion by canids (Lyman 1994). The majority of these elements were from ringed seals (n = 14) and again included vertebrae, ribs, and hind flipper elements. The remainder of the bones with evidence of carnivore gnawing or digestion were from caribou and Arctic fox. The presence of these bones within Dwelling 2 suggests that some elements were being fed to domesticated dogs who then excreted them at the site. This evidence supports the earlier suggestion (see section 3.4) that at least a portion of canid remains at Dwelling 2 represent domesticated dogs.
3.9 Summary and Conclusion

The results detailed in this chapter have allowed me to document late Thule food procurement strategies on Banks Island. I identified which animals were hunted at OkRN-1 and what strategies were used to exploit them. The Dwelling 2 faunal assemblage was dominated by mammals, with ringed seal, Arctic fox, and caribou being particularly abundant. Snow goose was the most represented avian taxon alongside smaller amounts of Canada goose, Ross’s goose, rock/willow ptarmigan, and snowy owl remains. The Family *Salmonidae* comprised the small fish assemblage recovered from Dwelling 2 with Arctic char and lake trout the only confirmed species.

An examination of skeletal part frequencies from the two most common large-bodied taxa, ringed seal and caribou, revealed that seals were brought back whole from the kill site, while only the caribou elements least appropriate for drying were transported to Dwelling 2. Certain portions of the caribou skeleton may have also been selected for their hides, taste, and use as tools or adornments.

The presence of migratory species and the age distribution of ringed seals addressed another research question regarding the seasonality of Dwelling 2. The majority of the ringed seal remains identified were juveniles, followed by adults, with a small number of fetal and yearling elements. This demographic profile suggests that seal hunting occurred primarily at the spring floe edge/pack ice with some seal hunting in the late winter. The presence or absence of other seasonal indicator species likewise support an occupation during the spring and fall. This interpretation is in accordance with the better known seasonal occupation of Thule *qarmat* during the transitional seasons of spring and fall (Park 1988).

The majority of faunal remains from Dwelling 2 were between 0.1 and 2.4 cm in length. This is most likely due to the small mean size of the most common elements (e.g., metapodials, carpals, tarsals, phalanges). Other signs of food processing, such as burning and cut marks, occurred in only marginal amounts. Finally, evidence of carnivore
gnawing and acid corrosion on several elements supports the presence of domesticated dogs at Dwelling 2.
Chapter 4

4 Discussion

In this chapter, I will address my final two research questions by documenting how the Banks Island subsistence economy changed through time, as well as how these subsistence strategies fit into their regional context. I will position Dwelling 2 within subsistence trends on Banks Island and, more broadly, within the western Canadian Arctic by comparing the Dwelling 2 faunal assemblage to those from previous excavations at OkRn-1 (Arnold 2010), the earlier Thule Nelson River site (OhRh-1) on Banks Island (Cooper 1981; Austin 1985; Da Rosa 1985; Thomsen 1985; Arnold 1986), and contemporary Mackenzie Inuit/Thule sites in the surrounding region. The latter include Kuukpak House 1 (Balkwill and Rick 1994; Friesen and Arnold 1995), Gutchiak (Morrison 2000), Avadlek Spit House 1 (Betts and Friesen 2013), McKinley Bay Houses 1 and 2 (Arnold 1992; Betts and Friesen 2013), Pauline Cove House 7 (Friesen 2013), Washout House 3 (Yorga 1980; Friesen and Hunston 1994), Iglulualuit Houses 11 and 20 (Morrison 1990), and the Bell site (Norman and Friesen 2010; Howse and Friesen 2016). The characteristics of the Dwelling 2 faunal assemblage, when compared to those from other sites, demonstrate that variability in subsistence economies can be attributed to different: seasons of occupation, settlement-subsistence strategies, local resource bases and culture, and knowledge about the surrounding environment.

4.1 Consumption Activities at OkRn-1

The 2009 test excavations at OkRn-1 (Arnold 2010) sampled two dwelling features (Figure 4.1). Dwelling 1 (D1) appeared as a low circular mound with a central depression; it is located at the head of the gully that extends from OkRn-1 to the beach. Arnold placed a 1x1 m test unit in the centre of the depression, as well as three additional 1x1 m test pits in associated areas, including a midden, the head of the gully, and an erosional feature below D1. The second structure, Dwelling 5 (D5), was a more substantial circular mound with a central depression. Arnold placed a 1 x 1 m test unit in the centre of the dwelling. This dwelling also has a linear depression that extends for
several metres in the direction of the shore, interpreted as an entrance tunnel (Arnold 2010). We interpret D1 and D5 as winter houses because they are larger and more substantial than Dwelling 2 and D5 has the remains of multiple whale bone posts protruding from its surface (Hodgetts et al. 2015; Hodgetts pers. comm.).

**Figure 4.1: Map of Dwellings and Features at OkRn-1**

Note: Dwellings 1, 2, and 5 highlighted in purple.
Arnold (2010) collected small assemblages of faunal remains from each of the test pits and Tom Porawski identified them at Western University. It should be noted that these collections of animal bones are from limited areas of each dwelling and may not be representative of the dwellings as a whole. To assess the likelihood that these tests are representative of the entire dwelling, I compared the relative abundance of taxa (% of NISP) from one 1x1 m unit of Dwelling 2 (112N336E) (Figure 2.1) and the entire Dwelling 2 assemblage (Table 4.1). I selected this particular unit because it contained deposits from two sampled contexts: context 5 (roof/wall collapse) and context 25 (house berm). There was a significant positive correlation between the two samples (r_s = 0.8678, p = 0.0114).

### Table 4.1: Comparison of Relative Abundance of Taxa between a Unit in Dwelling 2 (112N336E) and the Entire Dwelling 2 Assemblage

<table>
<thead>
<tr>
<th></th>
<th>112N336E</th>
<th>Dwelling 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NISP</td>
<td>NISP</td>
</tr>
<tr>
<td>Arctic char</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Lake trout</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Tundra swan</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Snow goose</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Lemming</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Arctic hare</td>
<td>22</td>
<td>5.1</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>74</td>
<td>17.2</td>
</tr>
<tr>
<td>Polar bear</td>
<td>3</td>
<td>0.7</td>
</tr>
<tr>
<td>Ringed seal</td>
<td>280</td>
<td>65.0</td>
</tr>
<tr>
<td>Caribou</td>
<td>45</td>
<td>10.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>431</td>
<td>100</td>
</tr>
</tbody>
</table>

Arnold’s (2010) test pit assemblages are therefore likely representative of the dwellings as a whole. However, my test demonstrated that some rare taxa may be over-represented.
(e.g., tundra swan) while others are under-represented (e.g., snow goose). This could cause errors in interpretation if the affected taxa are, like snow goose, important seasonal indicators. The placement of Arnold’s test pits may also influence their representativeness. The selected 1 x 1 m unit in Dwelling 2 was positioned in the collapsed wall at the edge of the dwelling, where it appears that midden material abutted the wall. The D1 tests were placed in the centre of the dwelling and in midden deposits outside the front entrance. The D5 test was placed in the centre of the dwelling. The formation processes for these assemblages may therefore have been slightly different than for the Dwelling 2 1 x 1 m sample.

4.1.1 Dwellings 1 and 5

The animal bones recovered from D1 and associated areas are dominated by ringed seal with smaller amounts of caribou, canid, and Arctic fox remains. In contrast, the D5 assemblage was primarily composed of caribou bones, followed by seal, Arctic fox, and trace amounts of avian remains (Table 4.2)

Table 4.2: Taxonomic Abundance of Species from Test Pits at D1, D5 (Arnold 2010), and Dwelling 2

<table>
<thead>
<tr>
<th>Taxon</th>
<th>D1*</th>
<th></th>
<th>D5</th>
<th></th>
<th>Dwelling 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NISP</td>
<td>%NISP</td>
<td>NISP</td>
<td>%NISP</td>
<td>%NISP</td>
</tr>
<tr>
<td>BIRD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goose sp.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Gull sp.</td>
<td>2</td>
<td>0.6</td>
<td>2</td>
<td>1.7</td>
<td>0.04</td>
</tr>
<tr>
<td>Bird Total</td>
<td>2</td>
<td>0.6</td>
<td>3</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>MAMMAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic hare</td>
<td>1</td>
<td>0.3</td>
<td>0</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Canid (dog/wolf)</td>
<td>9</td>
<td>2.9</td>
<td>0</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>10</td>
<td>3.2</td>
<td>19</td>
<td>16</td>
<td>26.8</td>
</tr>
</tbody>
</table>
The most abundant taxon in the D1 assemblage is ringed seal, while caribou is the most common species within D5. The latter dwelling also possesses a more significant proportion of Arctic fox bones (%NISP of 16 versus 3.24). The seal remains suggest a winter occupation, whereas ethnographic accounts indicate that caribou hunting took place primarily in the fall (e.g., Condon 1996). However, the caribou could have been recovered from cached supplies and the other taxa (e.g., bearded seal, Arctic fox, bear) are also year-round residents of Banks Island that could have been exploited at any time. As such, their architecture and faunal remains suggest that both D1 and D5 are likely fall/winter occupations, though with quite different subsistence foci.

This conclusion is supported by an analysis of ringed seal age distribution at D1. The ringed seal epiphyseal fusion data show no yearlings and a majority of adults with few juveniles (Table 4.3). In contrast, most ringed seals recovered from Dwelling 2 were juveniles, followed by adults, and a small number of fetal/yearling individuals. D1 was thus likely occupied during the winter when adult seals maintain breathing holes on the inshore fast ice (Smith 1987). The D5 ringed seal sample contained only 12 elements that could be put into an age class using the state of epiphyseal fusion. The majority of these skeletal parts (10 out of 12) were phalanges or metapodials that may have belonged to the same individual. However, one right radius and one left femur were categorized as young adult and old adult, respectively. The flipper elements also indicate at least one other adult and a juvenile were present. This age distribution resembles that of D1, however, a
single fore phalange was classified as a yearling and could suggest additional seal hunting into the spring or at the floe edge/pack ice (Smith 1987).

**Table 4.3: Age Estimates of Ringed Seals from DF1, OkRn-1, Based on Epiphyseal Fusion**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Skeletal Age Group</th>
<th>Skeletal Element</th>
<th>Number Fused</th>
<th>Number Unfused</th>
<th>Number Fusing</th>
<th>Percent Fused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling</td>
<td>1</td>
<td>Anterior phalanges 1-2 distal epiphysis</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Metacarpal I distal epiphysis</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Scapula – supraglenoid tubercle</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pelvic bone – Acetabulum</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metatarsal I distal epiphysis</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posterior phalanges 1-2 distal epiphysis</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>29</strong></td>
<td>0</td>
<td>0</td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Juvenile</td>
<td>5</td>
<td>Humerus distal epiphysis</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radius proximal epiphysis</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Femur proximal epiphysis – the head and the greater trochanter</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calcaneal tuber</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>7</strong></td>
<td><strong>5</strong></td>
<td><strong>1</strong></td>
<td><strong>53.8</strong></td>
</tr>
<tr>
<td>Young Adult</td>
<td>6</td>
<td>Humerus proximal epiphysis – epiphysis to diaphysis</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ulna proximal – olecranon</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anterior phalanges 1-2 proximal epiphyses</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Femur distal epiphysis</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
### 4.1.2 Comparison of Dwelling 2 Fauna with that of Dwellings 1 and 5

The relative abundance of ringed seal from Dwelling 2 falls between that at D1 and D5, as does the percentage of caribou and large terrestrial mammal remains. The Dwelling 2 sample assemblage also contains bird and fish warm season resources (e.g., snow goose, snowy owl, Arctic char) that are absent or nearly absent from both D1 and D5. This absence could relate to the small sample sizes at D1 and D5, however, it might indicate a stronger spring component to the occupation of Dwelling 2 than the other dwellings. Additionally, there are higher frequencies of Arctic fox bones at D2 that, in conjunction with the degree of articulation and frequency of slate uluit, suggest a focus on fox skin processing within the Dwelling 2 qarmaq. The particularly low abundance of Arctic fox in the D1 assemblage indicates that these activities were not similarly emphasized. The comparison between Dwellings 2, 1, and 5 thus corroborates the suggestion that Dwelling 2 was primarily occupied during transitional seasons with an unusually strong emphasis on fox pelt processing.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>10</th>
<th>7</th>
<th>2</th>
<th>52.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Adult</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius distal</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius distal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>epiphysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulna distal</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulna distal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>epiphysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacarpal I</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacarpal I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>proximal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>epiphysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacarpals II-V</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacarpals II-V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>distal epiphyses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metatarsal I</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metatarsal I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>proximal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>epiphysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metatarsals II-V</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metatarsals II-V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>distal epiphyses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posterior</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posterior</td>
<td></td>
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</tr>
<tr>
<td>phalanges 1-2</td>
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<td></td>
</tr>
<tr>
<td>proximal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>epiphyses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>20</td>
<td>4</td>
<td></td>
<td>22.6</td>
</tr>
</tbody>
</table>
4.2 Consumption Activities on Banks Island

4.2.1 Nelson River (OhRh-1)

Arnold (1986, 1994) excavated an early Thule driftwood house at Nelson River (OhRh-1) (Arnold and McCullough 1990; Friesen and Arnold 2008). It was comprised of two distinct rooms joined by a shared entrance tunnel. The dwelling floors were overlain with planks and poles, the frame constructed of driftwood support posts, and it was roofed with wooden beams. These architectural features differ significantly from those of Dwelling 2 at OkRn-1. As previously stated, the Dwelling 2 qarmaq possessed a living floor of compacted earth, low sod walls, and was likely roofed with animal skin.

The wooden rectangular house type is characteristic of Alaskan groups both ancestral to and contemporary with the Thule of the Canadian Arctic (Larsen and Rainey 1948; Taylor 1972; Le Mouel and Le Mouel 2002). Alaskan Thule often used whale bone in the construction of the entrance tunnels of their driftwood semi-subterranean dwellings. In some areas of Arctic Canada and Greenland, the paucity of wood necessitated the use of whale bone, stone, or sod for the entire dwelling (Le Mouel and Le Mouel 2002). Mathiassen (1927) described Alaskan driftwood houses and Canadian whale bone houses as corresponding structures born of different materials.

The Nelson River site, dated to the thirteenth century, is one of the earliest Thule sites east of Alaska (Friesen and Arnold 2008) and it follows that Alaskan house forms would be preserved if the appropriate materials were present. The OkRn-1 occupation post-dates that at Nelson River by approximately 300 years and changes in the availability of driftwood along the south coast of Banks Island may have resulted in their disparate architectural styles (cf. Alix 2005). Other possible causes include social change between early and late Thule groups, and different intended seasons of occupation. For example, Dwelling 2 was likely inhabited during late winter and transitional seasons, particularly spring, whereas Nelson River is interpreted as a winter house. Additionally, Schledermann (1976) argued that cooler temperatures during the Little Ice Age caused potential problems with ringed seal distribution and regional availability from year to
year. This resulted in qarmat and snow houses gradually replacing more permanent winter structures in order to increase mobility. Changes in architecture were thus one way of responding to worsening climate affecting the local resource base (Schlerdermann 1976). As such, different building styles and materials may be attributed to varying resource availability, cultural change, season of occupation, or climate.

4.2.1.1 Nelson River Faunal Assemblage

Arnold (1986) published the relative abundance of animal species (% of MNI) in a 10% (n = 2176) sample of all faunal remains recovered from OhRh-1. These results can be found in Chapter One, but the lack of raw data precludes direct comparison with Dwelling 2 at OkRn-1. Faunal remains from the site were also identified by students from the University of Toronto under the supervision of Dr. Howard Savage. Cooper (1981) identified an NISP of 3163, and three other students identified smaller assemblages of 400 – 600 bones (Austin 1985; Da Rosa 1985; Thomsen 1985). I have compiled their results in Table 4.4 for comparison with Dwelling 2.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>NISP</th>
<th>OhRh-1 % of NISP</th>
<th>Dwelling 2 % of NISP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIRD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loon</td>
<td>1</td>
<td>0.03</td>
<td>0.1</td>
</tr>
<tr>
<td>Family Anatidae</td>
<td>5</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Anserinae sp.</td>
<td>37</td>
<td>1.1</td>
<td>-</td>
</tr>
<tr>
<td>Snow goose</td>
<td>3</td>
<td>0.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Tetraoninae sp.</td>
<td>1</td>
<td>0.03</td>
<td>-</td>
</tr>
<tr>
<td>Rock/willow ptarmigan</td>
<td>72</td>
<td>2.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Larus sp.</td>
<td>1</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Unidentified bird</td>
<td>39</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Class subtotal</strong></td>
<td>159</td>
<td>3.5</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>MAMMAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemming</td>
<td>47</td>
<td>1.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Arctic hare</td>
<td>128</td>
<td>3.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Canid (Dog/Wolf)</td>
<td>31</td>
<td>0.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Arctic fox</td>
<td>626</td>
<td>17.8</td>
<td>26.8</td>
</tr>
<tr>
<td>Bear</td>
<td>72</td>
<td>2.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Bearded Seal</td>
<td>5</td>
<td>0.1</td>
<td>0.03</td>
</tr>
</tbody>
</table>
Spearman’s correlation coefficient suggests a significant positive correlation between the relative abundance of taxa (% of NISP) from Dwelling 2 and Nelson River ($r_s = 0.6302, p = 0.0079$). The main similarities between the two collections are the high frequencies of ringed seal and Arctic fox, with seal being the dominant resource. Reliance on seal is, however, heavier at Nelson River, where it comprises nearly 70% of the assemblage, in comparison to 49% at Dwelling 2. Other important differences between the assemblages lie in the relative abundance of snow goose and caribou. The two species make up 2.1% and 15.0% of the Dwelling 2 assemblage, respectively, but only 0.1% and 0.3% of the OhRh-1 assemblage. Arnold (1986) also emphasized the evidence for bowhead whale hunting at Nelson River, including large quantities of baleen (Cooper 1981), a whaling harpoon head, and the bones of at least one whale in the assemblage (Arnold 1986). Although cetacean remains are much less frequent than those of ringed seal, one medium-sized whale could have provided more food than all the other animals combined. Arnold (1986) thus suggested that bowhead whale hunting was the main subsistence strategy at OhRh-1, while ringed seals were exploited as a supplementary resource in the late winter and early spring when caches of whale meat had been depleted.

In contrast, there is no strong evidence to indicate that whaling was undertaken by the Dwelling 2 occupants at OkRn-1. Most, if not all, of the short pieces of whale bone we recovered functioned as architectural elements that were likely scavenged from older sites. While Arnold (1986:69) acknowledges that the cetacean bones in the Nelson River sample may have come from a beached whale, he cites the harpoon head as compelling evidence to suggest otherwise. The baleen at Nelson River was not collected or recorded in detail, but the quantity is sufficient to support Arnold’s (1986) claim for active whaling (Cooper 1981).
Aside from whaling, the most notable differences between Dwelling 2 at OkRn-1 and the OhRh-1 dwelling are the relative lack of snow goose and caribou at Nelson River, and the stronger emphasis on ringed seal. The first two species aggregate and are most frequently hunted during the spring and fall, respectively. Their relative abundance in the Dwelling 2 assemblage suggests occupation during these transitional seasons, whereas their much lower frequencies at Nelson River, and the stronger emphasis on ringed seal, could indicate an exclusively cold season occupation. Alternatively, these differences could represent shifts in land use and subsistence strategies from the early to late Thule period on Banks Island. Later occupants of the island may have been more familiar with the local environment; a more substantial knowledge of the landscape allows for a broader range of subsistence strategies (Meltzer 2004).

4.2.1.2 Nelson River Seasonality

An analysis of ringed seal epiphyseal fusion and thin sections of ringed seal teeth can help to confirm the season of occupation at Nelson River. Cooper (1981) provided epiphyseal fusion data for 1708 ringed seal specimens from the majority of OhRh-1. Austin (1985), Da Rosa (1985), and Thomsen (1985) did not include a thorough consideration of seal demography and will not be part of this analysis. Arnold (1986) also did not discuss the age structure of his collection.

The relative frequencies of Cooper’s (1981) grouped age classes (Figure 4.2) suggest that both very young and very old age groups were underrepresented when compared to the immature-through-adult category. Cooper’s (1981) definition of “subadult” corresponds to Stora’s (2001) “old adult” (7+ years) category. Both age groups contain individuals with both epiphyses fused, but late fusing epiphyses (e.g., radius and ulna distal epiphyses) may still have the fusion line visible. Therefore, Cooper’s (1981) categories of “subadult, adult, and old adult” are comparable to Stora’s (2001) “young adult” and “old adult” age classes used in interpreting the Dwelling 2 ringed seal age distribution. The middle “immature or older uncertain” class is not particularly useful for a comparison with the OkRn-1 data, but the remaining “immature and younger” collection equates to Stora’s (2001) yearlings and juveniles. Cooper (1981) states that the majority of the
“immature and younger” class, as well as the middle category, are most likely juveniles (‘immature”) rather than yearling or fetal specimens. Although, unlike at OkRn-1 D1, there are a small number of yearling/fetal elements present.

**Figure 4.2: Relative Frequencies of Ringed Seal Age Classes from Nelson River (Cooper 1981) (n=1708)**

Thus, at least 47%, and probably more, of the ringed seals from OhRh-1 were not sexually mature. This demographic profile of mostly juveniles, some adults, and very few yearlings is similar to that at OkRn-1 Dwelling 2 and resembles Smith’s (1987) observations at the spring floe edge. Therefore, the demographic structure of the ringed seal assemblage shows that most seal hunting at the site took place at the same time of year as suggested for Dwelling 2. The emphasis on juveniles indicates that residents of OhRh-1 hunted seal on the pack ice, while the presence of some adults and very young individuals also demonstrates hunting at breathing holes and birthing lairs on the fast ice (Smith 1987). The same combination of strategies can be inferred from the Dwelling 2 demographic profile of ringed seals.
Danielson (1993) thin-sectioned ringed seal canines from OhRh-1 to estimate their season at death. His seasonal estimates are based upon the development of the most recent growth layer in the dentin. The dentin of seal teeth is produced in incremental growth layers (IGLs); two IGLs are formed over the course of one year, and together they are known as a growth-layer group (GLG). Subsequent GLGs each represent one year of growth, thus, they can be used to estimate the age of a seal, or the most recent IGL can be examined to determine when the seal died during its last year of life (Bowen et al. 1983; Stewart et al. 1996; Harwood et al. 2000) (Figure 4.3).

Danielson (1993) examined the thin sections from Nelson River under polarized transmitted light. He used the developmental sequence presented by Smith (1973):
translucent IGLs develop from the end of March to the end of June and opaque IGLs form from July to mid-March. He further noted the width of the most recent layer (i.e., partial vs. complete) to determine more specific seasons of death. Table 4.5 presents his results from Nelson River, but omits six specimens labelled “uncertain.”

Table 4.5: Age Estimations of Ringed Seals from Nelson River Based on Thin Sections of Canine Teeth

<table>
<thead>
<tr>
<th>Season of Death</th>
<th>Number of Specimens (n = 53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early – Late Winter</td>
<td>2</td>
</tr>
<tr>
<td>Late Winter</td>
<td>4</td>
</tr>
<tr>
<td>Late Winter – Early Spring</td>
<td>5</td>
</tr>
<tr>
<td>Early Spring</td>
<td>6</td>
</tr>
<tr>
<td>Early – Mid Spring</td>
<td>10</td>
</tr>
<tr>
<td>Mid-Spring</td>
<td>1</td>
</tr>
<tr>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>Mid – Late Spring</td>
<td>10</td>
</tr>
<tr>
<td>Late Spring</td>
<td>6</td>
</tr>
<tr>
<td>Late Spring – Open Water</td>
<td>5</td>
</tr>
<tr>
<td>Open Water</td>
<td>1</td>
</tr>
</tbody>
</table>

Danielson’s (1993) results indicate year-round seal hunting at the site, with a particular emphasis on the spring hunt. This emphasis on spring ringed seal hunting is similar to that indicated by the age profiles and epiphyseal fusion data at OkRn-1 Dwelling 2. These data from Dwelling 2 do not include the same definitive evidence for year-round seal hunting, something that could potentially be confirmed or refuted by future thin-sectioning of the seal teeth from that structure.

No fish species were recorded in any of the Nelson River faunal reports, suggesting that fish were not exploited during the occupation of OhRh-1. Bird taxa were recovered in small amounts, comprising only 3.47% of all analyzed assemblages, with only three elements identified as snow goose. A considerably higher number (n = 37) were identified to the subfamily *Anserinae*, but this taxon also includes swans and all true geese. The near absence of snow geese is unusual given the large population on Banks Island and their preponderance in the OkRn-1 Dwelling 2 bird sample. The thin sections (Table 4.5) clearly show late spring seal hunting at OhRh-1 during the snow goose migration and vulnerable molting period (Manning et al. 1956). It is possible that residents of OhRh-1 were more focussed on marine mammals than the broader range of
resources recovered from Dwelling 2. Alternatively, the whaling season at Nelson River would have overlapped considerably with opportunities to hunt snow goose (i.e., late spring to fall). Whales provide a much larger caloric contribution and would have been prioritized during this period. This explanation also supports Arnold’s (1986) suggestion that cached whale meat sustained populations at Nelson River until the late winter and spring seal hunt.

4.2.1.3 Comparison of Dwelling 2 and Nelson River

The differences between the Nelson River and Dwelling 2 faunal assemblages may therefore be attributed to differences in the timing of their seasonal occupation. Additionally, the settlement strategies employed by the occupants of OkRn-1 and OhRh-1 appear quite different. Climactic shifts and increased knowledge of the local landscape from the early to late Thule period may also account for some variation in the Banks Island Thule subsistence economy.

Dwelling 2 is a qarmaq likely occupied in the spring and fall. Although it is difficult to demonstrate the contemporaneous occupation of multiple dwellings, it is possible that the inhabitants of Dwelling 2 moved into a nearby winter house at OkRn-1 during the cold season. For example, both D1 and D5 are close to Dwelling 2 and are interpreted as winter occupations. The presence of at least two distinct dwelling types at OkRn-1 (qarmat and winter houses) may indicate that the use of the site spanned fall, winter and spring, with at least some households shifting seasonally from qarmaq to winter house and back to qarmaq. Others may have utilized winter houses throughout this period. Site occupants may well have remained nearby during the summer months as well, occupying the neighbouring OkRn-2 (Figure 1.1), which includes at least 9 tent rings and 18 caches, and dates to roughly 1400 cal AD, making it contemporaneous with OkRn-1 (Hodgetts et al. 2015).

In contrast, Nelson River appears to be comprised of only winter houses, the excavated one and several others (Arnold 1986). The architectural evidence from the site therefore suggests that the site occupants spent the entire cold season in these dwellings. The
ringed seal tooth section evidence suggests that they also spent the spring in these houses, but is silent on whether they were occupied in the fall. Residents likely moved elsewhere and utilized more ephemeral dwellings (i.e. tents) during the summer. Thus, settlement strategies on Banks Island during late Thule Inuit times were distinct from, and perhaps more variable than in the early Thule period, utilizing a wider range of dwelling types and with higher reliance on residential moves (though over very short distances) in transitional seasons.

It therefore seems that differences in the length and timing of their seasonal occupation, related to differing settlement-subsistence strategies, contributed to the major differences between the Nelson River and Dwelling 2 assemblages. The dominance of ringed seal at both sites can be attributed to seasonal overlap in their occupations during the late winter and early spring.

The differences between the Nelson River and OkRn-1 Dwelling 2 faunal assemblages may also relate to climatic shifts and their impact on whaling. The pursuit of cetaceans is carried out in spring when leads open in the sea ice, or during the summer/early fall open water season (McGhee 1996). Sediment cores from four lakes on Banks Island indicate a gradual cooling of the island from 2000 BP onward, eventually culminating in the Little Ice Age (approximately 1400 – 1600 AD) (Gajewski et al. 2000; Bradley 2000). Colder weather during the occupation of OkRn-1 would have affected the distribution and longevity of sea ice, reducing the open water whale hunting season. The decreasing availability of whales would lead to other means of subsistence, such as ringed seal, caribou, birds, and fish.

The social process of landscape learning may also account for some of the differences between the Nelson River and Dwelling 2 fauna. The occupants of Nelson River were among the first Thule groups to settle on Banks Island (Friesen and Arnold 2008). As such, they lacked specific knowledge regarding the local environment and about the location of necessary resources across the landscape (Meltzer 2003; Rockman 2003, 2008). They had not yet formed social ties to the land (Rockman 2003, 2008) nor had they ascribed stories or meaning to particular places (e.g., Aporta 2009; Basso 1996;
Collignon 2006; Henshaw 2006; Nuttall 1992). In contrast, the exploitation of a wider range of species suggests that the inhabitants of OkRn-1 Dwelling 2 were very familiar with the local resource base. Increased knowledge of the local landscape between the occupations of Nelson River and Dwelling 2 may explain why certain species and classes were more heavily exploited at the latter. As such, greater familiarity with the local environment should be considered alongside distinct seasons of occupation, settlement-subsistence strategies, and climates when considering differences between Dwelling 2 and Nelson River subsistence.

4.3 Consumption Activities in the Western Canadian Arctic

This section compares the OkRn-1 Dwelling 2 faunal assemblage with those from other contemporary sites in the Mackenzie Delta and on Victoria Island in order to place the coastal Banks Island subsistence economy in its regional context.

Figure 4.4: Location of Archaeological Contexts from the Mackenzie Delta and Victoria Island Mentioned in Text

Comparative sites from the Mackenzie Delta (Figure 4.4) include Kuukpak (NiTs-1) House 1 (Friesen and Arnold 1995; Balkwill and Rick 1994), Gutchiak (NhTn-1)
(Morrison 2000), Avadlek Spit (NjVj-1) House 1 (Betts and Friesen 2013), McKinley Bay (OaTi-1) Houses 1 and 2 (Arnold 1992; Betts and Friesen 2013), Pauline Cove (NjVi-3) House 7 (Friesen 2013), Washout (NjVi-2) House 3 (Friesen and Hunston 1994; Yorga 1980), and Iglulualuit (NlRu-1) Houses 11 and 20 (Morrison 1990). Further west, they include features at the Bell site (NiNg-2) that were contemporary to Dwelling 2 and had published faunal data (Norman and Friesen 2010; Howse and Friesen 2016).

Figure 4.5: Bird/Fish/Mammal Frequencies from Western Canadian Arctic sites (% of NISP)*

Figure 4.5 illustrates the frequencies of bird, fish, and mammal remains (% of NISP) recovered from each of the aforementioned sites, OkRn-1 Dwelling 2, and Nelson River. The majority of Mackenzie Delta sites show a strong emphasis on fish. This is unsurprising considering the over 60 fish species supported by the Mackenzie estuary,
representing the greatest faunal biomass in the region and the richest fish community in the Canadian Arctic (Whitridge 2001; Betts 2005). Gutchiak and Avadlek Spit are the most different from Dwelling 2, with only the smallest portion of their assemblages dedicated to marine or terrestrial mammals. The architecture at Gutchiak presents strong evidence for a primarily or exclusively warm weather occupation (Morrison 2000), while Avadlek Spit has been interpreted as a winter house (Betts 2005).

McKinley Bay, Pauline Cove, and Kuukpak possess a more significant proportion of mammals, approximately 50%, with the remainder a mix of fish and birds. McKinley Bay and Pauline Cove do not have one focal mammalian resource, such as the preponderance of ringed seal recovered at Dwelling 2, but instead their faunal assemblages include a variety of carnivores, caribou, seals, and cetaceans. Betts (2005) categorizes them as broadly based economies with an orientation towards fishing and birding.

In contrast, archaeological investigations at Kuukpak have shown a strong subsistence focus on beluga whales. They were the most common taxon in terms of NISP, with 2266 specimens and an MNI of 19, which would have provided a minimum of 5.3 metric tonnes of available meat (Friesen and Arnold 1995). Betts (2005) characterizes the Kuukpak subsistence economy as “beluga and gadids (burbot and cod)”-focussed. Despite a similar emphasis on mammals, and a focus on a single mammalian resource, Kuukpak subsistence was clearly distinct from that of Dwelling 2 at OkRn-1.

The Bell site assemblage (House 56 and middens TP2 and TP3) has similar frequencies of bird, fish, and mammal remains to Kuukpak, primarily due to the large number of arctic char and lake trout bones recovered from the site. When combining the two excavated midden contexts and one dwelling, 1572 remains were positively identified as either arctic char or lake trout (Howse and Friesen 2016; Norman and Friesen 2010). This is to be expected given that the Bell site is located at Iqaluktuuq, the “place of many arctic char,” a 3 km long stretch of the Ekalluk River that flows from Ferguson Lake into the ocean (Norman and Friesen 2010). Lake trout are present in the lake year-round and there is a substantial char run in the river in spring and fall.
However, overall, caribou dominates the Bell site Thule fauna with an NISP of 1492. Howse and Friesen (2016) also record 1327 large terrestrial mammal bone fragments that can most likely be attributed to caribou as well. The site’s Iqaluktuuq location is ideal for ambushing caribou herds attempting to cross the river. Norman and Friesen (2010) posit that Barren ground caribou were the main subsistence resource at the Bell site, followed by arctic char, and both were cached for consumption during the winter months. This is most similar to Betts’ (2005) caribou-focussed economy in the Mackenzie Delta, where it appears to be an innovation of the Early Historic period. There were no significant similarities between the Bell site and Dwelling 2 at OkRn-1.

Two of the sites in question, Washout and Iglulualuit, demonstrate relatively strong similarities to Dwelling 2 in terms of faunal exploitation. They are both located in the Mackenzie Delta and Betts (2005) categorizes them as having a ringed seal focal economy.

4.3.1 Washout

The Washout site, located on Herschel Island, was so named because it has been actively eroding into the Beaufort Sea for at least the last 40 years. Salvage excavations were undertaken by Yorga (1980) in order to recover material from two threatened houses (House 1 and House 2). Renewed fieldwork as part of the NOGAP excavations (Friesen and Hunston 1994) targeted another threatened dwelling (House 3) situated along the coast. This latter dwelling is dated ca. 1467 – 1649 AD and falls into the Mackenzie Inuit period in the Delta region. The former two houses date somewhat earlier and, unfortunately, the faunal samples have not been fully analyzed (Friesen 2013). However, small samples from the midden and interior of House 1 included large proportions of seal bone (Salter 1979; Stuart-Macadam 1978). The remainder of this analysis will focus primarily on House 3 as it is contemporary with OkRn-1’s Dwelling 2 and the fauna are better reported in the published literature.

A portion of House 3 had eroded into the Beaufort Sea before excavation began in 1985, but it was clearly recognizable as a semi-subterranean winter house. The front wall and
entrance tunnel had been washed away, but a living floor laid with driftwood logs was unearthed alongside a wooden rear sleeping platform (Friesen and Hunston 1994).

Over 2000 animal bones were recovered from Washout House 3 and subsequently identified by Leslie Still of the Canadian Museum of Nature (Table 4.6). I have reorganized the mammalian faunal data from Washout House 3 (Friesen and Hunston 1994) to facilitate comparisons with the OkRn-1 Dwelling 2 assemblage. For example, Table 4.6 combines the categories of “dog” and “dog/wolf” and does the same for “arctic fox”, “red fox”, and “arctic/red fox” specimens. It adds the single “dog/red fox” bone fragment to the fox NISP because those taxa occurred more frequently than canids. It also adds the original “unidentified seal” category to the “small seal (ringed/harbour)” classification because small seals were more common than large, bearded seals (NISP of 609 vs. 13).

Table 4.6: Faunal Frequencies from Washout House 3 (Friesen and Hunston 1994) Compared to Dwelling 2, OkRn-1

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Washout House 3</th>
<th>Dwelling 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NISP</td>
<td>%NISP</td>
</tr>
<tr>
<td>FISH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coregonus</td>
<td>38</td>
<td>3.4</td>
</tr>
<tr>
<td>Whitefish/cisco</td>
<td>58</td>
<td>5.2</td>
</tr>
<tr>
<td>Whitefish/grayling</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Coregonus/prosopium</td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Burbot</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Unidentified fish</td>
<td>474</td>
<td>-</td>
</tr>
<tr>
<td>Class subtotal</td>
<td>577</td>
<td>9.3</td>
</tr>
<tr>
<td>BIRD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic loon</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Common/yellow-billed loon</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>White-winged scoter</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Eider/white-winged scoter</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Duck cf. oldsquaw</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>Duck</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Shore bird</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>Jaeger/gull</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Arctic tern</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Unidentified bird</td>
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</tr>
<tr>
<td>Class subtotal</td>
<td>20</td>
<td>1.3</td>
</tr>
</tbody>
</table>
There are not many commonalities between the bird and fish taxa recovered from Washout House 3 and OkRn-1 Dwelling 2. This lack of overlap is partially due to disparate local resource bases and/or distinct seasons of occupation providing different opportunities for exploitation. In contrast, there is significant overlap in the represented mammalian species – with the exception of Dall’s sheep, which are not present on Banks Island. The relative abundance of mammalian taxa from both Washout and Dwelling 2 have a weak, positive correlation ($r_s = 0.4064$, $p = 0.0944$).

Similar to OkRn-1 Dwelling 2, the two most abundant mammalian taxa at Washout are small seals (ringed/harbour) followed by foxes. The ranked values of most other taxa, such as canids, bears, and cetaceans, are also shared between the two sites. The major difference is a lack of caribou remains at Washout, which may result from variation in their season of occupation. Dwelling 2 was occupied in the fall, when caribou were hunted, and during the spring snow goose hunt. Washout House 3 was likely occupied only during the winter. Seal and fish, both of which are well represented at Washout, are among the only subsistence resources available all winter (Yorga 1980; Friesen and Hunston 1994; Friesen 2013). The lack of caribou and low number of migratory birds suggest that the site was abandoned in these seasons or that these animals were not exploited.

<table>
<thead>
<tr>
<th>MAMMAL</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Arctic ground squirrel</td>
<td>17</td>
<td>1.5</td>
<td>4</td>
<td>6.7</td>
<td>-</td>
</tr>
<tr>
<td>Lemming/vole</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
</tr>
<tr>
<td>Canid (dog/wolf)</td>
<td>6</td>
<td>0.5</td>
<td>1</td>
<td>1.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Fox (red/arctic)</td>
<td>68</td>
<td>6.2</td>
<td>7</td>
<td>11.7</td>
<td>26.8</td>
</tr>
<tr>
<td>Bear</td>
<td>9</td>
<td>0.8</td>
<td>2</td>
<td>3.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Wolverine</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td>Bearded seal</td>
<td>13</td>
<td>1.2</td>
<td>2</td>
<td>3.3</td>
<td>0.03</td>
</tr>
<tr>
<td>Small seal (ringed/harbour)</td>
<td>863</td>
<td>78.0</td>
<td>22</td>
<td>36.7</td>
<td>49.1</td>
</tr>
<tr>
<td>Caribou</td>
<td>5</td>
<td>0.5</td>
<td>2</td>
<td>3.3</td>
<td>15.0</td>
</tr>
<tr>
<td>Dall’s sheep</td>
<td>2</td>
<td>0.2</td>
<td>1</td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td>Order <em>Cetacea</em></td>
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<td>1</td>
<td>1.7</td>
<td>0.04</td>
</tr>
<tr>
<td>Unidentified mammal</td>
<td>674</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Class subtotal</td>
<td>1663</td>
<td>89.5</td>
<td>43</td>
<td>71.8</td>
<td>92.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2260</td>
<td>100.1</td>
<td>60</td>
<td>100.3</td>
<td>92.4</td>
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</tbody>
</table>
Friesen and Hunston (1994) reported that the “small seal” sample contained a majority of immature individuals (14 of 22 MNI) that would have been hunted at the floe-edge during the spring and winter months (Smith 1987). This demographic profile is similar to those at Dwelling 2 and Nelson River, suggesting that seal hunting at the three sites may have been carried out at the same time. While it is possible that Washout’s occupants simply chose to focus their attention on resources other than caribou and snow goose, the lack of these warm season resources at Washout House 3 suggests that, like Nelson River, it was abandoned outside of winter and early spring.

Washout House 4 is located approximately 10m west of House 3 (Friesen and Hunston 1994). It consists of two upright posts and three small areas containing short, parallel logs. Due to site degradation, it is unknown whether House 4 represents an actual dwelling, a collapsed drying rack, or some other driftwood feature (Friesen and Hunston 1994). A small faunal assemblage (n = 204) was recovered from House 4 and features a preponderance of fish (n = 171), followed by mammals (n = 63), and very few bird remains (n = 6). The assemblage stands in contrast to that of House 3, especially due to the low number of seal bones (n = 9). Friesen and Hunston (1994) interpret House 4 as a possible summer occupation that was situated to take advantage of fish migrations.

The lack of diagnostic artifacts at House 4 has precluded any definitive dating, although a late prehistoric date is likely. It is therefore impossible to prove the contemporaneity of Houses 3 and 4. If they were occupied by the same Mackenzie Inuit groups, House 4 may have performed a similar function to that of Dwelling 2 at OkRn-1, allowing the inhabitants to shift seasonally between dwelling features at the same site. The intrasite variability at Washout mirrors the differences between D1, D5 and Dwelling 2 because more variable architecture allowed an occupation of Washout that also continued for multiple seasons. In this case, the Banks Island Thule and the Mackenzie Inuit at Washout may have practiced similar settlement-subsistence strategies in order to occupy their coastal locations for a longer period of time in any given year.

The same argument can be made to account for differences between Washout House 3 and Pauline Cove House 7. Shortly after the occupation of Washout, the settlement
moved 500 m westward to Pauline Cove where, as previously mentioned, mammals made up a less significant proportion of the faunal assemblage (Friesen and Hunston 1994). The differences in faunal exploitation between the two sites have been attributed to Washout representing a shorter term occupation restricted to the winter, whereas Pauline Cove incorporated more cached food and perhaps a longer seasonal occupation (Friesen 2013). Although Pauline Cove House 7 and OkRn-1 Dwelling 2 are not particularly alike due to disparities in fish abundance, a longer stay and more food reserves, as well as disparate local resources bases, may likewise account for differences between Washout House 3 and OkRn-1 Dwelling 2. As a result, the variation in caribou and snow goose abundance seems driven by seasonality, which is inextricably linked to diversity in architecture and settlement strategies.

### 4.3.2 Iglulualuit

Iglulualuit (meaning “many houses”) is one of the largest archaeological sites of the Canadian Arctic and is comprised of the collapsed and partially buried ruins of at least 30 winter houses. They are distributed along an 800 m stretch of the west coast of Franklin Bay. The site was noted by Stefansson (1914), and excavations were first carried out by Morrison (1990) in the summer of 1987. His field crew concentrated on two sod and driftwood winter dwellings known as Houses 11 and 20. Radiocarbon dates from these occupations produced date ranges ca. 1340 – 1640 AD (House 20) and ca. 1495 – 1905 AD (House 11), and alongside artifact distribution they indicate that Iglulualuit was inhabited during the Mackenzie Inuit period (Morrison 1990; Betts 2005).

Prior to excavation, both houses appeared as shallow, circular depressions 8 to 10 m in diameter, with few visible structural elements (Morrison 1990). The roofs were made largely of driftwood poles, supplemented by the occasional bowhead whale mandible, rib, or vertebra supports. The field crew uncovered recessed living floors and sleeping platforms also made of wooden logs. Both houses probably had entrance tunnels, but they were either inaccessible due to ground water or destroyed by coastal erosion (Morrison 1990). The house structure and building materials resemble those at Washout.
Faunal remains were the most common item recovered from the excavations. House 11 produced 2847 specimens and House 20 produced 2198, for a total faunal assemblage of 5045 (Table 4.7). Bowhead whale bones were not included in the original analysis because it is unclear whether they were used for food or as architectural elements, or whether they were hunted or scavenged (either from beached whales, or abandoned sites). Only limited reorganization was required for comparison with OkRn-1 Dwelling 2. Red fox (n = 9) and arctic fox (n = 21) specimens were added to the “Fox sp.” (n = 26) category to facilitate the Spearman’s rho calculation.

Table 4.7: Faunal Frequencies from Iglulualuit Houses 11 and 20 (Morrison 1990) Compared to Dwelling 2, OkRn-1

<table>
<thead>
<tr>
<th>Taxon</th>
<th>House 11</th>
<th></th>
<th></th>
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<tr>
<td></td>
<td>NISP</td>
<td>%NISP</td>
<td>MNI</td>
<td>NISP</td>
<td>%NISP</td>
<td>MNI</td>
<td>%NISP</td>
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<tr>
<td><strong>FISH</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Unidentified fish</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td><strong>Class subtotal</strong></td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BIRD</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock/willow ptarmigan</td>
<td>34</td>
<td>1.8</td>
<td>5</td>
<td>50</td>
<td>2.9</td>
<td>8</td>
<td>0.8</td>
<td></td>
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</tr>
<tr>
<td>Duck sp.</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
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<tr>
<td>-common eider</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
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<td></td>
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<tr>
<td>-canvasback</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
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<td>-</td>
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<td></td>
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<tr>
<td>-pintail</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td></td>
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<tr>
<td>-white-winged scooter</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>2</td>
<td>0.1</td>
<td>2</td>
<td>-</td>
<td></td>
<td></td>
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<tr>
<td>-old squaw</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goose sp.</td>
<td>16</td>
<td>0.9</td>
<td>-</td>
<td>2</td>
<td>0.1</td>
<td>1</td>
<td>2.5</td>
<td></td>
<td></td>
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<tr>
<td>-brant</td>
<td>5</td>
<td>0.3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-white-fronted goose</td>
<td>4</td>
<td>0.2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-blue goose</td>
<td>3</td>
<td>0.2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glaucous gull</td>
<td>4</td>
<td>0.2</td>
<td>1</td>
<td>2</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golden eagle</td>
<td>3</td>
<td>0.2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swan sp.</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>2</td>
<td>0.1</td>
<td>-</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-whistling swan</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-tailed jaeger</td>
<td>1</td>
<td>0.1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.04</td>
<td></td>
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</tr>
</tbody>
</table>
The faunal compositions of Houses 11 and 20 are similar. Both are dominated by ringed seal while other marine mammals, such as bearded seal and beluga whale, are comparatively rare. The most abundant terrestrial mammal based on NISP is caribou, followed by red/arctic fox. This trend reverses when considering the caribou and Fox sp. MNI values. Morrison (1990: 17) attributes this change to the possible non-food use of fox.

A wide variety of bird taxa was recovered from Houses 11 and 20. However, low NISP values render them relatively unimportant to diet in comparison to mammals, with the exception of rock/willow ptarmigan. Fish bones were the most infrequent class in both assemblages and none were identified below the class level. Overall, the subsistence practices and exploitation of mammalian taxa at Iglulualuit show strong similarities to
OkRn-1 Dwelling 2, though there is a much stronger focus on ringed seal at Iglulualuit. There is a weak positive correlation between the relative abundance of mammalian taxa in the two Iglulualuit houses and that at OkRn-1 Dwelling 2 (House 11: $r_s = 0.3901$, $p = 0.0836$; House 20: $r_s = 0.4007$, $p = 0.0988$).

Morrison (1990) interprets House 11 and House 20 as winter occupations based upon the dwelling architecture and the preponderance of ringed seal. The high proportion of ptarmigan in comparison to other avian taxa also supports this interpretation. Ethnographic accounts suggest that seal netting in the area continued into spring (Stefansson 1914). Unfortunately, very few mandibles were recovered from the Iglulualuit excavations. Morrison (1990) used thin-sections from the five specimens that were present to determine their season at death. Readings from all five individuals clustered in the April-May period, thus supporting the possibility of spring netting. There are no published epiphyseal fusion data for the ringed seal sample from Iglulualuit to support or refute these other lines of evidence. Nevertheless, the ethnographic accounts and the thin-sections suggest that seal hunting at Houses 11 and 20 occurred primarily in the spring, as I have suggested for OkRn-1 Dwelling 2.

A major difference between Iglulualuit versus Nelson River and Washout is the representation of caribou, which are more abundant at Iglulualuit. This abundance makes the site more similar to OkRn-1 Dwelling 2, though caribou are less prevalent in the Iglulualuit houses than in Dwelling 2. The Mackenzie Delta region is home to two major herds of caribou that are separated into eastern and western populations by the Mackenzie River and its delta (Betts 2005). The eastern herd of barren-ground caribou can be found along Franklin Bay near Iglulualuit in the summer and early fall, before migrating southward by mid-September (Martell et al. 1984). The abundance of caribou remains recovered from Houses 11 and 20 may suggest that the site was occupied during the fall and into the winter. Another possibility, which is perhaps more likely given the lack of other fall resources (e.g., migratory birds and fish), is that caribou remains were cached and subsequently consumed during the colder months.
Also notable is the very strong similarity between Houses 11 and 20 at Iglulualuit. There is a significant positive correlation between the two assemblages ($r_s = 0.7355$, $p = 0.000042$). This stands in contrast to the different faunal assemblages recovered from Dwellings 1, 2 and 5 at OkRn-1. Both Houses 11 and 20 are winter occupations that were inhabited when similar cold season resources were available, whereas I have established that the OkRn-1 dwellings were inhabited at different times of the year. As such, it seems that residents of Iglulualuit followed a settlement-subsistence strategy similar to that at Nelson River, where residents occupied winter houses throughout the entire winter and abandoned the site when the weather warmed. The large number of winter houses at Iglulualuit, as well as ethnographic accounts (Morrison 1990), suggest that Mackenzie Inuit groups returned to the site repeatedly over many years for the winter/spring seal hunt. Once again, the major differences in architecture and faunal composition when compared to Dwelling 2 can be attributed to local resource availability, differences in the nature of seasonal occupation, and distinct settlement strategies.

### 4.4 Summary and Conclusion

In this chapter, I addressed how the Banks Island Thule subsistence economy changed from early to late Thule times, and how the overall trend along the south coast resembled subsistence strategies in the surrounding region. I first compared Dwelling 2 to other test excavations performed at OkRn-1. Faunal assemblages from two additional dwellings at the site (D1 and D5) were analyzed and interpreted as fall/winter occupations based upon their faunal remains, and substantial surface remains. There is considerable intrasite variability when comparing D1 and D5 to Dwelling 2. The latter is interpreted as a transitional season dwelling with an emphasis on the preparation of fox pelts. The same abundance of articulated fox remains and slate *uluit* were not noted at D1 and D5. Although it is impossible to prove that these three dwellings were coeval, it is possible that Thule groups occupying OkRn-1 moved between *qarmat* and winter houses at different times of the year. The use of both dwelling forms would have facilitated occupation of this location for a longer period of the year.
In contrast, an analysis of fauna from Nelson River indicates a more restricted winter/early spring occupation. The other features at OhRh-1, which have never been excavated, are also interpreted as winter dwellings. As such, variability in architecture and settlement strategies is driving some of the diversity between the OhRh-1 and Dwelling 2 assemblages. Nelson River is also representative of an early Thule occupation on Banks Island, whereas OkRn-1 is dated to the late Thule period. Cultural and climatic change during the years separating the occupations may have also caused differences in faunal exploitation, as well as landscape learning processes that increased familiarity with the environment during later Thule times.

Comparisons were also carried out between the Dwelling 2 faunal assemblage and those from the surrounding western Canadian Arctic. I selected seven contemporary sites from the Mackenzie Delta and one from Victoria Island. An analysis of their relative abundances of bird, fish, and mammal classes demonstrated that variability in the local environment and seasons of occupation were driving diversity within the faunal assemblages. Gutchiak is one example of how a local abundance of fish and a warm season occupation created a unique faunal assemblage. Two sites from the Mackenzie Delta, Washout House 3 and Igluluauit Houses 11 and 20, represented subsistence economies focussed on ringed seal and were therefore most similar to OkRn-1 Dwelling 2. However, like at Nelson River, different seasons of occupations and settlement-subsistence strategies caused distinct faunal assemblages at each site.

In conclusion, my analysis identified notable differences in subsistence practices between the early and late Thule period on Banks Island. There was a shift from active whaling to the exploitation of a broader range of resources, observed at Dwelling 2. It also appears that architecture and settlement-subsistence strategies were more variable during the late Thule period, and that these later groups were more familiar with the local environment. In contrast, early Thule groups from Alaska would focus on familiar resources amidst a new landscape. For these reasons, in addition to different seasons of occupation, there was considerable divergence between the Dwelling 2 and Nelson River faunal assemblages, and therefore between the early and late Thule subsistence economies. Faunal exploitation on the south coast of Banks Island most resembled sites in the
Mackenzie Delta that were focussed on ringed seal, such as Washout and Iglulualuit, although some differences were also attributed to settlement-subsistence strategies and seasonality. Finally, the unique local resource base on Banks Island compared to the Mackenzie Delta and Victoria Island drove the majority of variation in faunal compositions.
Chapter 5

5 Conclusion

This thesis has aimed to use the faunal remains from Dwelling 2 at OkRn-1 to investigate consumption patterns during the late Thule period on Banks Island, N.W.T. My objectives were to document late Thule food procurement strategies at Dwelling 2, its season of occupation, and to situate the Banks Island subsistence economy within broader temporal and regional trends. This is the first faunal analysis from this area and time period in the western Canadian Arctic. I determined that the subsistence economy of Dwelling 2 was focussed on ringed seal with an unusually strong emphasis on fox pelt processing. The site occupation likely spanned fall, late winter, and spring; residents may have moved between different structures (e.g., winter house and qarmaq) to extend their seasonal use of OkRn-1.

Comparison with the early Thule Nelson River site on Banks Island revealed that the Nelson River fauna was more focussed on marine mammals, such as cetaceans, and those species available in the winter. Differences between Nelson River and OkRn-1, and thus between the early and late Thule periods on Banks Island, may be attributed to varying seasonality, settlement-subsistence strategies, climates, and greater familiarity with the local landscape during the late Thule period. Comparisons between Dwelling 2 and other contemporary sites in the Mackenzie Delta and on Victoria Island showed that the different subsistence economies were also due to similar variables, in addition to disparate local resource bases.

5.1 Subsistence Practices at OkRn-1

The faunal assemblage analyzed in this thesis was excavated by the Ikaahuk Archaeology Project during the summer 2014 field season. The animal bones were identified and analyzed to reconstruct the human use of Banks Island resources during late Thule times (ca. 1400 – 1700 AD). The assemblage was drawn from nine different contexts (n = 9329) in Dwelling 2, representing the roof/wall collapse, a midden, and four pits.
generated during the dwelling occupation. It was dominated by mammalian species, particularly ringed seal, Arctic fox, and caribou. The majority of ringed seal skeletal parts were well-represented in Dwelling 2, suggesting that these animals were transported whole to the site. An analysis of caribou skeletal part representation suggested that elements poorly suited for drying were brought back to Dwelling 2. The other elements were likely dried and cached elsewhere, perhaps near kill sites, for later consumption. In several cases, the fox elements recovered from Dwelling 2 were still articulated. This indicates that large portions of fox carcasses were discarded with soft tissue still intact, suggesting that at least a portion of the fox assemblage was primarily exploited for pelts rather than as food. This interpretation is supported by an abundance of slate uluit, a tool used for skinning and preparing hides, found within Dwelling 2.

A variety of bird remains was also represented in the assemblage, the most common avian taxa included: snow goose, rock/willow ptarmigan, Ross’s goose, Canada goose, and snowy owl. With the exception of ptarmigan, a year-round resident of Banks Island, the bird species are summer migrants. All fish bones in the analyzed assemblage were identified to the Family Salmonidae and as either lake trout or Arctic char when more specific identifications were possible. Arctic char is a common anadromous species on Banks Island that is often exploited during upstream and downstream runs in the fall and spring, respectively. However, there are also resident populations found in lakes year-round on Banks Island, both species are found in nearby Fish Lake and lake trout are found close by in Middle Lake and Emegak Lake, thus precluding an assessment of Dwelling 2 seasonality based upon the fish sample.

The architecture uncovered during our excavation of Dwelling 2 lacked many characteristic traits of Thule winter houses, such as a paved flagstone floor and whalebone supports. As a result, we interpreted Dwelling 2 as a Thule qarmaq, a shallow semi-subterranean house with sod walls and a skin roof. The shallow central depression, approximately 30 cm in depth, is similar to that of dwellings recorded at the Pembroke site on Victoria Island, which were interpreted as “relatively light winter houses.” The Pembroke structures had shallow entrance tunnels and partial stone pavements (Norman and Friesen 2010: 265). We define Dwelling 2 as a qarmaq because it stands in contrast
to the winter houses observed at OkRn-1 (e.g., Dwellings 1 and 5) which are larger and more substantial (surface mounds are higher and greater in diameter) and include protruding whale bone supports. The substantial entrance tunnel of Dwelling 2 makes it somewhat unique among archaeologically and ethnographically known qarmat, demonstrating the variability of Thule architecture and the existence of dwelling forms that are not readily characterized as classic winter house or qarmat structures.

I examined seasonal indicators to establish whether Dwelling 2 was inhabited during transitional seasons (i.e., spring and fall), like most qarmat reported ethnographically (Mathiassen 1927; Park 1988), or throughout the entire winter, as described in some ethnographic accounts (Boas 1964; Schledermann 1976). A demographic profile of ringed seals from Dwelling 2 showed a majority of juveniles, followed by adults, and few yearling/fetal elements. This trend indicates a spring hunting season at the floe edge, although adults were also hunted at breathing holes and birthing lairs close to shore (Smith 1987). Two ringed seal femora were identified as fetal elements, signalling that some seal hunting occurred in the late winter during their gestation period.

The preponderance of snow goose in the assemblage also suggests a season of occupation during their spring arrival and vulnerable molting period (Manning et al. 1956) until their return to the south in late fall. Ross’s goose, Canada goose, and snowy owl migrate to Banks Island around the same time and are also warm season indicators. Caribou on Banks Island are most commonly hunted in the fall when the animals and their hides are in prime condition (Stenton 1989). As such, we interpret the Dwelling 2 qarmaq as a late winter, spring, and fall occupation in accordance with previous assumptions of qarmat seasonality (reviewed by Park 1988).

Smaller faunal assemblages from Dwellings 1 and 5 at OkRn-1 were recovered and reported by Arnold (2010). A comparison between all three dwellings suggested that ringed seal hunting mostly took place at the same time of year (i.e., late winter and early spring), but that a higher frequency of caribou and snow goose at Dwelling 2 could be attributed to continued occupation of Dwelling 2 into the late spring and during the fall. Overall, it appears that the major differences in faunal abundance can be credited to
differences in seasonality, with Dwellings 1 and 5 occupied primarily in winter, and occupation of Dwelling 2 in the fall and again in late winter and spring.

5.2 Comparisons with Other Thule Sites

Documenting similarities and differences between Dwelling 2 and the earlier Nelson River site, as well as contemporary sites in the Mackenzie Delta and Victoria Island, positioned Banks Island subsistence strategies within broader temporal and regional trends.

Nelson River (OhRh-1) is one of the earliest Thule sites east of Alaska (Friesen and Arnold 2008) and the only other fully excavated Thule dwelling on Banks Island. It was primarily constructed with driftwood and has been interpreted as a winter occupation. The faunal assemblage from this excavation was compared to the animal bones recovered from Dwelling 2. There was a significant positive correlation between the two assemblages due to similar amounts of ringed seal and Arctic fox. Major differences between Nelson River and OkRn-1 include evidence of active whaling at Nelson River and a lack of snow goose and caribou recovered there. Ringed seal tooth thin section evidence from Nelson River suggests that seal hunting primarily took place in the winter and spring. As such, differences in faunal abundance may be due to the fall component of the Dwelling 2 occupation. Longer occupations of OkRn-1 spanning fall through spring were possible because of multiple house forms (i.e., qarmat and winter houses) that allowed for short residential moves as the weather changed.

Conversely, residents of Nelson River may have been more focussed on marine resources, including cetaceans, rather than a broader range of taxa. The higher number of species exploited at OkRn-1 could be credited to a greater familiarity with the local landscape during the late Thule period, or it may have been a necessity following the Little Ice Age and changes in the availability of whales.

On a broader regional scale, archaeological sites in the Mackenzie Delta and on Victoria Island were selected for comparison because of recorded movements between these regions and Banks Island during the ancestral Inuvialuit period (Condon 1996).
Excavated Mackenzie Inuit sites contemporary with OkRn-1 Dwelling 2 and with published faunal data include seven sites from the Delta and one site on Victoria Island. The majority of these settlements produced faunal assemblages with vastly different bird, fish, and mammal class frequencies when compared to Dwelling 2. There was more emphasis on fish in the Mackenzie Delta (e.g., Morrison 2000; Betts and Friesen 2013), and those sites with a greater proportion of mammal remains in both locations were focussed on a single non-seal resource (e.g., beluga, caribou) (Balkwill and Rick 1994; Friesen and Arnold 1995; Norman and Friesen 2010; Howse and Friesen 2016). Many Delta sites were located to take advantage of a concentration of a single focal resource, whereas no similar resource concentration exists on the south coast of Banks Island. Additionally, the Bell site on Victoria Island is slightly inland and situated alongside a river, in contrast to OkRn-1’s coastal location.

Two sites in the northern Mackenzie Delta region, Washout (Yorga 1980; Friesen and Hunston 1994) and Iglulualuit (Morrison 1990), were dominated by ringed seal remains. These sites produced weak positive correlations when compared to Dwelling 2 that may be attributed to similar coastal resource bases, while different seasons of occupation and settlement-subsistence strategies again produced some variation.

5.3 Contributions

This research has documented the late Thule subsistence economy on Banks Island and has therefore contributed to the broader Ikaahuk Archaeology Project goals of investigating how different cultural groups used Banks Island over time. The project, a 5-year SSHRC-funded initiative led by Dr. Lisa Hodgetts, considers the complex relationships between people, animals, and the landscape, investigated through multiple spatial scales (e.g. dwellings, sites, regions) and over time. An investigation of how these three factors have interacted over the years will elucidate cultural change on the island. The faunal analysis of Dwelling 2 records how humans exploited animals and utilized the local resource base during the late Thule period, a phase that has not previously been examined on Banks Island.
The OkRn-1 Dwelling 2 assemblage created the opportunity to examine temporal change in the Banks Island subsistence economy. My analysis suggests that there was a shift from active whaling to an exploitation of a wider range of species. As previously mentioned, this may be attributed to different seasons of occupation, settlement-subistence strategies, climates, and landscape learning processes. Resemblances between Dwelling 2 and the seal-focussed sites in the Delta (i.e., Washout and Iglulualuit) could suggest possible interactions, but are most likely evidence of how the local landscape is integral to subsistence economies and how Thule Inuit tailored their subsistence strategies to the local resource base, concentrating on seals where they were locally abundant.

Finally, Dwelling 2 is one of very few excavated Thule qarmat, as the majority of observed and recorded qarmat are from the proto-historic or historic periods (Morrison 1983; Park 1988). Determining the season of occupation at Dwelling 2 thus contributed to discussions of qarmat seasonality, which revolve around whether they were occupied only during transitional seasons or throughout the entire winter (Mathiassen 1927; Boas 1964; Schledermann 1976; Park 1988). I interpret Dwelling 2 as a fall, late winter, and spring occupation. This conclusion corresponds to traditional understandings of Thule qarmat seasonality first outlined by Mathiassen (1927). The entrance tunnel, a departure from usual qarmaq architecture, speaks to the high degree of variability in Thule architecture.

### 5.4 Future Research

I observed two distinct sizes of caribou remains during my faunal analysis of Dwelling 2. The bigger and smaller skeletal remains most likely represent Barren ground and Peary caribou, respectively. Jordon Munizzi and Antonia Rodrigues, two other members of the Ikaahuk Archaeology Project, are performing isotope and ancient DNA analyses that may clarify the migratory patterns and population dynamics of these two subspecies in the past. Their work may also speak to muskox population size in late Thule times to reveal whether late Thule groups simply chose not to eat much muskox, or whether the population may have been very low at that time.
The preponderance of articulated fox remains and uluit recovered from Dwelling 2 have introduced the possibility that we excavated a specialized occupation that was primarily used for activities associated with the skinning and processing of fox pelts. The lack of fox remains at OkRn-1 Dwelling 1 could be due to the selective transport of fox carcasses to Dwelling 2 for further working. However, it is impossible to confirm this hypothesis without the excavation of at least one other dwelling at OkRn-1. Further investigation into Dwelling 1 can clarify whether some observed trends, such as the paucity of fox, are simply the result of small sample size. Dwelling 5 is another probable winter house that could be excavated for a point of comparison.

Excavating a summer occupation from the late Thule period on Banks Island would expand our zooarchaeological record to include all seasons. OkRn-2 is a nearby, contemporary occupation that may have been used by the residents of OkRn-1 during the warm season. It contains at least nine tent rings and is dated to approximately 1400 AD.

Possible inter-site comparisons on Banks Island, aside from Nelson River, include Cape Kellet and a possible qarmaq and winter house observed at Middle Lake (OkRn-3). Radiocarbon dates from Cape Kellet indicate that it is another early Thule site. An examination of this occupation and other late Thule sites on Banks Island would help to establish the degree of variability during both time periods. Further archaeological survey encompassing more of the island will hopefully reveal Thule occupations located outside of the south coast region. Excavation and a subsequent faunal analysis of these settlements could document variability in Thule subsistence strategies on the island itself.

This thesis has detailed my preliminary insights into late Thule subsistence on Banks Island, but a better understanding of these strategies requires additional assemblages from various time periods and locations on the island.
References

Alix, C.


Amorosi, T., J. Woollett, S. Perdikaris, and T. McGovern.


Aporta, C.


Arnold, C.D.


2010 Archaeological Investigations near Fish Lake, Southwestern Banks Island, NWT in 2009. Report on file at the Prince of Wales Northern Heritage Centre, Yellowknife, NWT.
Arnold, C.D. and K. McCullough


Austin, P.A.

1985 Analysis of faunal remains recovered from the Nelson River No. 1 site (OhRh-1) on southeastern Banks Island, N.W.T. 2 – 4 West, 4 – 6 South. Unpublished report on file in the Howard Savage Zooarchaeology Laboratory at the University of Toronto Anthropology Department, Toronto, ON.

Balkwill, D. and A. Rick.


Basso, K.H.

1996 *Wisdom Sites in Places: Landscapes and Language Among the Western Apache*. Albuquerque: University of New Mexico Press.

Bradley, R.S.


Betts, M.

2005 Seven Focal Economies for Six Focal Places: The Development of Economic Diversity in the Canadian Western Arctic. Arctic Anthropology 42(1): 47-87.


Betts, M. and T.M. Friesen.


Binford, L.R.

Boas, F.
1964 *The Central Eskimo.* Lincoln: University of Nebraska Press.


Brink, J.W.

Caughley, G. and A. Gunn.

Cohen, A. and D. Serjeantson.

Collignon, B.

Condon, R.G.
1996 *The northern Copper Inuit.* Toronto: University of Toronto Press.

Cooper J.C.
1981 Analysis of faunal remains recovered from the Nelson River No. 1 site (OhRh-1) on southeastern Banks Island, N.W.T. during 1980. Unpublished report on file in the Howard Savage Zooarchaeology Laboratory at the University of Toronto Anthropology Department, Toronto, ON.

Danielson, R. A.
1993 An analysis of age and season of death for a sample of ringed seal (Phoca hispida) canine thin sections. Unpublished report on file in the Howard Savage Zooarchaeology Laboratory at the University of Toronto Anthropology Department, Toronto, ON.
Da Rosa, C.
1985 Analysis of faunal remains recovered from the Nelson River No. 1 site (OhRh-1) on southeastern Banks Island, N.W.T. 4 – 6 West, 6 – 8 South and 2 – 4 West, 6 – 8 South. Unpublished report on file in the Howard Savage Zooarchaeology Laboratory at the University of Toronto Anthropology Department, Toronto, ON.

Darwent, C.M. and J.C. Foin.

Davis, S.J.M.

Dawson, P.C.

Diab, M.C.

Faith, J.T. and A.D. Gordon.

Fisheries and Oceans Canada

Friesen, T.M.


Friesen, T. M., and M. Betts.


Friesen, T.M. and J. Hunston.


Fray, C.W. and C.J. Marean.


Gajewski, K., R.J. Mott, J.C. Ritchie, and K. Hadden.


Geist, V.


Gilbert, A.S. and B.H. Singer


Grayson, D.K.


2000  Variation reproduction and body condition of the ringed seal (Phoca hispida) in western Prince Albert Sound, NT, Canada, as assessed through a harvest-based sampling program. Arctic 53(4): 422-431.

Henshaw, A.S.


Hickey, C.


Hodgetts, L.M.


2013b  The rediscovery of HMS Investigator: Archaeology, sovereignty and the colonial legacy in Canada’s Arctic. Journal of Social Archaeology 13(1): 80-100.

Hodgetts, L.M. and E. Eastaugh

Hodgetts, L.M., E. Eastaugh, and J.S. Munizzi.


Hodgetts, L.M. and J.S. Munizzi.


Howse, L.


Howse, L. and T.M. Friesen.


Jenness, D.

1922 The Life of the Copper Eskimos. Ottawa: F. A. Acland.


Kerbes, R.H., V.V. Baranyuk, and J.E. Hines.


Knopp, J.A.

2010 Investigation the effects of environmental change on Arctic char (Salvelinus alpinus) growth using scientific and Inuit traditional knowledge. Arctic 63(4): 493.

Larsen, H. and F. Rainey.

1948 Ipiutak and the Arctic whaling culture. Anthropological Papers of the American Museum of Natural History 42.
Laugrand, F.B. and J.G. Oosten.


Le Mouel, J.F. and M. Le Mouel.


Lyman, R.L.


Lyons, N.


MacRury, I.K.


Manning, T.H.


1956 Narrative of a Second Defence Research Board Expedition to Banks Island. Arctic 9: 3-76.


Manning, T.H. and A. H. Macpherson.


Marshall, F. and T. Pilgram.


Martell, A., D. Dickinson, and L. Casselman.


Mathiassen, T.


Maxwell, M. S.


McGhee, R.


1996  *Ancient People of the Arctic.* Vancouver: University of British Columbia Press.

McLaren, I.A.

1958 The biology of the ringed seal (Phoca hispida Schreber) in the eastern Canadian Arctic. Fisheries Research Board of Canada Bulletin 118.

Meltzer, D.J.


Metcalfe, D. and K.T. Jones.


Møhl, J.


Moody J.L. and L.M. Hodgetts.


Morey, D.F.


Morrison, D.A.


Müller-Beck, H.


Münzel, S.C.


Nagy, M.


Norman, L. and T.M. Friesen


Nuttall, M.

Outram, A.K.


Park, R.W.


Parks Canada


Rasmussen, K.


Ringrose, T.J.


Rockman, M.


Ryan, K.

2003 A Late Dorset semi-subterranean structure from the Bell Site (NiNg-2), Ekalluk River, Victoria Island. Etudes/Inuit/Studies 27(1-2): 91-110.

Salter, E.

1979 Faunal Final Report – Washout Site (NjVi-2). Manuscript on file, Department of Anthropology, University of Toronto.

Samelius, G., R.T. Alisauskas, and J.E. Hines


Savelle, J.M.


Schledermann, P.

1976 The effect of climatic/ecological changes on the style of Thule Culture winter dwellings. Arctic and Alpine Research 8(1): 37-47


Sharp, H.S. and K. Sharp.


Sinclair, H.M.


Smith, T.G.

1973 Population dynamics of the ringed seal in the eastern Canadian Arctic. Fisheries Research Board of Canada Bulletin 181.

1987 *The Ringed Seal, Phoca hispida, of the Canadian Western Arctic*. Canadian Bulletin of Fisheries and Aquatic Sciences 216.
Smith, T.G. and I. Stirling.


Stefansson, V.


1914 Prehistoric and present commerce among the Arctic Coast Eskimo. Canada Development of Mines 6, Anthropological Series 3.


Stenton, D.R.


1991 Caribou population dynamics and Thule culture adaptations on southern Baffin Island, NWT. Arctic Anthropology 28(2):15-43


Stirling, I. and N.A. Oritsland.

1995 Relationships between estimates of ringed seal (Phoca hispida) and polar bear (Ursus maritimus) populations in the Canadian Arctic. Canadian Journal of Fisheries and Aquatic Sciences 52(12): 2594-2612.

Stirling, I., W.R. Archibald, and D. DeMaster.


Stora, J.

2001 Skeletal development in the grey seal (Halichoerus grypus), the ringed seal (Phoca hispida botnica), the harbour seal (Phoca vitulina vitulina), and the harp seal (Phoca groenlandica). Epiphyseal fusion and life history. Archaeozoologica 11(1/2): 199-222.


Stuart-Macadam, P.


Sutherland, B.G. and W.R. Golke.

1978 *A summary of fisheries data collected for the Land Use Information map series during the 1975 and 1976*. Ottawa: Indian and Northern Affairs Canada.

Swanson, H.K., K.A. Kidd, J.A. Babaluk, R.J. Wastle, P.P. Yang, N.M. Halden, and J.D. Reist.

2010 Anadromy in Arctic populations of lake trout (Salvelinus namaycush): otolith microchemistry, staple isotopes, and comparisons with Arctic char (Salvelinus alpinus). Canadian Journal of Fisheries and Aquatic Sciences 67(5): 842-853.

Taylor, W. E. jr.


Thomsen, H.V.

1985 The Nelson River site (OhRh-1), Banks Island, District of Franklin, N.W.T. House Structure #1. Unit 4 – 6 W; 4 – 6 S, Levels 10 – 70 cm. Unpublished report on file in the Howard Savage Zooarchaeology Laboratory at the University of Toronto Anthropology Department, Toronto, ON.

Usher, P.J.

1966 *Banks Island: An area economic survey, 1965*. Ottawa: Department of Northern Affairs and National Resources.
Whitridge, P.


Will, R.T.


Yorga, B.

Appendix A

Fox

Fox skeletal part zones were also used for the analysis of arctic hare and lemming bones.
Radius

Ulna
Tibia

Seal

Cranium
Humerus

Radius
Humerus

Tibia and Fibula
Wolf

Wolf skeletal part zones were also used for the analysis of possible domesticates and polar bears.
Tibia
Radius and Ulna

Innominate
Metapodials

Calcaneus and Astragalus
# Curriculum Vitae

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