THE HOLOCENE OCCURRENCE AND EXPLOITATION OF MAMMALS IN THE CLEARWATER AND LOWER SNAKE RIVER REGIONS OF IDAHO

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Authorization to Submit Thesis

This thesis of Jenifer Chadez, submitted for the degree of Master of Arts with a major in Anthropology and titled "The Holocene Occurrence and Exploitation of Mammals in the Clearwater and Lower Snake River Regions of Idaho," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

Twenty seven prehistoric zooarchaeological assemblages from 20 archaeological sites have been recovered from the Clearwater and adjacent lower Snake River regions in Idaho. Nearly 60% of the early prehistoric assemblages (ca. 10,000-6000 BP) are comprised of bear (*Ursus* spp.), while deer (*Odocoileus* spp.) dominate both middle (ca. 6000-3000 BP) and late (ca. 3,000-500 BP) prehistoric assemblages. Bighorn sheep (*Ovis canadensis*), bison (*Bison bison*), and pronghorn (*Antilocapra americana*), all of which are extirpated from the study area today, together comprise up to 2.5% of the total faunal assemblage and 6.5% of the late prehistoric assemblage. Within each phase, rabbits and large rodents comprise ≤3% of the total assemblage. The relative frequencies of mammals across all sites suggests subsistence practices focus on large mammals (>25 kg). Artiodactyl index values across all sites indicate a reliance on artiodactyls during all time periods. The relative abundance of deer was negatively correlated with taxonomic evenness (Spearman's *rho* = -0.8061; *p* = 0.0049), indicating that subsistence was focused upon deer.

Acknowledgments

First and foremost I would like to thank Lee Sappington for his instruction, encouragement, enthusiasm, and patience, and for providing me with opportunities for field work (even the infamous rose bush survey). I would like to thank Don Tyler for his encouragement and advice throughout the course of my undergraduate and graduate education. Sincere thanks are extended to Peter Isaacson for agreeing to be on my committee and for providing valuable feedback. I would also like to thank Laura Putsche and Mark Warner for sparking my interest in anthropology and faunal analysis, respectively, and Rodney Frey for teaching me about the importance of "heart knowledge." I am also deeply appreciative of Leah Evans-Janke at the Alfred W. Bowers Laboratory of Anthropology at the University of Idaho for her tremendous patience with my many, many site form requests.

Special thanks are extended to the Nez Perce Tribe's Cultural Resource Program, for providing faunal remains for me to identify, and to the Conner Museum at Washington State University for the use of their comparative collection.

Dedication

To my family: Julie, Clayton, Alison, Betty, Gene, Irene, and Pete for their unconditional support and love. And to Kerey, my sounding board, editor, cheerleader, and partner-in-adventure, thank you.

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Chapter 1: Introduction

Faunal remains were first analyzed from sites in the Columbia Plateau in the early 1950s and the Clearwater River region in 1969, but faunal analysis did not become common in the region until the 1990s (Sappington 1994). In recent years, a number of zooarchaeological investigations have been conducted in this region, and numerous taxa have been identified from excavated sites. Unfortunately, little research to date has examined faunal distributions within the region as a whole. Meriwether Lewis and William Clark's Corps of Discovery expedition recorded many mammal species in Nez Perce Country that have either been extirpated from the area (grizzly bear, gray wolves, and pronghorn) or have a severely reduced range (bighorn sheep and mountain goat) (Gass 1847; Moulton 2005; Pinkham and Evans 2013; Walker 1998).

In this thesis I describe 27 faunal assemblages recovered from 20 archaeological sites within the Clearwater and adjacent lower Snake River regions in Idaho. I examine artiodactyl abundance, prey body size categories, and measures of taxonomic richness and evenness to determine whether subsistence practices were generalized or specialized and whether temporal or spatial variation exists with regard to subsistence practices.

Chapter 1 of this thesis presents relevant natural and cultural background information. The natural setting focuses on regional paleoclimate, while the cultural setting section outlines the cultural chronology used in the study area, with emphasis on the Nez Perce seasonal subsistence cycle, hunting strategies, and game use and processing and serves as a basis for interpreting the subsistence patterns that were identified in the zooarchaeological remains. Chapter 2 provides an overview of the archaeological sites used in this thesis. Chapter 3 details the methods used during faunal and data analyses. Chapter 4 presents the results of faunal analyses with regard to prehistoric subsistence practices and variations therein. Chapter 5 summarizes the results of this research. Appendix A gives an overview of the life histories for game mammals utilized by the Nez Perce. Appendices B, C, and D present the amphibian, reptilian, and avian; molluscan and icthyofaunal; and intrusive rodent faunal assemblages from archaeological sites used in this thesis, respectively. Appendix E is the faunal assemblage from the Sweetwater Springs (10-NP-313) site that I reanalyzed.

Chapter 2. Natural and Cultural Setting

Paleoclimate

Pollen and plant macrofossils from sediment cores have been analyzed at a number of sites in the Columbia Plateau, providing local and regional vegetation and climate reconstructions (Fig. 1, Table 1). Though paleoecological data from many sites in the Columbia Plateau extends as far back as 100,000 BP, data older than the Last Glacial Maximum (ca. 26,000-19,000 BP) are not included in this chapter.

Sites with pollen records in eastern Washington range from 410 to 1220 meters above sea level (ASL) (Blinnikov et al. 2002; Whitlock and Bartlein 1997). These sites include Carp Lake (CL, 714 m), Kahlotus-Pasco-1 (KP-1, 410 m), Cemetery Hill Road-1 (CHR-1, 677 m), Vernon Marll-1 (VM-1, 1095 m), and Robinette Mountain-1 (RBM-1, 1220 m) (Blinnikov et al. 2002; Whitlock and Bartlein 1997).

Sites with pollen records in Idaho are higher in elevation than those in Washington, and range from 1035 to 2250 meters ASL. Blue Lake (BL, 1035 m) is located on Craig Mountain in the Snake River drainage and provides a pollen record spanning the last 4300 BP (Smith 1983). Star Meadows (SM, 1109 m) and Burnt Knob Lake (BKL, 2250 m) are both located in the Clearwater River Basin, Idaho, and have pollen records spanning the last 120,000 and 15,000 years, respectively (Brunelle and Whitlock 2003; Herring 2014, 2015). Sediments have also been analyzed from Dismal Lake (DL, 1630 m), Rocky Ridge Lake (RRL, 1750 m), and Horseshoe Lake (HL, 1920 m) in northern Idaho (Herring 2014). Pollen records for Dismal Lake span the last 13,600 years, pollen records at Rocky Ridge Lake span the last 2500 years, and pollen records for Horseshoe Lake span at least the last 5000 years (Herring 2014).

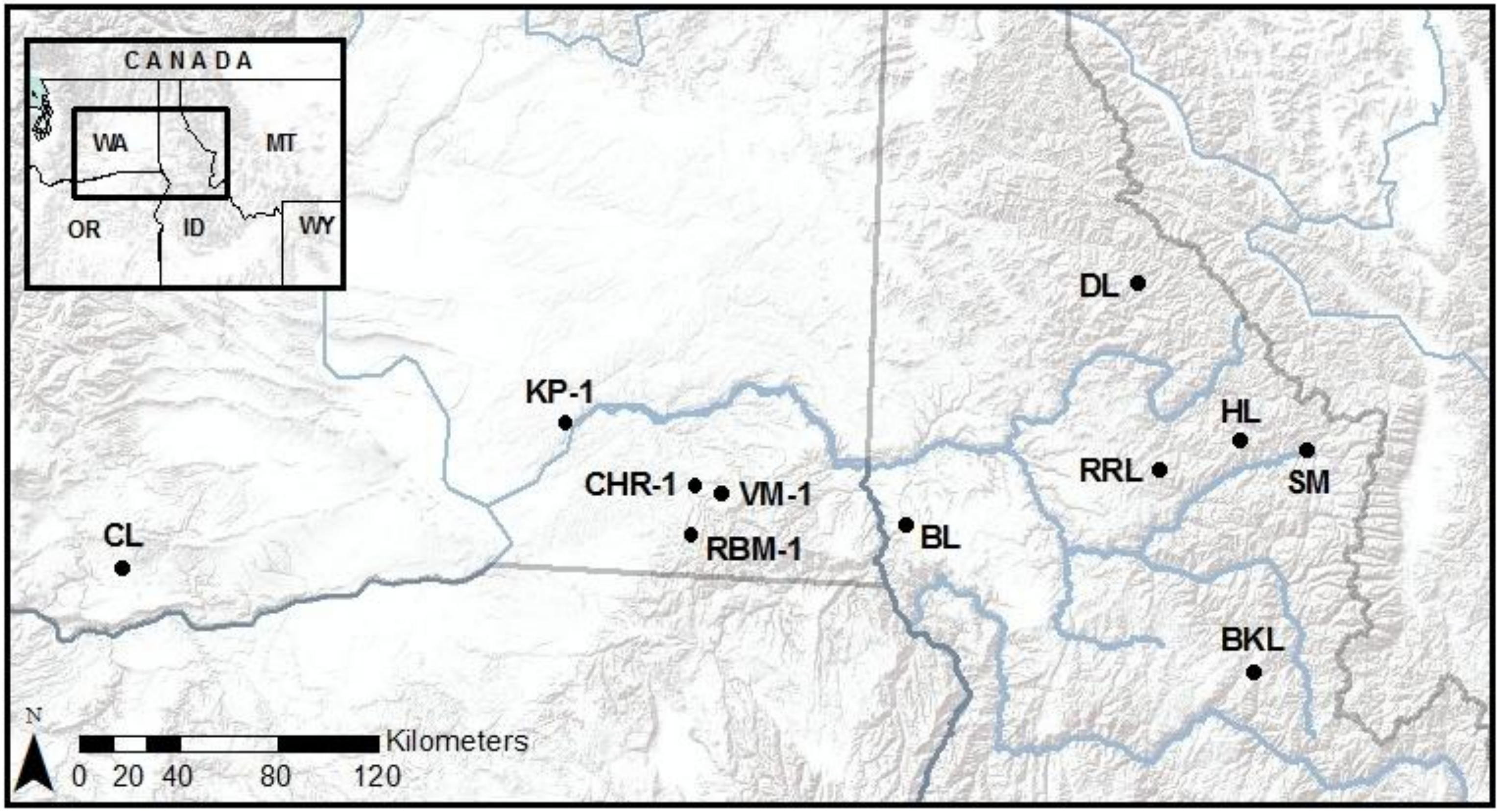

Figure 1. Map of select paleoclimate data locations in the Columbia Plateau. CL: Carp Lake (Whitlock and Bartlein 1997); KP-1: Kahlotus-Pasco-1; CHR-1: Cemetery Hill Road-1; RBM-1: Robinette Mountain-1;VM-1: Vernon Marll-1 (Blinnikov et al. 2002); BL: Blue Lake (Smith 1983); DL: Dismal Lake; RRL: Rocky Ridge Lake; HL: Horseshoe Lake; SM: Star Meadows (Herring 2014); BL:Burnt Knob Lake (Brunelle and Whitlock 2003).

Table 1. Summary of paleoclimate data for seven sites in the Columbia Plateau. Climate interpretations are relative to the present-day conditions.

Location	Vegetation	Inferred Climate	Years BP	Period**
Carp Lake, 714 m	*P. ponderosa-Pseudotsuga menziesii* forest *	-	3900-0	Mid-Late
	Pinus-Quercus woodland	Warm, dry	9100-3900	Early-Mid.
	Poaceae/Chenopodioideae steppe	Warm, dry	13,200	Late Glacial
	Spruce parkland	Cool, wet	15,000-13,000	Late Glacial
KP-1, 410 m	*Agropyron-Festuca* *	Warm	pre-2500	Late
	Artemisia increase	Dry	-	Middle
	Agropyron- Festuca - Poa grassland	-	-	Early
	Festuca-Agropyron grassland	Cool, wet	15,000-11,000	Late Glacial
CHR-1, 677 m	*Festuca-Agropyron* grassland *	-	ca. 11,000-0	Early-Late
	Festuca-Koeleria grassland	Cool, wet	15,000-11,000	Late Glacial
RBM-1, 1220 m	*Abies grandis-Pseudotsuga* forest*	-	7600-0	Mid.-Late
	Pinus ponderosa/Agropyron-Festuca	Warm, dry	-	Early
	Stipa-Festuca grassland	Cold, wet	15,000-11,000	Late Glacial
VM-1, 1095 m	*A. grandis-Pseudotsuga* forest *	-	ca. 4000-0	Mid.-Late
	P. ponderosa forest	Warm, dry	ca. 11,000-4000	Early-Mid.
	Pinus ponderosa/Festuca transition	Cool, wet	15,000-11,000	Late Glacial
Blue Lake 1035 m	*Pseudotsuga menziesii, Artemisia*	-	100-0	Late
	P. ponderosa forest with *Carex spp.* understory	-	1000-100	Late
	P. ponderosa forest with Poaceae understory	Dry	1700	Late
	Pseudotsuga menziesii-Pinus forest	Dry	3100-1700	Mid.-Late
	Pseudotsuga menziesii-P. ponderosa-P. contorta	Cool	4000	Middle
	Pseudotsuga menziesii-Artemisia steppe	Warm, moist	4300-4000	Middle
Dismal Lake 1630 m	Mesic conifer forest *	-	1350-0	Late
	Pseudotsuga menziesii forest	Warm, moist	-	Early
	Pinus-Alnus	Warm	13,400-11,600	Late Glacial
	Picea engelmannii-Artemisia	Cool, dry	13,600-13,400	Late Glacial
Rocky Ridge Lake 1750 m	*Tsuga mertensiana-Abies* *	-	500-0	Late
	Pinus-Abies-Alnus	-	2500-500	Late
Horseshoe Lake 1920 m	*Pinus, Picea, Abies,* and *Pseudotsuga/Larix**	Moist	5000	Middle
	Pinus-Alnus forest	-	Post-Mazama	Middle
Burnt Knob Lake 2250 m	Subalpine *Pinus-Abies* forest *	Warm, dry	2500-0	Late
	Pinus-Abies forest	Dry	ca. 7000-2500	Mid.-Late
	Pinus contorta- Pinus albicaulis-Abies bifolia-Alnus	Warm, moist	14,500	Late Glacial
	Picea engelmannii-Artemisia parkland	Cool	pre-14,000	Late Glacial
Star Meadows 1109 m	*Thuja-Abies* forest *	Warm, wet	post-6300	Mid.-Late
	Pseudotsuga/Larix, Alnus, Quercus	Warm, wet	5000	Middle
	Pinus parkland	Warm, dry	-	Early

* denotes modern vegetation

** Periods refer to the Holocene unless otherwise specified

Last Glacial Maximum (ca. 26,000-19,000 BP)

During the Last Glacial Maximum (LGM), between 20,000 and 16,000 BP, the Laurentide ice sheet caused cold and arid conditions and alpine glaciation in the Pacific Northwest (Whitlock 1992). Paleoecological reconstructions at sites in the Columbia Plateau suggest the LGM was colder and more arid than present (Blinnikov et al. 2002; Herring 2014, 2015; Whitlock and Bartlein 1997). In eastern Washington, *Artemisia* (sagebrush) became more widespread and forests retreated everywhere except for Carp Lake which retained *Picea engelmannii* (Engelmann spruce) (Blinnikov et al. 2002; Whitlock and Bartlein 1997). In northern Idaho, *Artemisia* was dominant at Star Meadows, suggesting a low tree cover and short growing season (Herring 2014, 2015).

Late Glacial interval (ca. 15,000 - 11,000 BP)

The retreat of glaciers from the highlands and the catastrophic Scabland floods facilitated the development of a sagebrush-grassland steppe in the Okanogan Highlands and Channeled Scablands (Whitlock 1992). *Pinus* (pine), *Abies* (fir), and *Picea* (spruce) were all present in small numbers, indicating the climate was warming from the LGM, but was cooler-than-present (Whitlock 1992). At Carp Lake, *Picea* (spruce) expanded into the cold, dry *Artemisia* (sagebrush) steppe during late-glacial; from ca. 13,200-9100 years ago, Carp Lake became warmer and drier than present and had a temperate steppe with Poaceae and Chenopodiineae, while *Alnus* (alder) was present in riparian areas (Whitlock and Bartlein 1997). KP-1 and CHR-1 were both grasslands during this period with KP-1 having a xeric *Festuca-Agropyron* (Fescue-Wheatgrass) grassland and CHR-1 having a mesic *Festuca-Koeleria* (Fescue-Junegrass) grassland. RBM-1 was a *Stipa-Festuca* (Needlegrass-Fescue) grassland, similar to the present subalpine community, while VM-1 was a *Pinus ponderosa-Festuca* (ponderosa pine-fescue) grassland transition zone (Blinnikov et al. 2002).

In northern Idaho, glaciers retreated from Dismal Lake around 13,600-13,400 BP, facilitating a *Picea engelmannii-Artemisia* (Engelmann spruce-sagebrush) parkland suggestive of a cool dry climate (Herring 2014). The area surrounding Dismal Lake was an open subalpine/alpine forest (Herring 2014). As the climate warmed around the Pleistocene-Holocene transition (ca. 13,400 to 11,600 BP), the abundance of *Picea* decreased sharply at Dismal Lake and was replaced by *Pinus* (pine) with lesser amounts of *Alnus* (alder) (Herring 2014). *Picea engelmannii-Artemisia* parkland was also present at Burnt Knob Lake prior to 14,000 BP, indicating colder-than-present conditions (Brunelle and Whitlock 2003). Around ca. 14,500 BP, *Picea* was replaced by a mixed conifer forest of *Pinus contorta* (lodgepole pine), *Pinus albicaulis* (whitebark pine), *Abies bifolia* (subalpine fir), and *Alnus* suggesting moister conditions, warmer summers, and colder winters (Brunelle and Whitlock 2003).

Early Holocene (11,000 - 7000 BP)

By the beginning of the early Holocene, glaciers had retreated from all but the highest elevations and forests were at higher elevations than present in the Northern Columbia Plateau, Blue Mountains, and northern Rockies (Chatters 1998). The early Holocene records indicate a warmer, drier climate was present across eastern Washington and northern Idaho, with the exception of Dismal Lake, which remained moist (Blinnikov et al. 2002; Brunelle and Whitlock 2003; Herring 2014, 2015; Whitlock and Bartlein 1997).

In eastern Washington, Carp Lake shifted from a Poaceae/Chenopodioideae grassland to a *Pinus-Quercus* (pine-oak) woodland around 9100 BP (Whitlock and Bartlein 1997). KP-1 underwent a shift to a more xeric grassland composed of *Agropyron* (wheatgrass), *Festuca* *idahoensis* (Idaho fescue), and *Poa sandbergii* (Sandberg bluegrass). CHR-1 shifted from a mesic *Festuca-Koeleria* grassland to the xeric *Festuca-Agropyron* grassland that remained throughout most of the Holocene, implying increased aridity from the Late Glacial to the early Holocene (Blinnikov et al. 2002). At RBM-1, the Late Glacial grassland was gradually replaced a *Pinus ponderosa/Agropyron-Festuca* parkland, implying warmer and drier conditions (Blinnikov et al. 2002). At the higher elevation VM-1, a *P. ponderosa* forest was present, while today *P. ponderosa* is found at higher elevations (Blinnikov et al. 2002).

In northern Idaho, the forest at Dismal Lake was primarily *Pseudotsuga menziesii* (Douglas fir) with minor components of *Pinus*, *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), *A. grandis* (grand fir), and *Alnus* (alder), suggesting a warm, moist climate during the early Holocene (Herring 2014). The early Holocene at Burnt Knob Lake had warmer and drier summers and dry cold winters, causing the upslope spread of *Pinus* and *Abies* (Brunelle and Whitlock 2003). Star Meadows had an early Holocene forest dominated by *Pinus* with a few *Picea* and *Pseudotsuga*/*Larix* trees and an understory of Poaceae (grass) and *Ambrosia* (ragweed), indicating an open warm, dry habitat (Herring 2014, 2015).

Middle Holocene (7000-2500 BP)

During the middle Holocene, lower portions of the Columbia Basin consisted of arid steppe and *Pinus ponderosa* parkland was present in the Okanogan Highlands (Blinnikov et al. 2002). Northern Idaho shifted to more mesic taxa, suggesting more moisture than during the early Holocene (Brunelle and Whitlock 2003; Herring 2014, 2015).

Carp Lake was composed of *Pinus* forest and *Quercus* woodland until ca. 3900 BP when the modern *P. ponderosa-Pseudotsuga menziesii* forest developed (Whitlock and Bartlein 1997). The mesic areas around Carp Lake had *Abies grandis* (grand fir), *Pinus* *monticola* (western white pine), and *Tsuga heterophylla* (western hemlock), *Quercus* woodland was retained in the lower treeline, and grassland was present at lower elevations (Whitlock and Bartlein 1997). Sagebrush increased at KP-1 during the middle Holocene, implying drier-than-present conditions (Blinnikov et al. 2002). The early Holocene pine/grass parkland at RBM-1 transitioned into the modern *Abies-Pseudotsuga* forest during the middle Holocene (Blinnikov et al. 2002).

From 4300 to 4000 BP, Blue Lake was an open area with expanding steppe vegetation (Gramineae, *Artemisia,* and Chenopodiineae) with an open *Pseudotsuga menziesii* forest on the mesic slopes above the lake near the forest-steppe transition. The high amount of *Pseudotsuga menziesii* and low amount of *Pinus* encountered at Blue Lake suggests a warmer, moister climate (Smith 1983). By ca. 4000 BP, a mixed conifer forest of *Pseudotsuga menziesii*, *Pinus ponderosa* (ponderosa pine), and *P. contorta* (lodgepole pine) was present at Blue Lake, indicating cooler conditions (Smith 1983).

At Dismal Lake, conifer species decreased sharply after the eruption of Mt. Mazama ca. 7000 BP; most components of the modern subalpine forest reached their modern proportions during the middle Holocene (Herring 2014). The post-Mazama forests surrounding Horseshoe Lake were dominated by *Pinus* and *Alnus*; by ca. 5000 BP a mixed conifer forest of *Pinus*, *Picea*, *Abies*, and *Pseudotsuga/Larix* was present (Herring 2014). Star Meadows was cooler and moister during the middle-to-late Holocene (Herring 2014, 2015). *Thuja plicata* first appeared ca. 6300 BP and increased in abundance from the middle-to-late Holocene, suggesting a shift to more mesic taxa (Herring 2014, 2015). The modern *Thuja-Abies* forest at Star Meadows developed after 6300 BP (Herring 2014, 2015). *Pseudotsuga/Larix*, *Alnus* and *Quercus* became more abundant at Burnt Knob Lake, suggesting summers were warmer and drier-than-present but wetter than during the early Holocene, and winters were wetter than during the early Holocene (Brunelle and Whitlock 2003).

Late Holocene (2500 BP to present)

The modern climate throughout most of the Columbia Plateau predates the late Holocene. The mesic forests of Carp Lake, RBM-1 and VM-1, Star Meadows, and Horseshoe Lake and the grasslands at KP-1 and CHR-1 were all established prior to 2,500 BP (Blinnikov et al. 2002; Herring 2014, 2015; Whitlock and Bartlein 1997). The late Holocene records indicate the climate of eastern Washington was similar to present and northern Idaho was cooler and drier than during the middle Holocene (Blinnikov et al. 2002; Herring 2014, 2015; Smith 1983; Whitlock and Bartlein 1997).

The present *Abies grandis-Pseudotsuga* forest at the RBM-1 site and the present grassland at the CHR-1 site was established during the early Holocene (after 7600 BP for RBM-1) and persisted through the late Holocene. The modern *P. ponderosa-Pseudotsuga menzeisii* forest at Carp Lake, the *Agropyron-Festuca* grassland at KP-1, and the *A. grandis* (grand fir)-*Pseudotsuga* forest VM-1 were established during the last half of the middle Holocene and persisted through the late Holocene (Blinnikov et al. 2002; Whitlock and Bartlein 1997).

Blue Lake remained a mixed conifer forest from 3100 to 1700 BP, but the composition of the forest decreased in *Pinus* and increased in grass, suggesting drier conditions (Smith 1983). By 1700 BP, Blue Lake had shifted to an open *P. ponderosa* forest and grassy understory with *Pseudotsuga menziesii* limited to the most mesic slopes or higher elevations, indicating conditions were drier than the middle Holocene (Smith 1983). Open *P. ponderosa* forest continued from 1000 to100 BP with an understory of Cyperaceae (either *Carex geyeri* or *Carex rossii*) and Chenopodiineae (Smith 1983). During the last 100 years BP, *Pseudotsuga menziesii, Artemisia,* and Chenopodiineae increased, while grass decreased (possibly related to historic grazing by livestock) (Smith 1983).

At Horseshoe Lake *Tsuga mertensiana* first appeared during the middle Holocene and increased in abundance throughout most of the late Holocene, suggesting regional cooling (Herring 2014). During the last half of the late Holocene (ca. 1350 BP to present), *Pinus monticola, P. contorta, Tsuga mertensiana, Picea engelmannii, Pseudotsuga menziesii, Larix occidentalis, and Alnus* spp. were the dominant taxa at Dismal Lake (Herring 2014). The record for Rocky Ridge Lake only extended through a portion of the late Holocene, but suggested shifting abundances of *Abies* spp., *Alnus viridis, Alnus rubra, Pseudotsuga/Larix,* and *Tsuga mertensiana* (Herring 2014). The modern subalpine *Pinus-Abies* forest developed after 2500 BP at Burnt Knob Lake, which includes *Abies bifolia* (subalpine fir), *Pinus albicaulis* (whitebark pine) and *Pinus contorta* (lodgepole pine) on southern dry slopes (Brunelle and Whitlock 2003). The absence of *Pseudotsuga/Larix* and the decrease in *Alnus* spp. suggests *Pseudotsuga* moved to lower elevations and the climate was cooler and drier than the middle Holocene (Brunelle and Whitlock 2003).

Clearwater River Region Cultural Chronology

Though the first anthropologist, Alice Cunningham Fletcher, arrived in the Clearwater River region (Fig. 2) in 1889, serious archaeological investigations weren't conducted until the early 1960s (Sappington 1994a; Sappington 2010). Based on major excavations conducted in the 1970s through the 1990s, the Clearwater River region was designated as a distinct cultural region in 1994. The cultural chronology for the region (Fig. 3) consists of four temporal periods, each with a representative cultural phase. While the earliest phases are similar to those defined for the adjacent lower Snake River region, the later phases reflect local developments by ancestors of the Nez Perce people (Sappington 1994a; Sappington 2010).

Pre-Clovis, Clovis, Folsom (Before 10,000 BP)

There are no known pre-Clovis or Folsom sites in the Clearwater River region. The only evidence of a Clovis occupation comes from one Clovis point collected in present-day Lapwai in the 1860s (Sappington 1994). In the broader Columbia Plateau, a Clovis cache was found and excavated near Wenatchee, Washington, and Folsom points have been recovered at sites in Oregon and on the Snake River Plain (Sappington 1994).

Early Prehistoric Period: Windust and Cascade Phases (ca. 10,000-6000 BP

The earliest known occupation of the Clearwater River region is represented by the Windust phase (ca. 10,000-6000 BP) (Sappington 1994, 1996). Early prehistoric period settlement in the Clearwater region is reflected by temporary residence camps located in open settings along rivers where foragers could process food and manufacture tools (Sappington

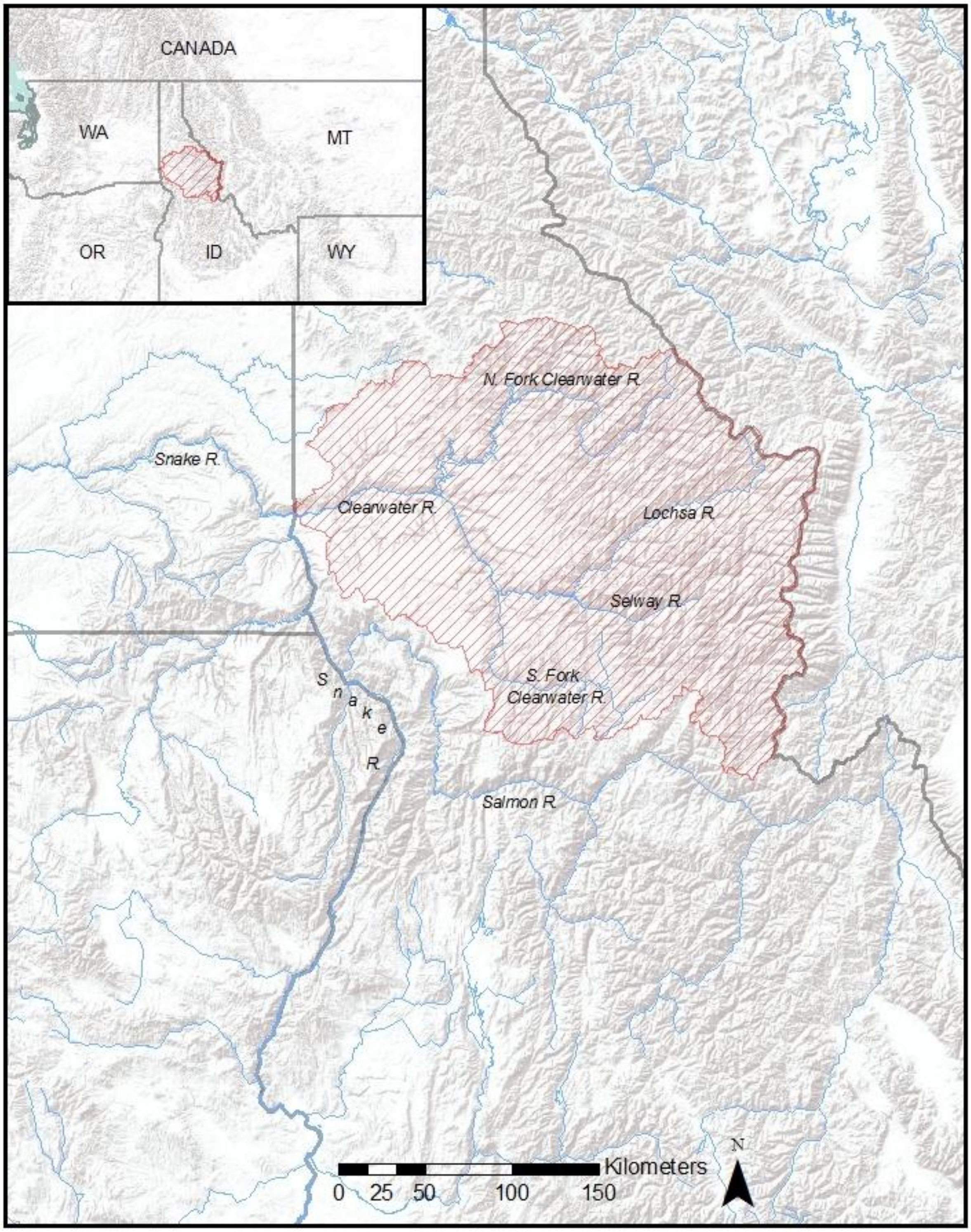

Figure 2. Location of the Clearwater River Region.

Years Before Present (BP)	**Paleoenvironments (Draper and Olson 1990)**		**Clearwater River Sequence (Sappington 1994)**	
	Period	**Paleoenvironment**	**Phase**	**Period**
Present	Late Holocene 4000 BP - present		Kooskia	Protohistoric Period ca. 500-200 BP
500				
1000			Ahsahka	Late Prehistoric Period ca. 3000-500 BP
2000		Modern climatic conditions (2500 BP); Douglas fir, hemlock, ponderosa pine		
3000		Cooler, moister conditions (after 4000 BP)		
4000		Moister (4300-4000 BP); sagebrush steppe contraction (4400 BP), conifer expansion (4000 BP)	Hatwai	Middle Prehistoric Period ca. 6000-3000 BP
5000	Mid-Holocene 7000-4000 BP			
6000				
7000		Arid (7000 BP); sagebrush expansion	Cascade and Windust	Early Prehistoric Period ca. 10,000-6000 BP
8000	Early Holocene 10,000-7000 BP			
9000		Increased temperatures (9000 BP); conifer expansion		
10,000				

Figure 3. Clearwater River region cultural sequences with paleoenvironments.

1994). Camp inhabitants were probably a few families who shifted residence in response to food availability. Constructed features during this period include hearths, living or occupational surfaces, and disposal areas for waste material (e.g. boiling baskets (Sappington 1994).

Both Windust and Cascade phases co-occur at sites along the Clearwater River (Sappington 1996). Sites in the Clearwater region with early prehistoric components include Hatwai, which contains the largest early period assemblage of Windust and Cascade tools, as well as Lenore, Spalding, and several sites on the North Fork of the Clearwater and Lochsa rivers (Sappington 1994).

The Windust phase toolkit reflects a broad-spectrum foraging subsistence and included large shouldered and stemmed lanceolate projectile points, a variety of cobble tools, large lanceolate or oval knives, and modified flakes (Sappington 1994, 2010). The Cascade phase toolkit includes the lanceolate Cascade projectile point, edge-ground cobbles, large lanceolate and triangular knives, end scrapers, modified flakes, and a variety of cobble tools (Sappington 1994, 2010). These tools are thought to reflect a shift toward increased plant and aquatic resource utilization associated with a climatic warming trend (Sappington 1994, 2010).

Middle Prehistoric Period: Hatwai Phase (ca. 6000-3000 BP)

During the middle prehistoric period in the Clearwater region, settlement patterns became more sedentary, characterized by pit house villages. Subsistence practices underwent a shift toward increased utilization of plant and fish resources (Sappington 1996, 2010).

The middle prehistoric period on both the Clearwater and lower Snake rivers is characterized by pit house villages (Leonhardy and Rice 1970; Sappington 1994, 1996). The first pit house in the Clearwater region was found at Hatwai and dated to ca. 5900 BP (Ames 1981; Sappington 1994). Features encountered at middle prehistoric sites include pit houses, internal house features such as posts and storage pits, scatters of charcoal, processed bone, and other cultural material, as well as hearths and other features not associated with houses (Sappington 1994).

The Hatwai toolkit includes tools associated with hunting, butchering and game-processing, hide-working, fishing, and plant-processing (Sappington 1994). Large side-notched points were found only during the early part of the Hatwai phase, while large stemmed or large corner-notched projectile points became common later in the Hatwai phase. Fishing technology, such as leister barbs, gorges, and net sinkers, indicates several fish-procurement methods were being utilized, while plant-processing tools, such as edge-ground cobbles, mortars, and pestles, indicates plant-processing was widespread during the middle prehistoric (Sappington 1994).

Late Prehistoric Period: Ahsahka Phase (ca. 3000-500 BP)

The late prehistoric is the best-known and most accurately dated period in the Clearwater region (Sappington 1994). By this period, the construction of pit houses and village settlement patterns had become widespread and many aspects observed ethnographically emerge (Longstaff 2013; Sappington 1994). Ahsahka phase activities include tool manufacture, hunting, fishing, and intensified utilization of plant resources (Sappington 1994).

Late prehistoric occupations have been found directly above middle prehistoric occupations, indicating continued occupation (Sappington 1994, 1996). Features are common during the Ahsahka phase and include pit houses, house furniture such as mortars and anvils, storage pits, and hearths (Sappington 1994). Houses appear to have been similar to ethnographic mat lodges (Sappington 1994).

During the late prehistoric, hunting technology shifted toward smaller projectile points associated with the bow and arrow. Few Ahsahka phase sites have points associated with spears or atlatls. Instead, projectile point style is variable and includes corner-notched, side-notched, base-notched, and stemmed, with small corner- and side-notched being the most common (Sappington 1994, 1996).

In the Clearwater region, hunting and processing tools are more common than faunal remains, possibly due to poor preservation and cultural practices including the pulverization and cooking of bone fragments for marrow or grease extraction (Sappington 1994). Technology associated with fishing and plant-processing are widespread during this period, indicating the importance of fish and plant resources. Tools associated with plant processing include mortars, pestles, anvils, and *tukes* (digging sticks), but edge-ground cobbles are absent (Sappington 1996).

Protohistoric Period: Kooskia Phase (ca. 500-200 BP)

The protohistoric period was brief, but a time of drastic cultural change. The protohistoric period is accompanied by the introduction of the horse between AD 1700 and 1730 and the appearance of European or Euroamerican trade materials (Sappington 1994). European/Euroamerican-introduced diseases were responsible for a 50% reduction in population on the Columbia Plateau (Sappington 1994). It is possible that this depopulation led to the loss of many aspects of traditional lifestyles and the development of new social systems (Sappington 1994).

Many protohistoric sites in the Clearwater River region are ethnographic villages (Sappington 1994). With the exception of Euroamerican goods, artifacts from the Kooskia phase are similar or identical to artifacts from the Ahsahka phase (Sappington 1996). Numerous projectile point styles co-occur, with the most common type being small side-, corner-, and base-notched points (Sappington 1994). Net sinkers, mortars, pestles, and *tukes* are found during this time as well. Kooskia phase burials have more grave goods than seen during the previous phases (Sappington 1996).

Cultural Setting

The Columbia Plateau spans the area between the Cascade Range on the west, the Rocky Mountains on the east, the Blue Mountains and Salmon River on the south, and the northern extent of the Rocky Mountains and the Columbia River (Walker 1998a). The Columbia Plateau has been recognized as a distinct culture area since 1896 and is generally subdivided into the Northern Plateau of south-central British Columbia and north-central Washington State and the Southern Plateau (Pokotylo and Mitchell 1998; Sturtevant 1998).

More than twenty groups inhabited the Plateau (Fig. 4), each with a similar cultural pattern (Walker 1998a). The two major language groups of the Plateau were Salishan, spoken in the northern portion of the Plateau, and Sahaptian, spoken in the southern Plateau (Kinkade et al. 1998). Components characteristic of the ethnographic pattern on the Plateau include subsistence centered on the intensification and storage of anadromous fish, ungulates, and

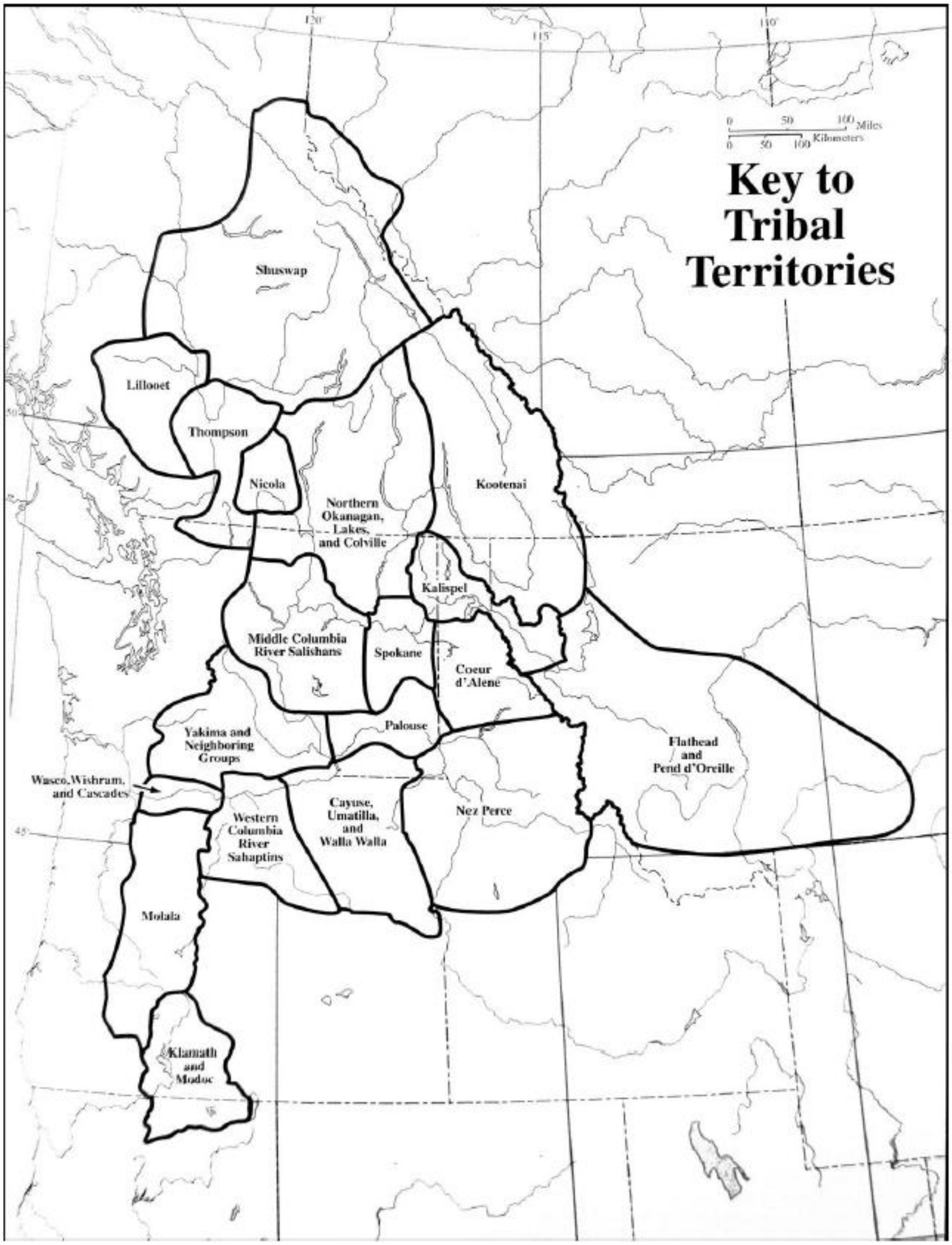

Figure 4. Key to Tribal Territories of the Plateau Culture Area (adapted from Walker 1998: ix).

roots; semisubterranean housepits with winter housepit villages; and high mobility dependent upon stages in the seasonal subsistence cycle (Chatters and Pokotylo 1998).

The Clearwater River region of north central Idaho represents a distinct cultural region within the southern Columbia Plateau cultural area (Sappington 1994a; Sappington 2010). Elevation ranges from ca. 225 meters above sea level (ASL) at the confluence with the Snake River to over 2743 meters ASL at the crest of the Bitterroot Range (Sappington 2010; Sobota 2001). Humans have lived in the Clearwater River basin and adjacent lower Snake River region for at least 10,000 years BP (Sappington 1994a; Sappington 2010; Sobota 2001).

This region is ethnographically and historically part of the territory of the Nez Perce Indians who inhabited approximately 70,200 square kilometers (27,000 square miles) across north-central Idaho, northeastern Oregon, and southeastern Washington (Fig. 5) and who had population concentrations all along the river corridor (Ames 1981; Josephy 2007; Marshall 1977; Schwede 1966; Sappington 1994a). Bands of Nez Perce extended approximately 80 miles down the Snake River from present-day Lewiston, ID, as well as along the Salmon, Grande Ronde, and Imnaha rivers, and Wallowa country of northeastern Oregon (Josephy 2007; Spinden 1964).

Craig Mountain (*Lok-ka-mah-sam*) divided the Nez Perce into two major groups: those living west of the mountain (*Pu-nim'-moo*) and those living east of the mountain (*Na-ki-ma*). Each division was subdivided into smaller groups with each group having a number of villages, and each village being the home of a band or clan (Sappington et al. 1995). In 1891, Alice Cunningham Fletcher and Billy Williams (*Kew-kew'-lu-yah*) recorded the names and locations of 78 villages (Sappington et al. 1995). These villages were divided into 12 groups, each with a unique name, with six groups belonging to the *Pu-nim-moo* division, three groups

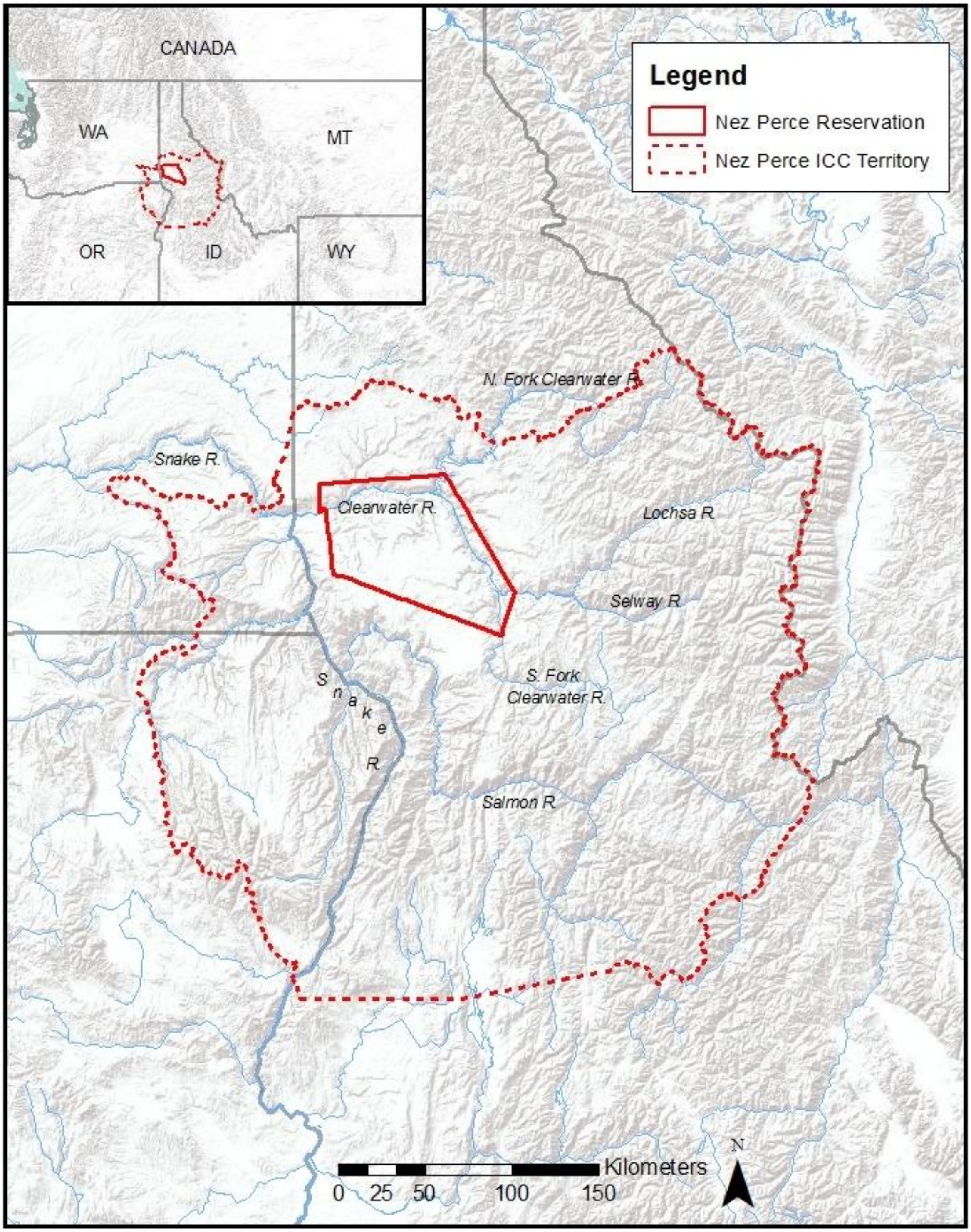

Figure 5. Map of the current Nez Perce Reservation and Nez Perce Indian Claims Commission territory.

belonging to the *Nak-ki'-ma* division, and three groups whose names have been lost but which were dependent on both west and east groups (Sappington et al. 1995). Nez Perce villages were usually located along the river near the mouth of an adjoining stream (Sappington et al. 1987; Spinden 1964) or on islands in the river (Spinden 1964), while temporary camps were usually situated at higher elevations where upland fishing, hunting, or root digging activities occurred (Walker 1998b).

Nez Perce Seasonal Subsistence Cycle

The Nez Perce practiced a seasonal subsistence cycle, or seasonal round (Ames 1981; Walker 1998b). During the late fall and winter, the Nez Perce congregated in winter villages in the river canyons (Sappington 1994; Walker 1998b). Villages primarily consisted of lodges with subterranean foundations and a pole framework overlaid with grass/bark/reed mats, skins, and/or layers of earth (Josephy 2007; Sappington et al. 1987). Lodges could house several families, and the largest were capable of housing an entire village (Josephy 2007). Villages also contained menstrual huts, sweathouses, and semi-subterranean dormitories (Josephy 2007). Winter hunting consisted of individual deer hunting and communal deer drives, however, fish made up the bulk of the winter food supply (Sappington et al. 1987).

Early spring subsistence activities included hunting (via communal drives), canoe trips down the Snake and Columbia rivers for early salmon runs, and gathering early root crops (Walker 1998b). During the spring, salmon runs were fished and low elevation roots gathered (Walker 1998b). Temporary upland camps were used during midsummer for hunting, fishing, and plant-gathering, though sometimes the winter village site served as the base camp for fishing activities (Sappington et al. 1987; Walker 1998b). Salmon and steelhead fishing was the major subsistence activity during late spring and early summer, with salmonids comprising up to 50% of the diets of some Nez Perce (Marshall 1977; Sappington et al. 1987). During the summer, the Nez Perce traveled between fishing camps and root and berrying grounds (Sappington et al. 1987). Plant resources are thought to have comprised around 30-40% of the Nez Perce diet (Marshall 1977). Root crops were the most important plant resource and large groups of Nez Perce (and sometimes bands from several tribes) would congregate to gather them (Marshall 1977; Sappington et al. 1987). Important root crops include camas (*qém̓es*), kouse (*qá·msit*), bitterroot (*łit̓á·n*), and wild carrot (*ilqú·lx*), while important berries include serviceberries (*kayapásx*), chokecherries (*tíms*), gooseberries (*pílus*), and huckleberries (*cemí·tx*) (Marshall 1977; Sappington et al. 1987).

During the fall, salmon fishing, hunting, and late plant-gathering occurred to build up winter food stores (Walker 1998b). Hunting was practiced almost constantly, except during the peak of salmon season (Josephy 2007; Walker 1998b).

Nez Perce Hunting

Many species of game occurred prehistorically throughout Nez Perce Territory (Table 2). The principal big game included deer, elk, bighorn sheep, mountain goat, moose, bison, pronghorn, and black and grizzly bear. Grouse, and various species of waterfowl were also hunted (Josephy 2007; Marshall 1977; Sappington 1994; Sappington et al. 1987).

Table 2. Common, scientific, and Nez Perce names for select regional taxa.

Common Name	Taxonomic Name	Nez Perce Name*
Cottontail rabbit	*Sylvilagus nuttallii*	hé·y̓uxc (rabbit)
Weasel	*Mustela* spp.	c̓ílile· (weasel), ku·cpú· (mink)
Hare/Jackrabbit	*Lepus* spp.	wilá·lix (jackrabbit)
Striped skunk	*Mephitis mephitis*	tískeˀ
Marmot	*Marmota* spp.	ˀisqó·y̓qoy̓/cé·xcem
Fox	*Vulpes* spp.	tilípexiˀ/tilípeˀ
Raccoon	*Procyon lotor*	k’ayk’áyoc
Porcupine	*Erethizon dorsatum*	sác̓as
Bobcat/Canada Lynx	*Lynx rufus*	qéhep
Coyote	*Canis latrans*	ˀiceyé·ye
Beaver	*Castor canadensis*	táx̣cpol
Gray wolf	*Canis lupus*	hími·n
Pronghorn	*Antilocapra americana*	coq̓aláynin’ (f), lak’á·lix (m)
Mountain Lion	*Puma concolor*	k’oy̓am̓á
Deer	*Odocoileus* spp.	ˀímes
Deer, mule	*Odocoileus hemionus*	yeˀémes (f), té·wisi·n/té·wis (m)
Deer, white-tailed	*Odocoileus virginianus*	tatáp̓ay (f), tip̓í·tawisi·n /té·wis (m)
Bighorn sheep	*Ovis canadensis*	hiyé·te (f), tin’ú·n (m)
Bear, black	*Ursus americanus*	yá·kaˀ
Bear, grizzly	*Ursus arctos*	x̣áx̣·c
Elk	*Cervus elaphus*	tasí·px/tasí·pk (f), wewúkiye (m)
Bison	*Bison bison*	qoq̓á·lx̣

*Nez Perce names are adapted from Aoki 1994.

Hunting comprised 15-30% of the Nez Perce yearly diet (Marshall 1977). Three classes of animals were hunted: "hoofed animals" (*wu·líwetelikin*), "pawed, furry animals" (*ceptu·télikin*), and "flying animals" (*weyu·télikin*) (Marshall 1977). Hoofed animals were hunted extensively, while the other two animal classes were hunted opportunistically. Large "pawed animals" were generally hunted as part of a ritual rather than for meat, but their meat was eaten (the exception seems to be bear, but sources are unclear) (Marshall 1977). Non-ungulates hunted included black and grizzly bear, rabbit, squirrel, badger, and marmot (Walker 1998b).

The "hoofed animals" (*wu·líwetelikin*) class was the most intensively utilized and was further subdivided into "edible hoofed animals" (*ˀímes*) and "inedible hoofed animals," the latter category included only the horse (*síḱ̲em*). Edible ungulates included elk (*Cervus elaphus*, *wewúkiye*), mule deer (*Odocoileus hemionus*, *té·wisi·n*), white-tailed deer (*O. virginianus*, *tip̓í·tawisi·n*), bighorn sheep (*Ovis canadensis*, *tin'ú·n*), mountain goat (*Oreamnos americanus, c̓ax̣í·sx̣is*), moose (*Alces alces, sá·slaqs*), bison (*Bison bison, qoq̓á·lx̣*) and pronghorn (*Antilocapra americana*, *lak'á·lix*) (Aoki 1994; Marshall 1977).

Mule deer, white-tailed deer, and elk were the most intensively hunted species. All three species winter in lower elevations and move to higher elevations during the summer as browsing opportunities increase (Marshall 1977). Hunting intensity varied throughout the year and was lowest during times of high salmon fishing and root gathering activity and highest during the late summer through early fall (Marshall 1977). Deer were hunted most extensively during the fall when they were migrating between high and low elevations (Sappington 1994; Sappington et al. 1987). The Nez Perce burned the winter range of cervids to increase winter browse (Marshall 1977).

Bison were hunted on the Palouse (until their disappearance around AD 1770), on the Columbia plains, and on the northern and western fringes of Nez Perce territory (Josephy 2007). Bison were also hunted in the northern Great Plains and in southeastern Oregon and on the Snake River plain of southern Idaho until their disappearance around AD 1845 (Josephy 2007). The acquisition of the horse in the mid-1700s allowed bison hunting excursions in the Great Plains to be made more quickly, and horses provided a more successful method of hunting bison. Nonetheless, bison meat was rarely brought back from the plains (Sappington et al. 1987; Walker 1998b). Deer and elk were hunted from horseback as well (Spinden 1964).

The Nez Perce employed a variety of hunting methods, including the use of communal encirclement methods to flush out game, using decoys and scarecrows to move animals into areas where they could be easily killed, game drives, ambushing (primarily used on bison in pre-horse times), nets and nooses, and the use of deadfalls (Josephy 2007; Walker 1998b). Game could also be stalked by hunters wearing antlers and skins (Josephy 2007).

Game drives, used primarily for deer, involved the use of long, converging wings of materials and debris with a narrow opening with concealed hunters nearby or lines of hunters ca. 60 yards apart (Spinden 1964). Decoys were used to hunt deer, bighorn sheep, and wolves and consisted of the stuffed head and attached cape of an animal placed over the head of the hunter. Elk whistles made from elderberry wood were used to hunt elk, deadfalls were used for coyotes and wolves, rabbits were rounded up in drives (on the hills near the Snake River), and small game was caught with a running noose (Spinden 1964). Deer and elk were stalked at salt licks, watering holes, and along game trails (Josephy 2007). Hunting implements included spears and bows and arrows, with arrows sometimes being tipped with rattlesnake venom (Walker 1998b).

Nez Perce Mammal Processing and Use

After an ungulate was killed, it was unjointed, the legs removed, and the back cut into a couple large pieces with the head remaining attached to the skin. Most mammals were skinned and the hides were either dressed immediately or cleaned and dried for future dressing (Spinden 1964).

Meat was ground with stone pestles and mortars of stone, wood, or basketry (Josephy 2007; Walker 1998b), and baked in earth ovens, boiled with hot rocks in watertight baskets, or broiled on sticks or wooden frames inserted into the ground around fires (Josephy 2007; Spinden 1964; Walker 1998b). Bones were broken for marrow extraction (Sappington 2010). Small fawns were boiled whole, while deer, elk, and bison meat was dried for winter use (Spinden 1964). Otter and beaver were considered delicacies, but dogs were never eaten and horse was only eaten in times of famine (Spinden 1964).

The Nez Perce used bone, antler, and horn to make numerous implements. Bone was used to make awls, spearheads for fish spears, gouges, dice and gaming pieces, and beads (Spinden 1964). Digging stick handles and wedges were made from elk antler, and spoons and ladles were made of bison and bighorn sheep horns (Spinden 1964). Antler was also used as a hammerstone in flint-knapping activities. Spoons, bowls, and drinking cups were made of wood or bighorn sheep or bison horn (Harbinger 1964; Josephy 2007). Knives, wedges, axes, scrapers, and clubs were made from antler, bone, stone, and wood (Josephy 2007). The Nez Perce used bighorn sheep horn to made bighorn bows which were particularly strong and sought after by other tribes (Josephy 2007; Spinden 1964). Bighorn bows were made by removing a strip of horn which was steamed, stretched, and straightened, then attaching a backing of deer sinew with glue made from either winter steelhead skin or sturgeon blood (Spinden 1964). Bowstrings were made from twisted deer sinew (Spinden 1964). Bighorn bows were made until bighorn sheep became scarce in the area in the early 1800s (Josephy 2007).

Clothing was made from the hides of bighorn sheep, deer, elk, pronghorn, mountain goat, bison, wolf, bear, coyote, and smaller mammals (Josephy 2007). Everyday clothing was unornamented, but clothing for special occasions was decorated with polished elk teeth; beads or disks of bone, shell, or stone; dyed or natural porcupine quills; feathers; beaver teeth; and paint (Josephy 2007). Decorative accessories, such as sashes, bracelets, and neckpieces were made from ermine and otter skins; bear, eagle, and badger claws; pieces of fur; teeth; bones; and shells (Josephy 2007).

Men and women wove strips of otter or ermine fur into their braids (Spinden 1964). Men's ornaments included necklaces of bear claws, wolf teeth, and deer hooves (Spinden 1964). Otter skin collars were worn by men over the tops of deerskin shirts (Spinden 1964). Men also had elaborately ornamented blankets prepared from an entire elk or bison skin (Spinden 1964). Women's gowns were made from two attached deer skins and could be ornamented with fringes, elk teeth, or dentalia shells (Spinden 1964).

Paint was made from the tallow of bear, elk, other mammals, or fish oil mixed with minerals, clays, and ochres (Josephy 2007). Rattles were made from a wooden handle wrapped in deerskin with attached deer hooves or a bag of rawhide with stones (Spinden 1964). Drums were made from rawhide as well (Spinden 1964).

Chapter 3. Archaeological Setting

Summary of Archaeological Sites Used in this Study

This section presents summaries of the 20 archaeological sites that contain zooarchaeological assemblages in the Clearwater and lower Snake River regions of Idaho (Fig. 6). As sites in the region span different time periods (Fig. 7), this section is intended to place faunal assemblages recovered from each site into an appropriate cultural context. Interpretations of faunal remains within these sites can be found in chapters 4 and 5.

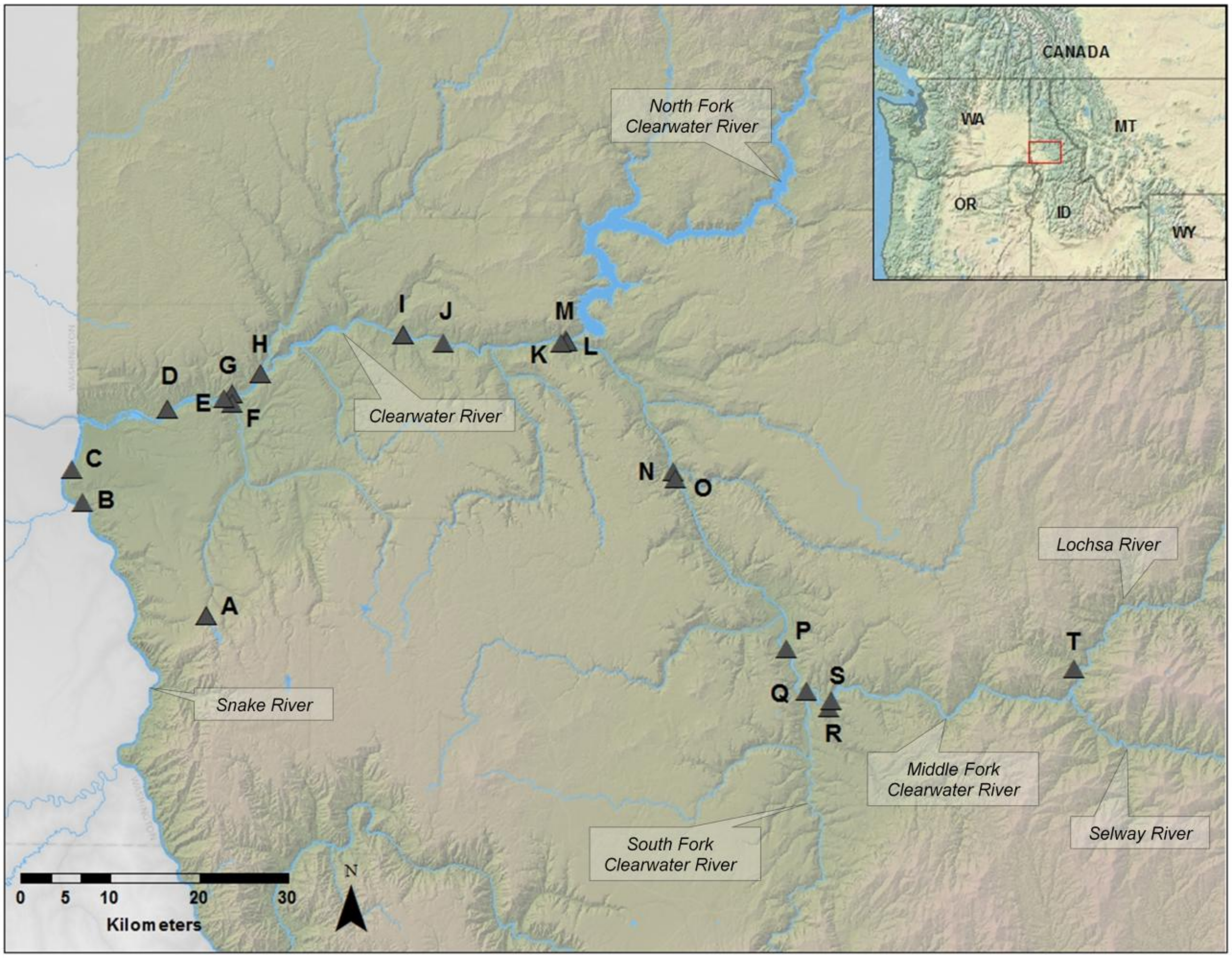

Figure 6. Map of Idaho showing locations of archaeological sites where faunal remains were recovered (triangles). Site key: A: Sweetwater Springs; B: Red Elk Rockshelter; C: *Wewukiyepuh*; D: Hatwai; E: *Qi·ˀtípa* F: North Lapwai Valley; G: Spalding; H: Arrow Beach; I: Lenore; J: *We'eptes Pa'axat*; K: Canoe Camp; L: Ahsahka; M: Clearwater Fish Hatchery; N: *Lolonima'puh*; O: *Piik'uh taxxsawxt*; P: Waterline Trench; Q: Kooskia Bridge; R: *Kam'-nak-ka*; R: *Tuhkaytahs'peh*; T: Pete King Creek. Sites A through M are included in the downriver region while sites N through T are included in the upriver region.

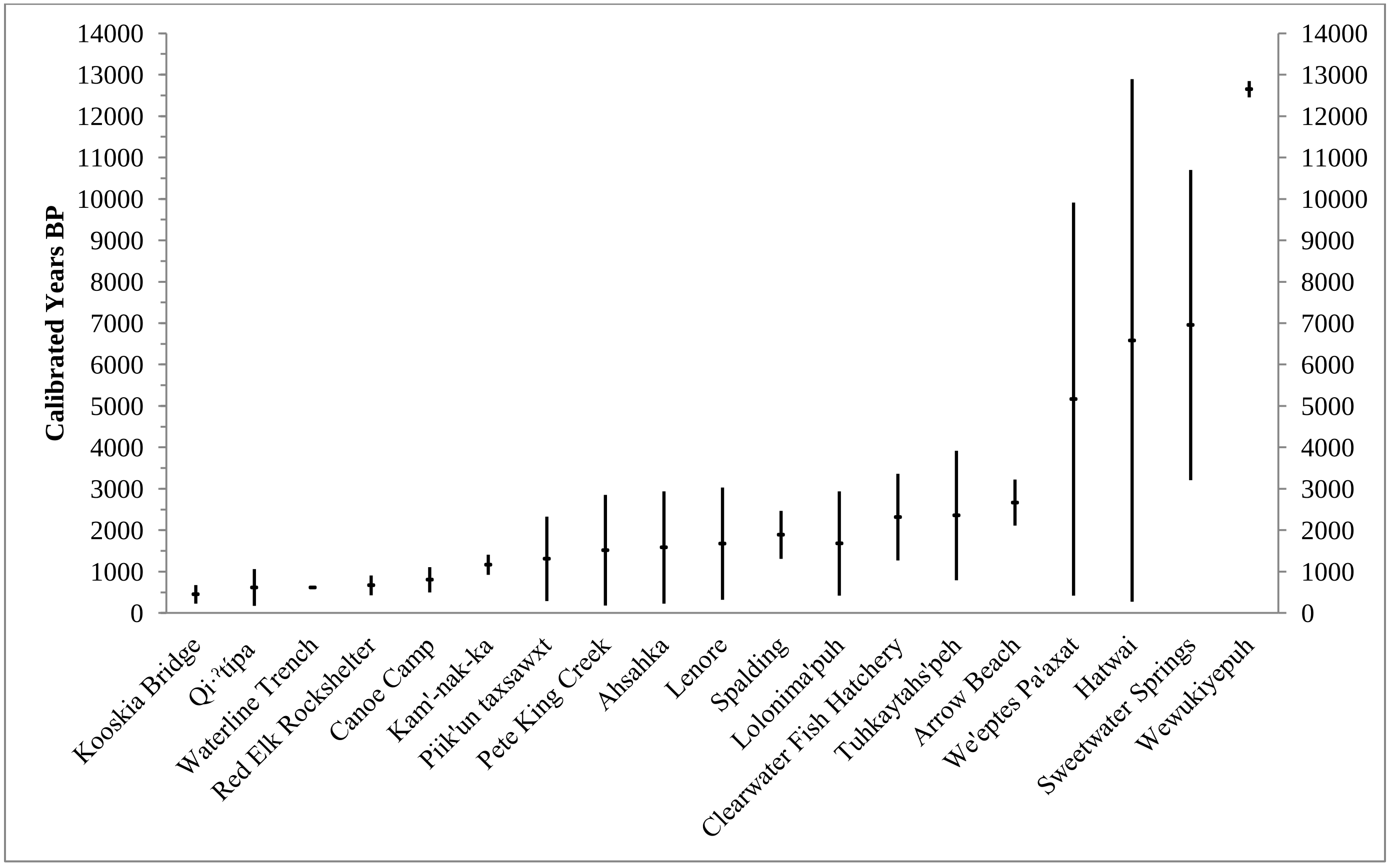

Figure 7. Age ranges of 19 archaeological sites in calibrated years B.P. One site (North Lapwai Valley) is not represented.

10-CW-4: Clearwater Fish Hatchery

Investigations:

Test excavations were conducted at the Clearwater Fish Hatchery site (10-CW-4) by personnel from the University of Idaho in the summer of 1987, from summer 1988 to February 1989, in December of 1989, and a more extensive excavation from January to April of 1990. Excavations involved trenches, five 1x1 meter test units, 18 1x2 meter units, and 52 2x2 meter units. All sediment was screened through 1/8 inch wire mesh. Sediment from features was collected for fine screening in the laboratory (Sappington 1991).

Prehistoric Occupation:

The Clearwater Fish Hatchery site and the site at Ahsahka (10-CW-5) were part of a single ethnographic village, *Acqa?a'wawi*, which was occupied by the *Atskaaiwawipu* band of the Nez Perce for approximately 3000 years (Sappington 1991). Radiocarbon dates indicate the site was primarily occupied during the late prehistoric period (Ahsahka phase), while the earliest date suggests the site was first occupied during the latter part of the middle prehistoric (Hatwai phase) period around 3359-2996 BP. Features encountered (n = 21) primarily consisted of hearths and activity areas, but several house floors were exposed in cross-section. Features within the house floor included hearths, food processing areas, tool caches, and other activity areas. Analyses based on the distribution of features and cultural materials within the house indicated the house was occupied by two families (Sappington 1991).

Artifacts indicate activities associated with food- and hide-processing, tool production by men, women (pestle blank), and children (based on the high degree of manufacturing errors). Micropoint preforms and micropoints are also present at the Clearwater Fish

Hatchery site which could provide evidence of toys made for, or by, children (Sappington 1991).

Faunal Remains:

Faunal analysis for the Clearwater Fish Hatchery site was conducted by Deborah Olson. Faunal remains were highly fragmented and exhibited an absence of both low-survivability elements, such as vertebrae, ribs, proximal femur and humerus, and "fragile" taxa, such as small game, fish, and birds, indicating the environmental conditions were not conducive to preservation of faunal material. Only 6.8% of the faunal assemblage was identifiable to at least the family level. The majority of the remains were unburned (88%) and unmodified (54%). Faunal remains were recovered from 11 of the 21 features. Cultural modification of the faunal remains includes cut marks, historic saw marks, and impact fractures; the latter probably related to marrow extraction (Sappington 1991).

10-CW-5: Ahsahka/Acqa?áywawi

Investigations:

Limited test excavations were conducted at Ahsahka during the construction of the Dworshak National Fish Hatchery by personnel from Idaho State University in 1967 and again by personnel from the University of Idaho in 1987 in response to a proposed construction project. All material was screened through 1/8 inch wire mesh. The majority of cultural materials pertained to the prehistoric occupation of the site (Sappington, Cochran, and Leonhardy 1987; Sappington, Cochran, and Sprague 1987).

Prehistoric Occupation:

Radiocarbon dates indicate the site was primarily occupied during the late prehistoric period (Ahsahka phase) with some features spanning both later prehistoric and protohistoric (Kooskia phase) periods. Twelve features were found during the test excavation at Ahsahka, including a house pit with internal features, four hearths, a cobble tool manufacturing area on the floor of a house, a concentration of tightly grouped, unburned talus rock either representing a burial in which the remains decomposed completely or a food cache, a tool cache within the house pit, two depressions, one concentration of fire broken, and one feature which represented a historic disturbance into another feature. One hearth represented an area of repeated occupation and provided the highest concentration of cultural material at the site; the high frequency of burned rock indicated extensive cooking (or heating stones for sweating). A unique find at the site was a group of Desert Side-Notched points common to the Great Basin which are not frequently encountered in the Columbia Plateau (Sappington, Cochran, and Leonhardy 1987; Sappington, Cochran, and Sprague 1987).

Faunal Remains:

Faunal analysis at Ahsahka was conducted by Leslie J. Tevebaugh. The faunal assemblage was highly fragmentary with only 7.3% of the faunal remains identifiable to at least the family level. Only dense bone, such as limb fragments and teeth, were preserved at Ahsahka. The fragmentary nature was partly attributed to breakage during butchering, processing, and cooking. In addition, Ahsahka is an open-air site and the soil composition negatively impacted preservation (Tevebaugh 1987).

10-CW-25: Canoe Camp

Investigations:

Archaeological testing and reconnaissance was conducted at Canoe Camp by University of Idaho personnel from May 1988 to February 1994. Investigations included 132 auger holes and four 1x1 meter test units; additional auger hole testing was conducted in 1990, 1992, 1993, and 1994. All material was screened through 1/8 inch mesh, while the upper 20 centimeters of material was screened through 1/16 inch mesh to enhance the recovery of glass beads (Sappington 1994b; Sappington and Wegars 1988). Additional excavations were conducted in 2003-2005 by the Nez Perce Tribe Cultural Resource Program (Lyon n.d.).

Prehistoric Occupation:

Radiocarbon dates suggest Canoe Camp was occupied during the late prehistoric period. Canoe Camp probably represents a village due to the presence of one house pit and the possible existence of several others. No evidence was found of contact-period or historic Nez Perce occupation (Sappington 1994b, Sappington and Wegars 1988).

Features found at Canoe Camp during the 1988 and 1990 investigations include one house pit (cal. 666 BP), one probable house pit, one probable house floor, a cluster of fire-cracked rock, and other concentrations of fire-cracked rock (Sappington 1994b). The 2003-2005 excavations resulted in the identification of three features (all with associated radiocarbon dates), including a probable game processing area, an occupational surface, and the remains of charred wood probably representing a natural fire (Lyon n.d.). Lithic artifacts indicate activities at Canoe Camp included stone tool manufacture and modification, hunting, meat- and hide-processing, and fishing (Sappington 1994b).

Faunal Remains:

Faunal analysis at Canoe Camp was conducted by Robert Lee Sappington and Priscilla Wegars in 1988 and Deborah Olson in 1990. Faunal remains were fairly common in both the auger holes and in the test excavation units during both the 1988 and 1990 investigations, but remains from both excavations were highly fragmented, probably as a result of cultural practices. Evidence of burning was present on 58.1% of the bone from the 1988 investigation. Nearly half of the faunal remains from the 1990 excavation, including deer and pronghorn elements, came from the house pit. It was assumed that all faunal remains represented prehistoric occupation of the site with the exception of two bones that exhibited saw marks (Sappington 1994b).

10-IH-453: Pete King Creek

Investigations:

Pete King Creek was recorded in 1966 as a house pit village. Archaeological excavations were conducted by University of Idaho personnel from 1984 to 1985 (24 1x1 meter units) and 1988 (17 2x2 meter units all excavated to sterile deposits). All material was screened through 1/8 inch mesh hardware cloth. The majority of recovered cultural materials were related to the prehistoric component of the site (Sappington and Carley 1989).

Prehistoric Occupation:

Radiocarbon dates suggest Pete King Creek was occupied ca. 2800-310 years ago. Fifteen features were encountered at the site and include hearths, a feature associated with plant-processing, a feature associated with baking or roasting activities, a feature associated with lithic production, and two features which exhibited historic disturbance. The lithic assemblage from Pete King Creek indicates activities centered around the acquisition of local cores (granitic, metamorphic, and quartzite) and projectile point manufacture (Sappington and Carley 1989).

Faunal Remains:

Faunal analysis at Pete King Creek was performed by Deborah Olson. Faunal remains were widespread, but all elements were extremely fragmentary with only 2.8% of the assemblage identifiable to at least the family level. The majority of the faunal remains from the 1988 excavation were unburned (64.3%) and exhibited weathering, while remains from the earlier excavation exhibited more burning (55.3%). Some fragments displayed cut marks, two fragments exhibited blue-green staining associated with copper, and two displayed saw marks associated with the historic occupation of the site. Several types of faunal remains were associated with features, but elk elements were the only species identified. Elk were found in association with a hearth and a baking/roasting feature (Sappington and Carley 1989).

10-IH-820: Looking Glass' Village, Kam'-nak-ka

Investigations:

The three archaeological sites that comprise *Kam'-nak-ka* (10-IH-820, 10-IH-2213, and 10-IH-2214) are located on property owned by the Kooskia National Fish Hatchery (KNFH). Site 10-IH-820 was recorded in 1978, based on ethnographic information. Archaeological investigations took place in 1993 in response to the exposure of cultural material during placement of a pipeline. The University of Idaho and Nez Perce tribal members began investigations in spring 1993 with 12 1x1 meter test units and 128 auger holes excavated in proximity to the pipeline route. Two additional sites, 10-IH-2213 and 10-IH-2214, were located during intensive surveying of the remainder of the KNFH property. Data recovery excavations were conducted with an additional 11 2x2 meter and three 1x2 meter units. In 1997, nine 1x1 meter units and 276 auger holes were excavated in proximity to nearly every infrastructural element of the hatchery. Sediment was screened through 1/8 inch screen and sediment from the 1x2 meter and 2x2 meter units were waterscreened through 1/16 inch mesh (Sappington et al. 1997, Sappington and Evans-Janke 2002).

Prehistoric Occupation:

Investigations suggested *Kam'-nak-ka* was initially occupied as an intermittent camp around 4500 BP. Increasing amounts of cultural material and features suggest site use shifted to a village around 3500 BP. Some features encountered at *Kam'-nak-ka* include a hearth, an oval concentration of cobbles with associated lithics, nine concentrations of fire-cracked rock with associated lithics and faunal remains, an oval concentration of cobbles with associated lithics, and a shallow cluster of fire-cracked rock with an associated core and debitage. A possible house was also encountered, based on the presence of a mortar base and adjacent pestle. A cache of elk and deer antler tools and unmodified antler fragments was found 110-120 centimeters below the surface, and included three digging stick handles and two wedges (Sappington et al. 1997; Sappington and Evans-Janke 2002).

Lithic tools encountered at the site suggested activities associated with hunting, plant-processing (edge-ground cobble, pestles), fishing (net sinkers/net sinker blanks), hide/leather working (perforators), wood and/or bone working (scrapers and spokeshaves), ritual or recreational activities (pipes), wood/bone tool manufacture (shaft abrader and shaft polisher), and lithic tool manufacture or toolkit rejuvenation (debitage, cores, point/preforms)

(Sappington et al. 1997; Sappington and Evans-Janke 2002). In addition, 46 bone tools, tool fragments, or possible waste from bone tool-making were identified. Bone tools included awls (n = 8), scraping tools (n = 5), a gaming piece fragment, a probable bead fragment, a possible bead or whistle fragment, and nineteen antler tools including wedges, wedge fragment, a flaking tool, and three digging stick handles (Sappington et al. 1997; Sappington and Evans-Janke 2002).

Faunal Remains:

Faunal remains from the 1993 excavation were analyzed by Deborah L. Olson, while faunal remains collected in 1997 were not analyzed extensively due to their small number and fragmented condition. However, preliminary analyses from the 1997 faunal assemblage identified jaw fragments from deer and elk and a Cervidae vertebrae.

While preservation at the site appeared to be good, only 5.3% of the assemblage was identifiable to at least the family level (2.4% to genus-level). The low number of identifiable specimens was attributed to the high degree of fragmentation indicative of intensive processing for marrow extraction. The majority of the assemblage (n = 5316 or 72.2%) was unburned, while other remains were calcined (n = 833 or 11.3%), partially burned (n = 792 or 10.7%), or completely burned (n = 426 or 5.8%). Cultural modifications were present on 5.7% (n = 422) of the assemblage, with most modifications associated with subsistence activities. Evidence for butchering and marrow extraction included cut marks (n = 187), scrape marks consistent with removal of the periosteum prior to breaking for marrow extraction (n = 6), bone flakes/impact fractures indicative of marrow extraction (n = 196), and an historic saw mark (n = 1) (Sappington et al. 1997; Sappington and Evans-Janke 2002). Nine features contained faunal remains which consisted of concentrations of fire-cracked rock with associated lithics and faunal remains. Faunal remains associated with one feature exhibited crushing. Species represented in features included deer, elk, bear and bighorn sheep; small, medium, large, medium/large, and undetermined mammals were also present (Sappington et al. 1997; Sappington and Evans-Janke 2002).

10-IH-1009: Tuhkaytahs'peh

Investigations:

Tuhkaytahs'peh was originally reported in 1891 as a former Nez Perce village site (*Tuck-ae-tack 'poo*). Personnel from the University of Idaho, Clearwater National Forest, and Nez Perce tribal members began archaeological testing at *Tuhkaytahs'peh* in the fall of 1990, with in-depth investigations occurring in September of 1992 and May of 1993 involving six 2x2 meter units and one 2x12 meter trench. All sediment was screened through 1/8 inch mesh (Sappington 1991a; Sappington and Olson 1994).

Prehistoric Occupation:

The earliest date and larger stemmed points indicate the initial occupation of *Tuhkaytahs'peh* occurred during the middle prehistoric period (ca. 3700 BP) as a hunting camp, as only projectile points and faunal remains were recovered in the lower levels. The site was reoccupied, or continuously occupied, in the late prehistoric as indicated by the construction of a pit house. A second pit house was constructed much later in the site's occupation.

A probable house floor, based on a concentration of mortar bases, was encountered during the testing phase. Features encountered during the 1992-1993 excavation included a house pit rim, a dense concentration of fire-cracked rocks with associated tools and mortar bases, an internal hearth on the floor of a second house (ca. 3300 BP), an oval concentration of fire-cracked rock which appeared to represent heated cobbles placed into a pit, a concentration of fire-cracked rock, and a small concentration of fire-cracked rocks in a pit (Sappington 1991a; Sappington and Olson 1994).

Faunal Remains:

Faunal analysis at *Tuhkaytahs'peh* was performed by Deborah Olson. Faunal remains at the site were highly fragmentary. Evidence of burning was present on 51% of the assemblage. Cut marks (n = 24) and impact fractures (n = 64) were also present, while historic saw marks (n = 6) were present on fragments in the upper levels. Nine bone tools were also recovered from the site (Sappington and Olson 1994).

10-IH-1395: Kooskia Bridge

Investigations:

Excavations at the Kooskia Bridge site occurred in 1982 and 1985 by a crew with members from the University of Idaho, Washington State University, and Nez Perce tribal members. In 1982, a backhoe was used to remove gravel fill placed at the site in the early 1960s by the Idaho Transportation Department (ITD). The initial backhoe trench indicated the existence of cultural deposits below the gravel fill. Two additional backhoe trenches were excavated and the trench lines were divided into 35 units each 1 meter in length and between 50 and 70 centimeters in width. The 1985 excavations were conducted in response to the planned construction of a bridge and boat ramp. A backhoe was used to remove fill and 12 2x2 meter excavation units. Sediment from both excavations was screened through 1/8 inch wire mesh (Sappington and Carley 1987).

Prehistoric Occupation:

Analysis of projectile points suggests a late prehistoric occupation. There is ethnographic evidence the area was occupied during the winter. Some features encountered at the Kooskia Bridge site included a house pit associated with deer, bear, other mammal, and fish remains; a house floor; an occupation surface/scattered hearth; and two hearths or ovens with associated faunal remains. The frequency of fire-cracked rock associated with features and the house pit indicated considerable use of fire for cooking or heating. Activities that took place in or near the house pit included refuse disposal, manufacture of cobble tools, toolkit maintenance and rejuvenation, and faunal processing (Sappington and Carley 1987).

Faunal Remains:

Faunal remains from the Kooskia Bridge site were analyzed by Leslie J. Tevebaugh. The 1982 assemblage included 207 very fragmented remains which were excluded from my analyses as the number of identified specimens was not given for identified remains. Only 6% of the 1985 faunal assemblage was identifiable due to activities related to butchering and marrow extraction. The presence of fish remains (n = 5) and freshwater clam shells suggest preservation at the site was relatively good. Cultural modifications were present on 40% of the assemblage and were limited to cut marks and burning. At least one of the two *Ursus* individuals identified was a juvenile (Sappington and Carley 1987).

10-IH-1948: Kamiah Waterline Trench

Investigations:

The Kamiah Waterline Trench site was located in the vicinity of an ethnographic Nez Perce village (*Te-sy'yak-poo/Tisaiyux'peh*). Excavations were conducted at the Kamiah

Waterline Trench in fall 1990 in response to the exposure of cultural material by the construction of a waterline. Personnel from the University of Idaho excavated six 1x1 meter units and all sediment was screened through 1/8 inch wire mesh (Sappington 1991b).

Prehistoric Occupation:

Temporally diagnostic artifacts and one radiocarbon date indicated the Kamiah Waterline Trench site was occupied during the late prehistoric period. Fire-cracked rock was common and recovered in all units and in association with faunal remains and other artifacts indicating cooking and food processing activity occurred at the site. Recovered artifacts indicate other activities associated with hunting, hide-processing, fishing, and lithic tool manufacture. The presence of a mortar base at the site indicated the presence of a house. Features present at the site included a large hearth or oven with associated faunal remains and lithics, a pit in the hearth feature containing fragments of mammal bone (n = 11) thought to be associated with food processing and cooking activities, and a concentration of cultural material including lithics and faunal remains (Sappington 1991b).

Faunal Remains:

Faunal remains were analyzed by Robert Lee Sappington and confirmed by Deborah L. Olson. A total of 115 elements were recovered from the site. Faunal remains were highly fragmentary with only 13% (n = 15) being identifiable due to processing activities and differential preservation. Evidence of burning was present on 66.1% (n = 76). Freshwater clam (probably *Margaretifera falcata*) was also present in the assemblage. Three of the four deer elements, undiagnostic faunal elements, and shell fragments were associated with a feature (Sappington 1991b).

10-LE-34: Lolonima 'puh

Investigations:

Both the *Lolonima'puh* and *Piik'uh taxxsawxt* sites fall within the Milepost 53 project area. *Lolonima'puh*, which had previously been reported as a Nez Perce camp, was originally recorded by University of Idaho archaeologists in 1978. *Lolonima'puh* was tested by the Nez Perce Tribe Cultural Resource Program in 2002 and excavated by crews from the University of Idaho and the Nez Perce Tribe Cultural Resource Program in 2004. A total of 32 1x1 meter units, one 2x2 meter unit, and one 0.5x0.5 meter unit were excavated to a depth of at least 1 meter; cultural material was found up to 1.6 meters below the surface. All sediment was screened through 1/8 inch wire mesh (Sappington 2008).

Prehistoric Occupation:

Radiocarbon dates indicate the site was occupied during the late prehistoric period. Four features were found consistent with non-intensive use of the site (i.e. no house pits or areas of intensive cooking, processing, or tool manufacture), indicating *Lolonima'puh* was used as a camp. A Cascade projectile point and edge-ground cobbles, both associated with dates ca. 8000-4000 BP, indicated an earlier occupation at the site. Prehistoric activities at *Lolonima'puh* included hunting, fishing and processing of animal and plant resource (Sappington 2008).

Faunal Remains:

Faunal analysis at *Lolonima'puh* was performed by Jennifer Hamilton. The majority of the faunal remains recovered were mammalian (93%); with small amounts of bird remains and unidentified clam shell fragments. Only 6% of the assemblage was identifiable to the level of genus or species. Historic species present included chicken and cow. Cultural modifications included burning (n = 116), sawing (historic, n = 11), and natural modifications included gnawing by rodents or carnivores (n = 3). The faunal assemblage indicated prehistoric and historic game processing activities occurred at *Lolonima'puh* (Hamilton 2008).

10-LE-102: Piik'uh taxxsawxt

Investigations:

Piik'uh taxxsawxt and *Lolonima'puh* both fall within the Milepost 53 project area. *Piik'uh taxxsawxt* was discovered during a 2001 survey, tested by the Nez Perce Tribe Cultural Resource Program in 2002, and excavated by crews from the University of Idaho and the Nez Perce Tribe Cultural Resource Program in 2004. Six units were taken to a depth of 1.5 meters and one unit was taken to a depth of 1.9 meters. A total of 16 auger holes, two 1x1 meter test units, five 1x2 meter units, and seven 2x2 meter units were excavated. All sediment was screened through 1/8 inch wire mesh (Sappington 2008).

Prehistoric Occupation:

The prehistoric component at *Piik'uh taxxsawxt* is comparable to that of *Lolonima'puh*. Cultural material and radiocarbon dates indicate *Piik'uh taxxsawxt* was a prehistoric camp occupied from around 2200 to 900 years ago with activities focused on hunting and processing deer and other medium and large game, lithic tool manufacture and toolkit rejuvenation, and hide-working. The presence of a stemmed projectile point indicated a possible earlier occupation, while a contact-period occupation was also present at the site. Eight features were found, mainly concentrations of burned rock and sediment assumed to have been hearths or ovens. Features were associated with faunal processing (n = 1), lithic production (n = 1), and cooking activities (n = 6) (Sappington 2008).

Faunal Remains:

Faunal analysis at *Piik'uh taxxsawxt* was performed by Jennifer Hamilton. Faunal remains were very fragmentary with only 4 specimens, all teeth, being identified to species. Burning was observed on 17% (n = 227) of the assemblage. Modifications included a cut mark, a chop mark, a flake scar, and gnawing by rodents or carnivores. There was no evidence of sawing or historic game processing (Hamilton 2008).

10-NP-102: Arrow Beach

Investigations:

Investigations at both the Arrow Beach and Lenore sites occurred in 1967 and 1968 by personnel from the Idaho State University Museum. Both sites used 2x2 meter units and all sediment was screened through 1/4 inch mesh. A backhoe trench was dug at the end of the excavations to delineate the boundaries of the site (Toups 1970).

Prehistoric Occupation:

The presence of human remains and an undisturbed burial in a house pit, as well as a number of other probable house pits, indicated Arrow Beach was used as a village and campsite for the last 3000 years. Three occupation periods were distinguished, while a fourth was present from a disturbed context. The earliest occupation began around ca. 3000 BP. Features encountered include hearths (n = 6), possible earth ovens (n = 2), house pits (n = 6), possible storage pits, a dog burial, and individual caches of hackberry seeds, elk bone, netsinkers, and lithic cores (Toups 1970). Some small lumps of clay with probable impressions of basketry fiber or matting were also found. In addition, 147 bone tools and 32 antler fragments were found. Bone tools identified include awls (n = 79), tubes (n = 19), cut/pointed bone (n = 10), needles (n = 2), a possible whistle, and polished fragments (n = 12). Riverine and plant resources were both utilized (Toups 1970), and other tools were associated with hunting, processing, hide-working, and tool manufacturing activities (Sappington 1994).

Faunal Remains:

The Arrow Beach faunal assemblage was analyzed by Polly Toups. The exact number of the assemblage is unknown, however, 468 specimens were identified. The assemblage was highly fragmentary; the fragmentation was suggestive of marrow removal where elements were cut and broken, rather than grease extraction, where elements would have been crushed (Toups 1970). Broken and burnt bone was present, further indicating processing for marrow removal and boiling for grease (Sappington 1994). The presence of *Bison* heel and foot bones indicated the animals were killed and butchered nearby rather than being transported from the Great Plains. Unique among the assemblage was an elk vertebrae with scratching in the shape of an owl or eagle (Toups 1970).

10-NP-105: Lenore

Investigations:

Investigations at both the Lenore and Arrow Beach sites occurred in 1967 and 1968 by personnel from the Idaho State University Museum. Both sites used 2x2 meter units and all sediment was screened through 1/4 inch mesh (Toups 1970).

Prehistoric Occupation:

Three occupation periods were distinguished, with the earliest (Lenore I) beginning ca. 7500 BP during the early prehistoric period. The Lenore I toolkit contained large projectile points and scraping and cutting tools. The middle prehistoric period Lenore II occupation contained large side-notched projectile points, edge-ground cobbles, scrapers, knives, spokeshaves, and possible fishing implements. The late prehistoric Lenore III occupation was classified by the presence of house pits. No features were encountered during the Lenore I occupation, while Lenore II had one feature associated with plant-processing, and Lenore III had house pits (n = 8), six of which had internal features such as hearths and mortar bases. Bone tools were encountered throughout all occupations (Toups 1970).

The absence of house pits in both the Lenore I and Lenore II occupations suggested the earliest inhabitants of Lenore were semi-sedentary hunter-gatherers (Toups 1970). Activities during the early period at Lenore included hide-working, manufacturing, and food processing, while activities during the Lenore II occupation include hunting, processing, hide-working, and tool manufacture (Sappington 1994).

Faunal Remains:

The Lenore faunal assemblage was analyzed by Polly Toups. Total faunal remains at Lenore were scarce, and only half were reported by components (Sappington 1994). The preservation at Lenore was poor, especially for remains from the earliest occupation of the site. Faunal remains found in house pits include deer, elk, bison, bear, beaver, and unidentified artiodactyls, carnivore, bird, fish, and mammal. Deer, bear, artiodactyl, and shell fragments were found below one of the house pits. Possible *Lepus* remains were found in the earliest levels (Toups 1970).

10-NP-108: Spalding

Investigations:

The testing phase at Spalding began in July-August of 1978 and involved 42 auger holes and several test squares. Additional excavations occurred during October-December of 1978 (involving 2x2 meter and 1x2 meter excavation units), and April-May of 1979 (involving 1x1 meter excavation units). Excavations were conducted by personnel from the University of Idaho and Nez Perce tribal members. During the testing phase all sediment was dry-screened through 1/8 inch mesh and during the excavation phases sediment was water-screened through 1/8 inch mesh (Chance and Chance 1985).

Prehistoric Occupation:

The prehistoric occupation at Spalding was divided into the early prehistoric Lapwai component and the late prehistoric Init' component. The emphasis during the Lapwai component, dated between 11,200 and 8000 years BP (Chance and Chance 1985), was on food processing, tool manufacture, and hide-working (Sappington 1994). Around one quarter of the tools and many faunal fragments from this component showed signs of burning, which suggest a possible boiling basket emptying area was present (Chance and Chance 1985). Bone tools were present in both Lapwai (n = 29) and Init' (n = 56) components and included a needle midsection, a possible atlatl spur, a rectangular rod with sawn crosses, awls, a flesher, and needles (Chance and Chance 1985).

The Init' component was characterized by the presence of house pits (n = 2). Features associated with one of the houses included a central hearth, a storage pit, possible post molds (n = 9), a hopper mortar base on a columnar basalt block, and two pairs of mortars and anvils. The mortars and anvils indicated two food-preparing groups inhabited the same house, while the surfaces of the mortars suggest at least 2 food-processing methods were practiced. The second house pit was similar to the first, which suggested the two houses were part of a village located around Lapwai Creek (Chance and Chance 1985).

Faunal Remains:

The mammalian assemblage at Spalding was identified by Elaine Anderson, the fish assemblage was identified by Richard Casteel, and John White and Craig Henry provided faunal consultation. Faunal remains were recovered from both occupations at Spalding. The majority of the faunal remains from the Init' component were from the floor of one of the house pits and include turtle, beaver, rabbit, fox, raccoon, elk, deer, pronghorn, and bighorn sheep remains. Both house pits had a large array of fish remains, such as salmonid and sucker, suggesting an occupation corresponding with salmon or steelhead runs, during the spring-to-fall or the winter (Chance and Chance 1985).

Bones from both occupations were fragmented. No bones from the Lapwai occupation displayed cultural modifications, while evidence of burning (n = 5) was present on both deer (n = 1) and artiodactyl (n = 2) elements. Cut marks were present on one bighorn sheep element from the Init' component (Chance and Chance 1985).

A short-faced bear (*Arctodus simus*) element was found during excavation and was probably contemporary with the site's occupation, as the element had probable evidence of burning and cut-marks (Chance and Chance 1985). Faunal remains found in proximity with the short-faced bear include medium and large mammal bones with the same degree of mineralization and color, and similar butchering marks (Chance and Chance 1985). To date, this is the only example of extinct fauna occurring in an archaeological context in the Clearwater River region.

10-NP-139: Lapwai Valley Sewer Line/Qi·ˀtípa

Investigations:

Qi·ˀtípa was originally recorded in 1979 based on ethnographic information (Schwede 1966). It was tested by a crew from the University of Idaho in the spring of 2009 prior to the construction of a sewer line. Testing involved 29 auger holes at 10 meter intervals along ca. 300 meters of the sewer line from the river to the highway, and five 1x1 meter units were excavated based on results from the auger holes. Sediment was screened through 1/8 inch wire mesh (Sappington 2009, 2010).

Prehistoric Occupation:

Two radiocarbon dates were obtained, suggesting occupation of the site occurred during the late prehistoric and protohistoric periods, but the initial occupation of the site is unknown. The presence of a mortar base and the relatively high concentration of cultural material suggests an intense occupation and probably functioned as a late prehistoric camp (possibly a village). Prehistoric cultural material included projectile points, preforms, blanks, modified flakes, a net sinker, a mortar base, and bone tools. A stone bead, relatively rare in the Clearwater region, was also found. Associated activities included the manufacture and maintenance of lithic tools, fishing, harvesting freshwater clams/mussels, hunting, and plant-processing.

Faunal Remains:

The faunal assemblage at *Qi·ˀtípa* was analyzed by Oliver Bielmann. Four genera were identified, including deer, elk, coyote, and a probable bear (Bielmann 2009). No domestic animals were identified. A partial skeleton, identified as prairie dog (*Cynomys* spp.), is listed under Sciuridae in Appendix D as no prairie dogs are known to occur in Idaho.

Bird, fish (probably non-salmonid), and freshwater mollusk (probably *Margaritifera falcata*) elements were also recovered (Bielmann 2009; Sappington 2009).

10-NP-143: Hatwai

Investigations:

Hatwai was excavated from 1977 to 1978 by personnel from Boise State University in response to an ITD highway-widening project. The excavations were concentrated in a 300 meter-long area above Hatwai Creek and involved a series of backhoe trenches, small hand-dug trenches and pits, and large excavation blocks. Sediment was screened through 1/4 inch wire mesh and selected bulk samples were water screened through 1/16 inch mesh fiberglass cloth (Ames et al. 1981; Atwell 1989).

Prehistoric Occupation:

Four cultural occupations were delineated, including the early prehistoric Hatwai I, the middle prehistoric Hatwai II, the late prehistoric Hatwai III, and the late prehistoric-protohistoric Hatwai IV (Ames et al. 1981).

Ten pit houses demonstrating two construction styles and dated between ca. 5050 and 3100 BP were identified in the Hatwai III occupation. Eight of the houses had associated radiocarbon dates. One house contained an earth oven with possible boiling stones and fire-cracked rock (Ames et al. 1981). Floor 1 of the house had a large bone maceration feature (Sappington 1994). Other cultural material from the house pits included hopper-mortar bases, anvils, pestles, lithic tools and flakes, bone and antler tools, a stone pipe, fire-cracked rock, and faunal remains (Ames et al. 1981).

Bone and antler tools recovered at Hatwai included awls, needles, antler leister barbs, antler wedges, a pendant, a pin, metapodial blanks, beads, and tubes. Lithic tool manufacture and wood-, bone-, and hide-working activities took place at the site, and root crops, fish, and mammals were utilized (Ames et al. 1981). Activities associated with the Hatwai I occupation include hunting, tool manufacture, and hide-working. Few Hatwai II artifacts were recovered. The Hatwai III occupation contained the majority of all recovered items, and included tools associated with hunting and game-processing, hide-working, and bone, antler, and stone tool manufacture (Ames et al. 1981).

Faunal Remains:

The faunal remains at Hatwai were analyzed by Ricky G. Atwell, and the molluscan assemblage was analyzed by R. Lee Lyman (Ames et al. 1981; Atwell 1989). Faunal remains from the Hatwai I occupation were highly fragmented and contained unspecified artiodactyl long bone fragments (Sappington 1994a). The high degree of fragmentation was probably due to smashing bones prior to boiling, probably during winter occupation (Sappington 1994a). Some remains had evidence of burning (Sappington 1994a), but the number of culturally modified elements is unknown. Faunal remains were recovered from six of the ten house pits, bone concentrations were found associated with some anvils, and a large bone maceration feature was found in one of the house pits (Ames et al. 1981).

10-NP-287: Red Elk Rockshelter

Investigations:

Red Elk Rockshelter, located on the lower Snake River across from present-day Asotin, WA, was recorded in 1983 and archaeological testing was conducted in May 1984 by two archaeologists from the University of Idaho's Laboratory of Anthropology. Three 1x1 meter test units were excavated and sediment was screened through 1/8 inch mesh wire (Sappington 1984).

Prehistoric Occupation:

Four radiocarbon dates were obtained from Red Elk Rockshelter which suggest it was occupied during the late prehistoric and protohistoric periods. The lithic assemblage indicated hunting, game-processing, pulverizing of bone or other battering tasks, and lithic tool rejuvenation took place at the site. Features were limited to one hearth, thought to represent either one large hearth or a number of smaller hearths (Bonstead 2015; Sappington 1984).

Faunal Remains:

Faunal remains at Red Elk Rockshelter were analyzed by Fredrick Thomas. Preservation at the site was good, but the assemblage was highly fragmentary due to butchering and marrow and possible grease extraction activities. Only approximately 9% of the assemblage was identifiable. Burning was present on some elements, but was not common. The high number of limb bones and low number of ribs and cranial elements suggested some animals were killed near the site, while most animals were transported back to the site after they had been quartered elsewhere (Thomas 1984). A bighorn sheep element was radiocarbon dated to cal. 375-320 BP (AD 1440-1510) (Bonstead 2015).

10-NP-311: North Lapwai Valley

Investigations:

Testing was conducted at the North Lapwai Valley site by the Nez Perce Tribe Cultural Resource Program between July and August 1994 and involved auger holes at each intersection point within a 10x10 meter grid, additional auger holes in areas found to be lacking cultural material, and 11 1x1 meter test units placed near or adjacent to auger holes that produced high concentrations of artifacts. All sediment was screened through 1/8 inch mesh (Lyon 1995).

The site was tested again prior to the proposed construction of the Lapwai Valley Sewer Line by the Nez Perce Tribe Cultural Resource Program in 2007 and the University of Idaho in 2009. Testing consisted of 35 auger holes and seven 1x1 meter units. All sediment was screened through 1/8 inch mesh (Sappington 2009).

Prehistoric Occupation:

There are no radiocarbon dates for the North Lapwai Valley site. The presence of a house pit and related cultural materials suggested an occupation site where hunting, food-processing, especially marrow-extraction, and lithic tool manufacture and toolkit rejuvenation took place. Cultural material was encountered in 27 auger holes and almost every excavation unit; the most common cultural material included lithic tools, debitage, faunal remains, and fire-cracked rock. A house pit was encountered which contained large amounts of spirally-fractured crushed bone, large amounts of river mussel shell, and an anvil with bone fragments and an edge-ground cobble on its surface. The house pit fill contained fragmentary bone and river mussel shell, debitage, and fire-cracked rock fragments (Lyon 1995).

Faunal Remains:

Faunal remains from the North Lapwai Valley site were analyzed by Jason Lyon (1994 investigation) and Oliver Bielmann (2009 investigation). The 1994 assemblage was highly fragmented, with only 1.3% (n = 19) of the assemblage identifiable to at least the order level. Identified remains include pronghorn (encountered ca. 130 cm below the surface), deer, rabbit or hare, Canid, some rodents, and mussel shell fragments (n = 252). Cultural modifications were present on 34% of the assemblage (n = 496 elements), and included burning (n = 237 or 16.27%), calcination (16.13% or n = 235), cut marks/striations (n = 12 or 0.82%), and polishing (0.82% or n = 12) (Lyon 1995).

The 2009 assemblage was also fragmentary. Domestic pig (*Sus scrofa*; n = 17) was the only identification made at least to genus-level. Other identifications included intrusive rodents (n = 4) and freshwater mollusk shell (prob. *Margaritifera falcata*; n = 151). Only 11.54% of the mammalian assemblage was identifiable to at least the order level. Evidence of burning was present on 53.58% of the mammalian assemblage (n = 98), while the molluscan assemblage exhibited no evidence of burning (Bielmann 2009).

10-NP-313: Sweetwater Springs:

Investigations:

The Sweetwater Springs hatchery site is an upland site located near Sweetwater Creek. At the time of testing, a small U.S. Fish and Wildlife hatchery was already present on the site. Archaeological testing began in the spring of 1994 and involved 20 auger holes and two 1x1 meter test units. After testing, portions of the site were capped with gravel and temporary hatchery facilities were installed. After fish from the temporary hatchery had been outplanted in August of 1994, the temporary facilities were removed and the Nez Perce Tribe Cultural Resources Program completed a second testing phase. The second testing phase involved eight 1x2 meter and one 1x1 meter test units. All sediment was screened through 1/8 inch wire mesh (Lyon 1995).

Prehistoric Occupation:

Radiocarbon dates and cultural material suggest Sweetwater Springs had either independent early, middle, and late prehistoric occupations or one continuous occupation. Lithic items found suggest the site was used as a habitation and resource procurement and processing area. A large number of mortar bases and several end-battered cobbles suggest plant-processing activities. A fragment of a stone pipe and a possible atlatl weight or shaft abrader were also found (Lyon 2000).

The early prehistoric period at Sweetwater Springs (Sweetwater I and II occupations) was represented by lithic items (including lanceolate-shaped Cascade points and edge-ground cobbles), fragmentary faunal remains, and one hearth feature (calibrated date of ca. 10,360 BP). The middle prehistoric period (Sweetwater III occupation) involved long-term occupation with activities focused on hunting, plant and animal processing, and lithic tool manufacture; activities were inferred based on the presence of a pit house (ca. date ca. 3690 BP), faunal remains, and lithic tools. The late prehistoric period (Sweetwater IV) was represented by a hearth (cal. date ca. 3060 BP); lithic tools and debitage associated with hunting, food preparation, and toolkit rejuvenation; and a large amount of faunal remains. The protohistoric period (Sweetwater V) was from a largely disturbed context, attributed to construction of the original hatchery facilities in the 1950s, was represented by lithics suggesting activities related to hunting and food processing (Lyon 2000).

Faunal Remains:

Faunal remains from Sweetwater Springs were originally analyzed by Jason Lyon in 1995 and reexamined by me in 2014 (Appendix E). A majority of the bones exhibited spiral fractures indicating processing of the flesh surrounding the bone and the utilization of bone marrow (Lyon 1995). Faunal remains identified in 1995 included black bear, elk, and deer, rabbit or hare (Lyon 1995). Cultural modifications were present on 8.3% of the assemblage and included cut-marks, burning, polishing, and the presence of one whole and one partial awl (Lyon 1995).

10-NP-336: Wewukiyepuh

Investigations:

Preliminary surveying and testing at *Wewukiyepuh* was conducted in 1997 by personnel from the University of Idaho Alfred W. Bowers Laboratory of Anthropology in response to the proposed construction of a 9-acre gravel settling pond. Archaeological monitoring began in June of 1998 and the discovery of faunal and cultural material prompted further archaeological investigation, involving the excavation of 15 1x1 meter units. Sediment was screened through 1/8 inch mesh and bulk samples were collected from each level for water screening through finer mesh or flotation analysis. A significant portion of material from the original site was removed or disturbed prior to its discovery (Schuknecht 2000).

Prehistoric Occupation:

Wewukiyepuh represented a small, briefly-occupied forager location with activities related to lithic production and food processing activities. Eight of the nine tools recovered were consistent with a Windust-era toolkit, and two radiocarbon dates from the site also supported a Windust phase site. Three features were identified at *Wewukiyepuh* and included one hearth, located near elk remains, and two adjacent concentrations of debitage (Schuknecht 2000).

Three samples were submitted to Botana Labs for macrobotanical identification. Archaeobotanical preservation was very poor, suggesting either temporary cultural occupation or poor preservation. One sample, taken from below a grizzly bear mandible contained Douglas-fir late wood, fragmented small snail shells, a rodent mandible and tooth fragments, and was thought to represent natural activity. A sediment sample from below an elk mandible contained Douglas fir, one pine family (probably belonging to *Pinus*), three very small CCS flakes, and mammal bone, fish vertebra, and small snail shells. A sample of charcoal from the grizzly bear mandible area was fully charred, mature, Douglas fir wood (Schuknecht 2000).

Faunal Remains:

Faunal analysis at *Wewukiyepuh* was performed by Sarah Schuknecht. Only 5.13% (n = 88) of the assemblage was identifiable to at least genus-level. Identified species included grizzly bear, elk, and a single freshwater mussel shell (*Margaritifera* cf. *falcata*). The unidentified fish vertebra may represent a natural deposit. Analysis of the elk mandible indicates the animal was between 2.5 and 3 years old at the time of death (Schuknecht 2000).

Throughout the duration of the project, several paleontological remains were found in the vicinity of *Wewukiyepuh* and included five areas of fragmented bison bone, one area of fragmented mammoth tusk, an eye guard and antler tines of an elk, two areas of antler fragments, and areas containing fragmented remains of bison bones and mammoth tusk (Schuknecht 2000).

10-NP-453: We'eptes Pa'axat

Investigations:

Personnel from the University of Idaho conducted archaeological testing at *We'eptes Pa'axat* in February of 2003 in response to an ITD passing lane project on US Highway 12. Testing involved 30 auger holes and two 1x1 meter test units. Data recovery began in January of 2004 and involved the excavation of 19 1x1 meter units. All sediment was screened through 1/8 inch mesh (Ridenour 2006).

Prehistoric Occupation:

Radiocarbon dates and projectile point typology suggested intermittent human occupation of the site since at least 10,000 BP that continued into the historic period. Material culture indicated the site was utilized as a base camp with activities associated with lithic tool manufacture, hunting, and food processing, and hide-working. Hunting technology included atlatl darts (indicative of Windust and Cascade phase occupations) and arrow points. Early (Cascade phase ca. 8000-4500 BP) plant-processing technology was indicated by edge-ground cobbles found in association with features and other plant-processing items (battered cobbles and mortars). Perforators, scrapers, and spokeshaves were also found at the site suggesting hide-working, wood, and/or bone-shaping activities (Ridenour 2006). Features encountered at *We'eptes Pa'axat* mainly consisted of arrangements or clusters of fire modified rock (n = 7), however activity/occupation surfaces were present (n = 2), and one feature consisted of discolored sediment with one flat cobble (Ridenour 2006).

Faunal Remains:

Faunal analysis at *We'eptes Pa'axat* was performed by Jennifer Hamilton. Only 3% of the remains recovered could be identified to species. One molar was placed in an "unidentified omnivore category" which may represent bear. Burning was present on 22% of the faunal assemblage and three bones exhibited cultural modification, including a chop mark on a deer element and cut marks on large and unidentified mammal elements. One bone was burned and had several flakes removed from one end suggesting it was used as a scraper (Hamilton 2006).

Chapter 4. Methods

General

Data were compiled from 20 archaeological sites representing 27 faunal assemblages. For each assemblage, the number of identified specimens (NISP) of each taxon, the total recovered remains for each assemblage, and the age of each assemblage were tabulated. Total NISP for each assemblage was calculated as ΣN, where N is the total number of individuals identified in the sample. Only temporally and spatially non-intrusive mammal remains were retained for analysis. As the majority of faunal assemblages from the region are highly fragmented (Table 3; Lyon 1995; Sappington 1994b; Sappington and Carley 1987; Sappington and Evans-Janke 2002; Sappington et al. 1997), documentation of human use was occasionally omitted from site reports. Therefore, all taxa ethnographically known to have been exploited by the Nez Perce (Marshall 1977; Sappington 1994a; Spinden 1964) were included in analyses regardless of the presence of butchering marks. Pleistocene megafauna species from culturally sterile deposits were not included in analyses.

A total of 151 radiocarbon dates were used to calculate the midpoint of the age ranges for each site (calibrated years BP) (Codding et al. 2010; Lyman 2003, 2009). The temporal midpoint was used to assign sites to one of three regional cultural phases (Sappington 1994a): the early prehistoric Windust/Cascade phase (ca. 10,000-6,000 B.P.), middle prehistoric Hatwai phase (ca. 6,000-3,000 BP), and late prehistoric Ahsahka phase (ca. 3,000-500 BP). These three divisions roughly correspond to divisions within the Holocene, but regional terminology was retained for accuracy. For assemblages with no associated radiocarbon dates or where the radiocarbon dates were unreliable, sites were assigned to a cultural phase based on temporally diagnostic artifacts encountered at the site as determined by the principal

Table 3. Percent of identifiable remains from the Clearwater and Lower Snake River regions of Idaho.

Site Number	Assemblage Name	Total Recovered Remains	Total NISP	Percent Identified	Screen Size (inches)
10CW4	Clearwater Fish Hatchery	5597	155	2.8%	1/8, 1/16
10CW5	Ahsahka Sportsmen's Access	3535	51	1.4%	1/8
10CW25	Canoe Camp	285	3	1.0%	1/8, 1/16
10IH453	Pete King Creek	1308	28	2.1%	1/8
10IH820	*Kam'-nak-ka*	7368	159	2.2%	1/8, 1/16
10IH1009	*Tuhkaytahs'peh*	3479	12	0.34%	1/8
10IH1395	Kooskia Bridge	5442	77	1.4%	1/8
10IH1948	Waterline Trench	115	4	3.5%	1/8
10LE34	*Lolonima'puh*	400	1	0.25%	1/8
10LE102	*Piik'uh taxxsawxt*	1340	4	0.30%	1/8
10NP102	Arrow Beach*	468	247	52.8%	1/4
10NP105	Lenore*	108	26	24.1%	1/4
10NP108	Spalding	77	8	10.4%	1/8
10NP108	Spalding	253	91	36.0%	1/8
10NP139	*Qi·ˀtípa*	1086	13	1.2%	1/8
10NP143	Hatwai	179	156	87.1%	1/4, 1/16
10NP143	Hatwai	889	663	74.6%	1/4, 1/16
10NP287	Red Elk Rockshelter	2375	48	2.0%	1/8
10NP311	North Lapwai Valley	1790	10	0.56%	1/8
10NP313	Sweetwater II	226	1	0.44%	1/8
10NP313	Sweetwater III	258	5	1.9%	1/8
10NP313	Sweetwater IV	387	13	3.4%	1/8
10NP336	*Wewukiyepuh*	1714	88	5.1%	1/8
10NP453	*We'eptes Pa'axat*	758	11	1.4%	1/8

*indicates assemblages where total recovered remains were not split by assemblage.

investigator at the site. Only one multi-component site (*We'eptes Pa'axat*) was not able to be split into phase-specific components and was therefore excluded from further analyses. Geographic locations of sites were obtained from the Idaho State Historic Preservation Office.

To determine whether the prehistoric occupants of the region favored a generalist or specialist subsistence strategy, taxonomic richness and evenness metrics were used. A generalist subsistence strategy is one in which size categories and taxa are relatively equally represented in an assemblage, whereas a specialized economy is characterized by a disproportionate amount of taxa of one size or taxonomic group (Lyman 2013). Taxonomic richness was derived by summing the total number of exploited taxa found in each assemblage. Taxonomic evenness, or the extent to which taxa are equally represented in an assemblage, was calculated using the reciprocal of Simpson's index (Codding et al. 2010; Jones 2004; Lupo and Schmitt 2005; Schmitt and Lupo 1995), calculated as:

$$\frac{1}{\mathrm{D}} = \frac{1}{\sum\left(\frac{n_i(n_\mathrm{i}-1)}{N(N-1)}\right)}$$

where n_i is the number of individuals in a taxon and N is the total number of individuals in the sample (Jones 2004). The reciprocal of Simpson's index increases as evenness increases and is heavily weighted toward the most dominant taxon in an assemblage (Jones 2004).

For the sake of regional consistency, identified taxa were placed into one of three size categories based on their live weight: small (≥ 0.7 kg), medium (5 to ≤ 25 kg), and large (> 25 kg) (Table 4; Lyman 2013). The division of taxa into three size categories allowed individual assemblages to be categorized as representing a generalized or specialized subsistence strategy (Lyman 2013). A specialized subsistence strategy is an assemblage in which > 66% of the remains fall into one size category, while a generalized subsistence

Table 4. Body size (adult average live weight) of mammalian taxa exploited along the Clearwater and Lower Snake River regions, Idaho. *Source:* Live weight from Smith et al. 2003.

Common name	Taxonomic name	Live weight (kg)	Size category
Cottontail rabbit	*Sylvilagus nuttallii*	0.76	Small
Weasel	*Mustela* spp.	0.15-0.94	
Hare/Jackrabbit	*Lepus* spp.	1.55-2.42	
Striped skunk	*Mephitis mephitis*	2.09	
Marmot	*Marmota* sp.	3.3-7.2	
Fox	*Vulpes* (spp.)	4.13	
Raccoon	*Procyon lotor*	5.52	Medium
Porcupine	*Erethizon dorsatum*	7.09	
Bobcat/Canada Lynx	*Lynx* sp.	8.90-9.37	
Coyote or domestic dog	*Canis* sp.	13.41	
Beaver	*Castor canadensis*	21.82	
Gray wolf	*Canis lupus*	42.75	Large
Pronghorn	*Antilocapra americana*	46.08	
Mountain Lion	Puma concolor	51.6	
Deer, mule/white-tailed	*Odocoileus* spp.	54.21-55.51	
Bighorn sheep	*Ovis canadensis*	74.64	
Bear, black/grizzly	*Ursus* spp.	99.95-139.44	
Elk	*Cervus elaphus*	217.75	
Bison	*Bison* spp.	579.26	
Short-faced bear	*Arctodus simus*	720	

strategy is an assemblage in which 33% of the remains fall into at least two size categories (Lyman 2013). Identified taxa were those identified at least to genus-level, though in the absence of any genus-level identifications a family-level identification was used. In sites containing taxa represented at both the genus- and family-level (e.g. *Sylvilagus nuttallii* and Leporidae), only the most specific identification was used to derive taxonomic richness.

To evaluate the relative contribution of artiodactyl species (bighorn sheep, bison, deer, elk, and pronghorn) to smaller prey taxa, an artiodactyl index (AI) was calculated as:

$$\sum \text{artiodactyl NISP} / (\sum \text{artiodactyl NISP} + \sum \text{small mammal NISP} + \sum \text{medium mammal NISP}),$$

where artiodactyl NISP is the NISP for each artiodactyl species and small and medium mammal NISP is the NISP values for each small mammal species (NISP values for each species appear on Table 1) (Byers et al. 2005; Codding et al. 2010; Lyman 2003). AI values were plotted against the calibrated age midpoint for each site. AI values of 0 indicate an exclusive focus on small and/or medium prey, while AI values of 1.0 indicate an assemblage composed entirely of artiodactyl species (Byers et al. 2005). Ideally, the minimum number of individuals (MNI) would have been used to calculate artiodactyl index values to avoid the inflated contribution of artiodactyls relative to small taxa due to differential processing (Hockett 2015), but MNI values were only available for three of the 20 sites in the study area.

Mann-Whitney rank-sum tests were used to determine differences in the occurrence of species within downriver and upriver assemblages (those below and above the confluence of the North Fork and mainstem Clearwater River, respectively) during the late prehistoric period, the only period for which upriver assemblage data were available. Stata 9.0 (StataCorp. 2005) was used for all statistical calculations. All maps were created using ArcMap 10.1 (ESRI 2011).

Zooarchaeological analysis

One zooarchaeological assemblage, Sweetwater Springs:10-NP-313, identified in 1995, was reanalyzed to determine if the presence of a comparative osteological collection would provide additional genus- or species-level identifications in a fragmentary assemblage. Skeletal identifications were made using comparative osteological collections from the Charles R. Conner Museum at Washington State University and osteological manuals (Adams and Crabtree 2012; Beisaw 2013; France 2008; Gilbert 1990; Hillson 1999; Schmid 1972). Species-level identification of rodent remains were made using a microscope to compare the dentition of the remains to known dentition patterns (Chomko 1990).

The 1995 identification included two species: (*Euarctos americanus* [sic.] and *Cervus canadensis*), three genera (*Odocoileus*, *Citellus* [sic.], and *Geomys*), two orders (Lagomorpha and Rodentia), and five size-based mammal categories (Lyon 1995). Based upon this new evaluation, a skull (n=1), mandible (n=1), and mandible fragments (n=2) were reassigned from *Geomys* to *Thomomys talpoides* (the only *Thomomys* species present in the region (Nez Perce Tribe Wildlife Division n.d.).

Chapter 5. Results

A variety of mammal species were exploited at archaeological sites along the Clearwater and lower Snake rivers (Table 5). Of the artiodactyl species, bison, deer, and elk were present throughout early, middle, and late prehistoric assemblages, while pronghorn were present in middle and late prehistoric assemblages only, and bighorn sheep were present in late prehistoric assemblages only.

Taxonomic richness, but not evenness, was strongly correlated with total sample size (Total NISP) across all 27 assemblages (Spearman's *rho* = 0.8234; $p < 0.001$ and Spearman's *rho* = 0.2347; $p = 0.2386$, respectively). These results suggest that current sampling intensity limits our understanding of species diversity but not the degree to which specialization occurred within assemblages.

Plotting taxonomic richness against taxonomic evenness suggests a specialized subsistence even when the number of taxa (richness) is high (Fig. 8). The only exception is the Spalding I (early prehistoric) assemblage where site inhabitants appear to have practiced a generalized subsistence and shifted to a more specialized subsistence during the late prehistoric period (represented by the Spalding II assemblage).

Comparing the utilization of size categories across assemblages further demonstrates a specialized subsistence (Table 6). To avoid the influence of small sample size, relative frequency of size categories was only calculated for those assemblages where NISP > 40 (Lyman 2013). The data for all ten assemblages suggest a specialized subsistence strategy focused on large mammals. Both small and medium mammal remains are comparatively rare for all assemblages except Red Elk Rockshelter. Screen size was not correlated with the percentage of small ($p = 0.4748$) or medium ($p = 0.3328$) mammal remains recovered.

Table 5. Number of Identified Specimens (NISP) for 27 Assemblages from the Clearwater and Lower Snake River Regions of Idaho.

SiteName	Sylvilagus	Mustela	Lepus	Leporidae	Mephitis	Marmota	Vulpes	Mustelidae	Procyon_lotor	Erithozon_dorsatum	Lynx	Canis_sp	Castor_canadensis	Canis_lupus	Antilocapra_americana	Puma concolor	Odocoileus	Ovis_canadensis	Ursus	Cervus	Equus	Bison	Arctodus_simus	Total NISP	Richness	Evenness
Clearwater Fish Hatchery	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-	130	-	10	4	8	-	-	155	6	1.41
Ahsahka	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	4	-	2	-	10	-	51	4	1.97
Canoe Camp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	3	2	3
Pete King Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	25	-	-	-	28	3	1.26
Kam'-nak-ka	1	-	-	1	4	-	-	1	-	-	-	15	1	-	-	-	111	5	7	13	-	-	-	159	8	1.99
Tuhkaytahs'peh	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	10	-	-	-	-	-	-	12	2	1.43
Kooskia Bridge	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	57	1	16	2	-	-	-	77	5	1.70
Waterline Trench	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	4	1	1
Lolonima'puh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-
Piik'uh taxxsawxt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	4	1	1
Arrow Beach I	-	-	-	-	-	-	-	-	-	-	2	-	-	1	1	-	6	-	-	1	-	1	-	12	6	4.13
Arrow Beach II	2	-	1	-	-	-	-	-	-	-	1	16	2	1	3	-	140	8	1	39	-	21	-	235	12	2.54
Lenore I	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Lenore II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	3	2	3
Lenore III	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	16	-	1	1	-	2	-	22	6	1.91
Spalding I	3	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	1	8	6	9.33
Spalding II	5	-	-	-	-	-	4	-	2	-	-	4	4	-	12	-	39	13	-	8	-	-	-	91	9	4.35
Qi·ˀtípa	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	9	-	1	2	-	-	-	13	4	2.11
Hatwai I	-	3	-	-	-	-	1	-	-	-	1	8	1	-	1	-	126	-	1	14	-	-	-	156	9	1.51
Hatwai II	7	6	1	1	-	1	6	-	-	-	-	14	1	-	-	2	597	3	1	23	-	-	-	663	12	1.23
Red Elk Rockshelter	1	-	6	6	-	-	-	-	-	-	-	2	-	-	-	-	21	11	1	-	-	-	-	48	6	3.81
North Lapwai Valley	-	-	-	1	-	-	-	-	-	-	-	1	-	-	4	-	4	-	-	-	-	-	-	10	4	3.75
Sweetwater II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-
Sweetwater III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3	-	-	-	5	2	2.5
Sweetwater IV	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	10	-	1	1	-	-	-	13	4	1.44
Wewukiyepuh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56	32	-	-	-	88	2	1.88
We'eptes Pa'axat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	11	1	1

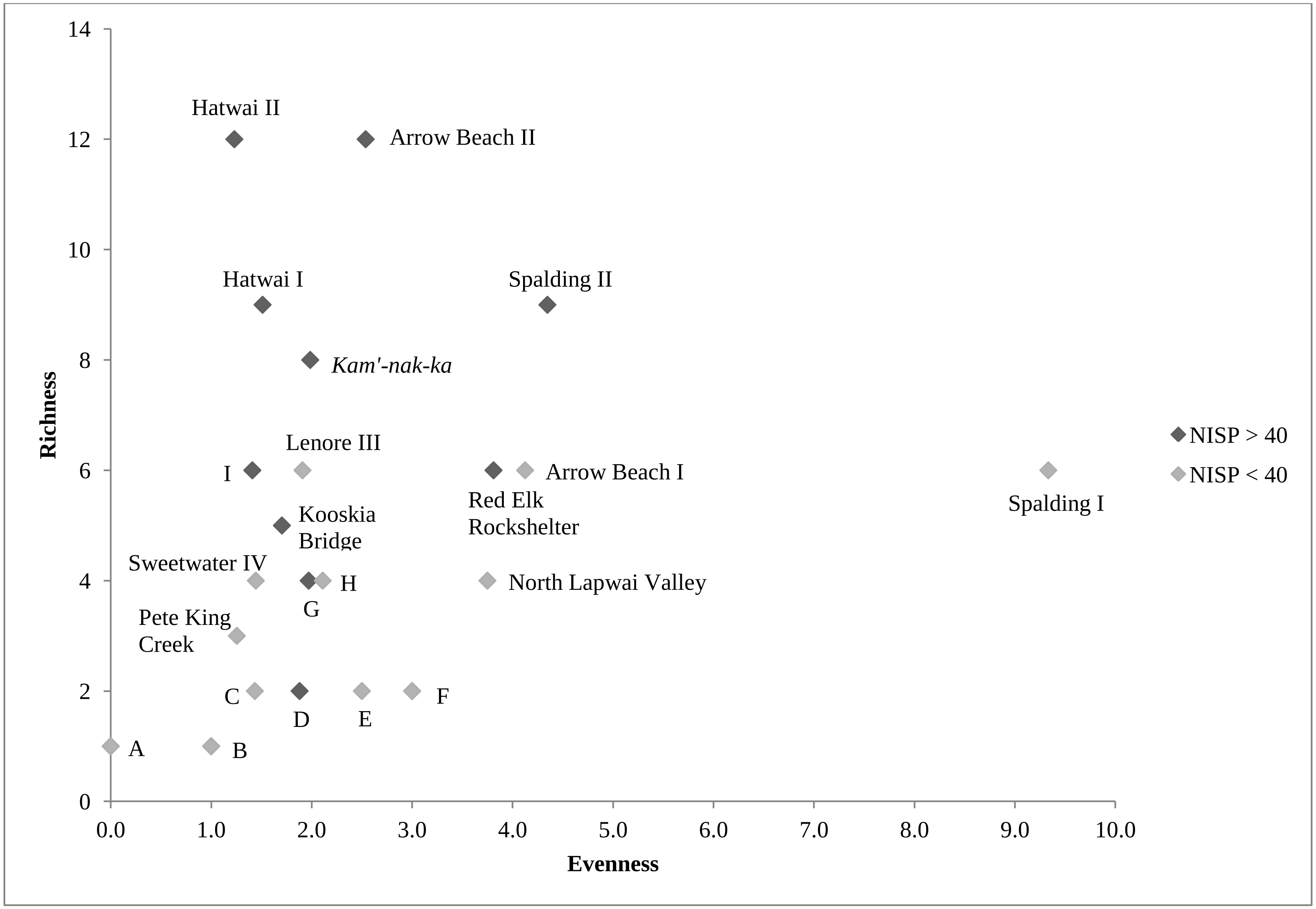

Figure 8. Measures of taxonomic richness and evenness for all assemblages. A: Lenore I, *Lolonima'puh*, Sweetwater II; B: *Piik'uhtaxxsawxt*, *We'eptes Pa'axat*, Waterline Trench; C: *Tuhkaytahs'peh*; D: *Wewukiyepuh*; E: Sweetwater III; F: Canoe Camp, Lenore II; G: Ahsahka; H: *Qi·ˀtípa*; I: Clearwater Fish Hatchery.

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Table 6. Absolute and relative (%) frequencies of mammal prey by body size in 10 prehistoric faunal assemblages where NISP > 40.

Assemblage name	Period	Small (0.4-5 kg)	Medium (5-25 kg)	Large (>25 kg)	NISP
Wewukiyepuh	6000-10,000	-	-	88	88
		-	-	(100)	
Hatwai I	3000-6000	4	10	142	156
		(2.6)	(6.4)	(91.0)	
Hatwai II	500-3000	22	15	626	663
		(3.3)	(2.3)	(94.4)	
Clearwater Fish Hatchery	500-3000	1	2	152	155
		(0.65)	(1.3)	(98.1)	
Ahsahka	500-3000	-	-	51	51
		-	-	(100)	
Kam'-nak-ka	500-3000	7	16	136	159
		(4.4)	(10.1)	(85.5)	
Kooskia Bridge	500-3000	-	1	76	77
		-	(1.3)	(98.7)	
Arrow Beach II	500-3000	3	19	213	235
		(1.3)	(8.1)	(90.6)	
Spalding II	500-3000	9	10	72	91
		(9.9)	(11)	(79.1)	
Red Elk Rockshelter	500-3000	13	2	33	48
		(27.1)	(4.2)	(68.8)	

Across all assemblages, the relative abundance of medium mammals, based on NISP, was correlated with taxonomic evenness (Spearman's *rho* = 0.5671; *p* = 0.002), and NISP values for large mammals were negatively correlated with taxonomic evenness (Spearman's *rho* = -0.4277; *p* = 0.0261), suggesting subsistence practices were intensively focused on large mammal species, undoubtedly as a result of the large amount of deer remains, while medium mammals contributed to assemblage diversity. As medium mammal species present in assemblages are all furbearing mammals and were utilized by the prehistoric occupants of the area for purposes other than subsistence, it is probable that medium mammal species were taken as-needed rather than representing a variability in subsistence activities. The relative abundance of small mammals showed no correlation with taxonomic evenness (Spearman's *rho* = 0.2706; *p* = 0.1722), suggesting small mammals were never the focus of subsistence activities. The percentage of small, medium, and large mammals did not significantly differ between up- and downriver sites.

Artiodactyl index values across all sites indicated a reliance on artiodactyls during all time periods (Fig. 9). Relative to other species, elk dominated the early prehistoric assemblage, while deer dominated both middle and late prehistoric assemblages (Table 7).

When compared to all non-artiodactyl species (all small and medium mammals, wolf, mountain lion, bear, and short-faced bear) across all sites, artiodactyls comprised approximately 90% of middle and late prehistoric assemblages but only 34% of early prehistoric assemblages owing to the large bear NISP found at *Wewukiyepuh*. However, there was no significant difference in the percentage of artiodactyls between the early and middle prehistoric periods (Mann-Whitney rank-sum test, *p* = 0.1913), suggesting artiodactyl species were the focus of subsistence activities in all prehistoric periods.

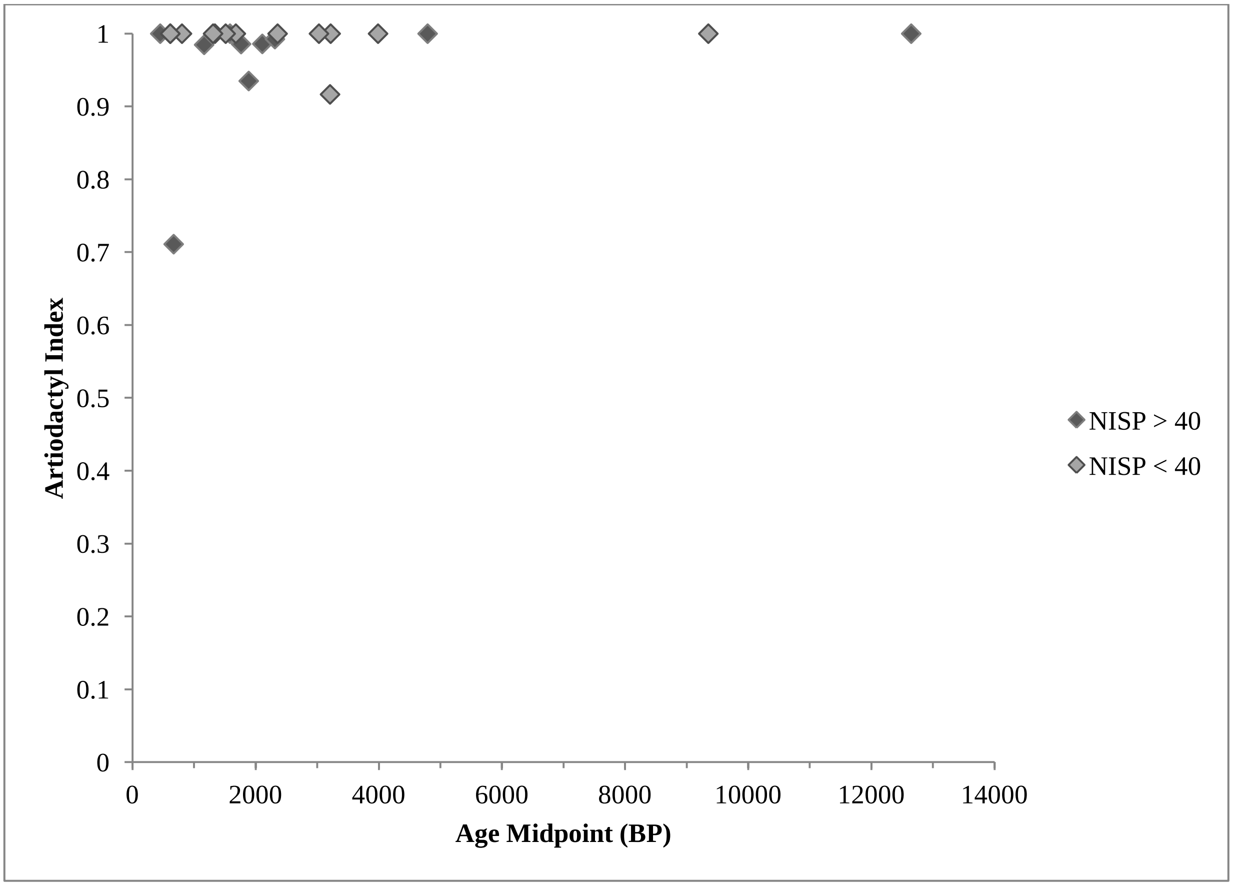

Figure 9. Artiodactyl index values for 23 assemblages. Four assemblages are not included: Lenore I, Spalding I, and North Lapwai Valley as they had no associated radiocarbon dates, and We'eptes Pa'axat as it is a multi-component site.

Table 7. Absolute and relative (%) frequencies of mammal species in 27 prehistoric faunal assemblages.

	Period (BP)		
Taxa	10,000-6000	6000-3000	3000-500
Sylvilagus nuttallii	3 (3.06)	-	16 (1.00)
Mustela spp.	-	3 (1.70)	6 (0.38)
Lepus sp.	1 (1.02)	-	8 (0.50)
Leporidae	-	-	11 (0.69)
Mephitis mephitis	-	-	4 (0.25)
Marmota sp.	1 (1.02)	-	1 (0.06)
Vulpes spp.	-	1 (0.57)	10 (0.63)
Mustelidae	-	-	1 (0.06)
Procyon lotor	-	-	2 (0.13)
Erithozon dorsatum	1 (1.02)	-	-
Lynx spp.	-	3 (1.70)	1 (0.06)
Canis spp.	-	8 (4.55)	56 (3.52)
Castor canadensis	-	1 (0.57)	11 (0.69)
Canis lupus	-	1 (0.57)	1 (0.06)
Antilocapra americana	-	2 (1.14)	21 (1.32)
Puma concolor	-	-	2 (0.13)
Odocoileus spp.	1 (1.02)	136 (77.27)	1192 (75.02)
Ovis canadensis	-	-	45 (2.83)
Ursus spp.	56 (57.14)	2 (1.14)	40 (2.52)
Cervus elaphus	32 (32.65)	18 (10.23)	120 (7.55)
Equus spp.	1 (1.02)	-	8 (0.50)
Bison spp.	1 (1.02)	1 (0.57)	33 (2.07)
Arctodus simus	1 (1.02)	-	-
Total	98	176	1589

A variety of ungulates were present prehistorically in the Clearwater and Lower Snake River regions of Idaho. Deer and elk, both of which are present in the region today, were likely acquired locally (Figs. 10,11). Both bison and pronghorn have been regionally extirpated, while bighorn sheep have a severely reduced range. Of these, pronghorn and bighorn sheep were likely acquired locally (< 10 km) (Figs. 12,13; Lyman 2007, 2009). Bison skeletal elements with low general utility indices (Lyman 1994) were recovered at several sites, suggesting bison were likely present within the study area as well (Fig. 14), rather than being transported to the area from the Great Plains (Chance and Chance 1985; Sappington et al. 1987; Toups 1970).

Across assemblages where Total NISP > 40, the relative abundance of deer was negatively correlated with taxonomic evenness (Spearman's *rho* = -0.8061; *p* = 0.0049), further indicating a specialized, deer-focused subsistence. The relative abundance of bighorn sheep was correlated with taxonomic evenness (Spearman's *rho* = 0.8283; *p* = 0.0031), suggesting it represented a diversifying component of a deer-specialized subsistence. Relative abundances of bison (Spearman's *rho* = 0.2422; *p* = 0.5002), elk (Spearman's *rho* = 0.1758; *p* = 0.6272), and pronghorn (Spearman's *rho* = 0.4399; *p* = 0.2033) were not correlated with taxonomic evenness, suggesting these species did not contribute to patterns of specialization in the region.

No difference in artiodactyl distribution between upriver and downriver assemblages was detected (Mann-Whitney rank-sum test, *p* = 0.4923). On a per-species basis, only the occurrence of pronghorn showed a statistically significant difference between up- and downriver sites (Mann-Whitney rank-sum test, *p* = 0.0449), with greater numbers documented at downriver sites.

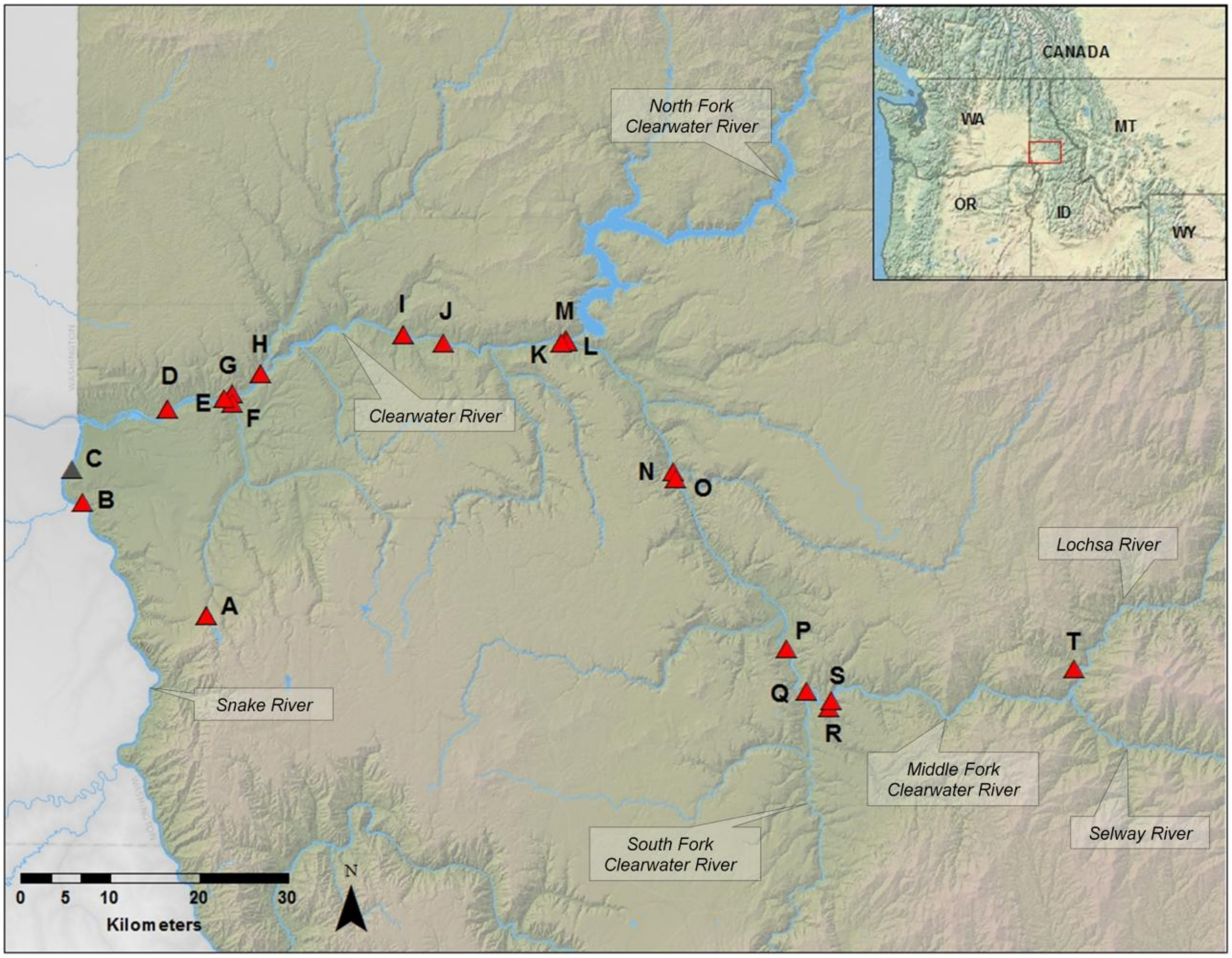

Figure 10. Map showing locations of deer remains in the study area. Red triangles represent locations where deer remains were recovered.

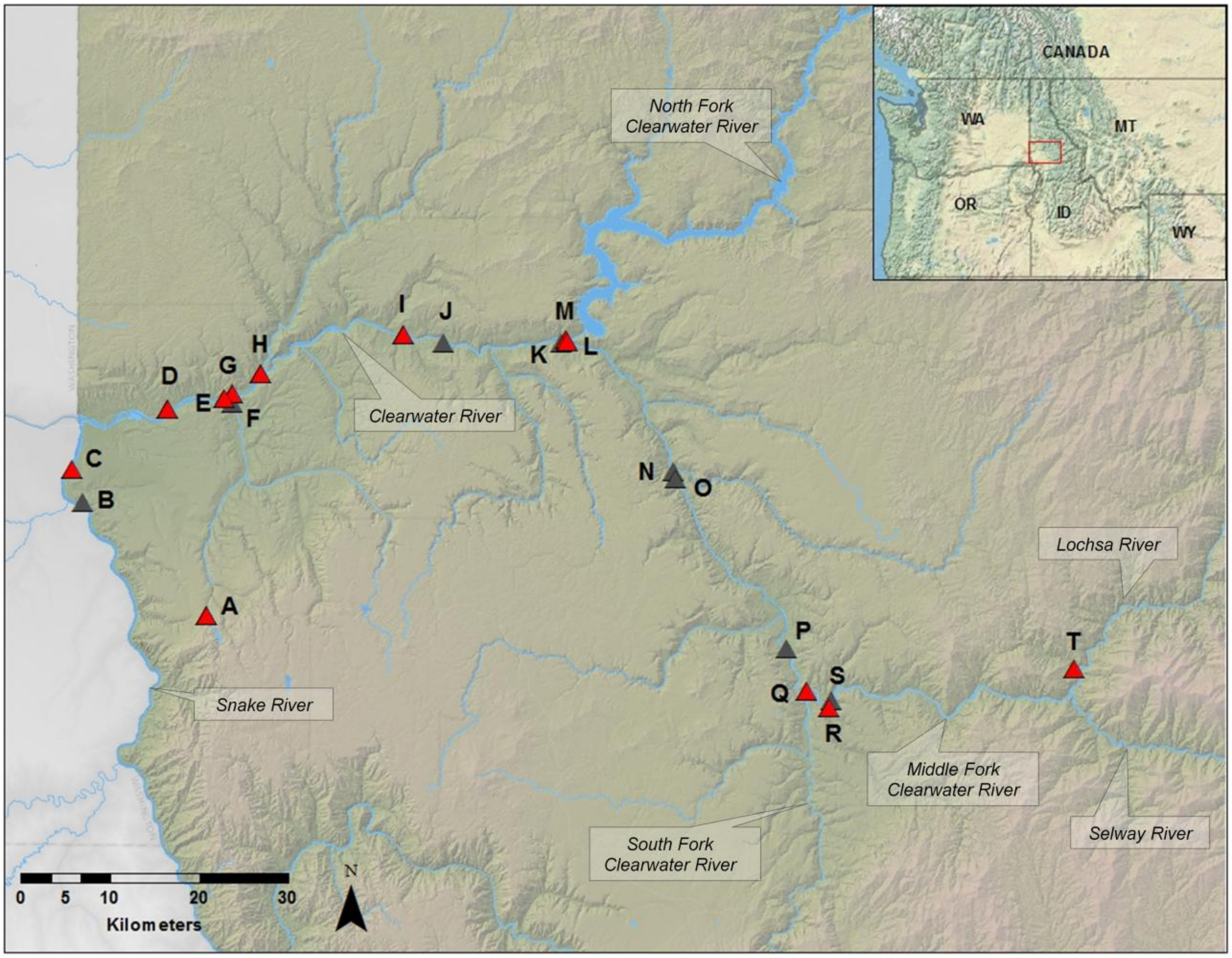

Figure 11. Map showing locations of elk remains in the study area. Red triangles represent locations where elk remains were recovered.

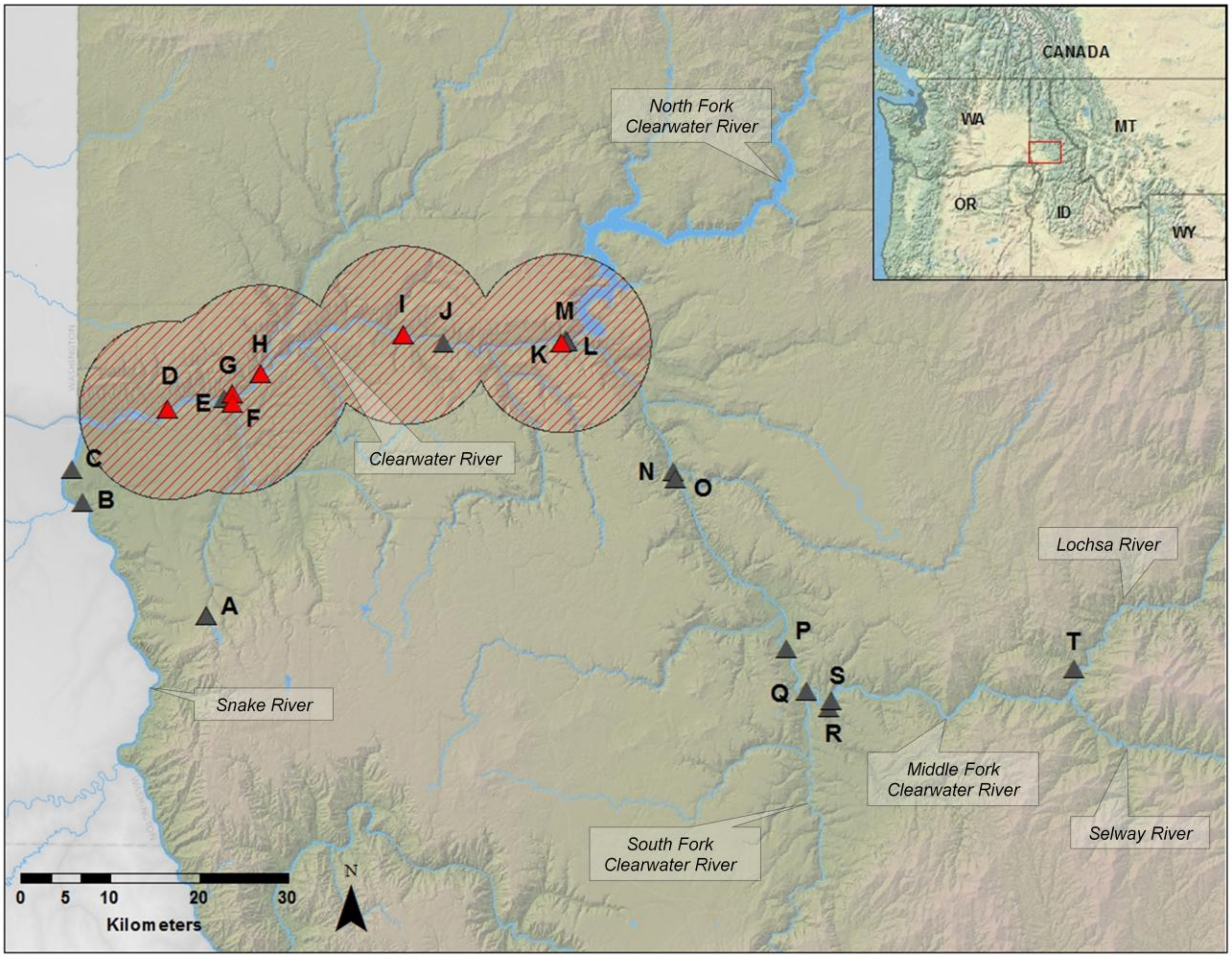

Figure 12. Map showing locations of pronghorn remains in the study area. Red triangles represent locations where pronghorn remains were recovered. Circles represent a 10 kilometer buffer.

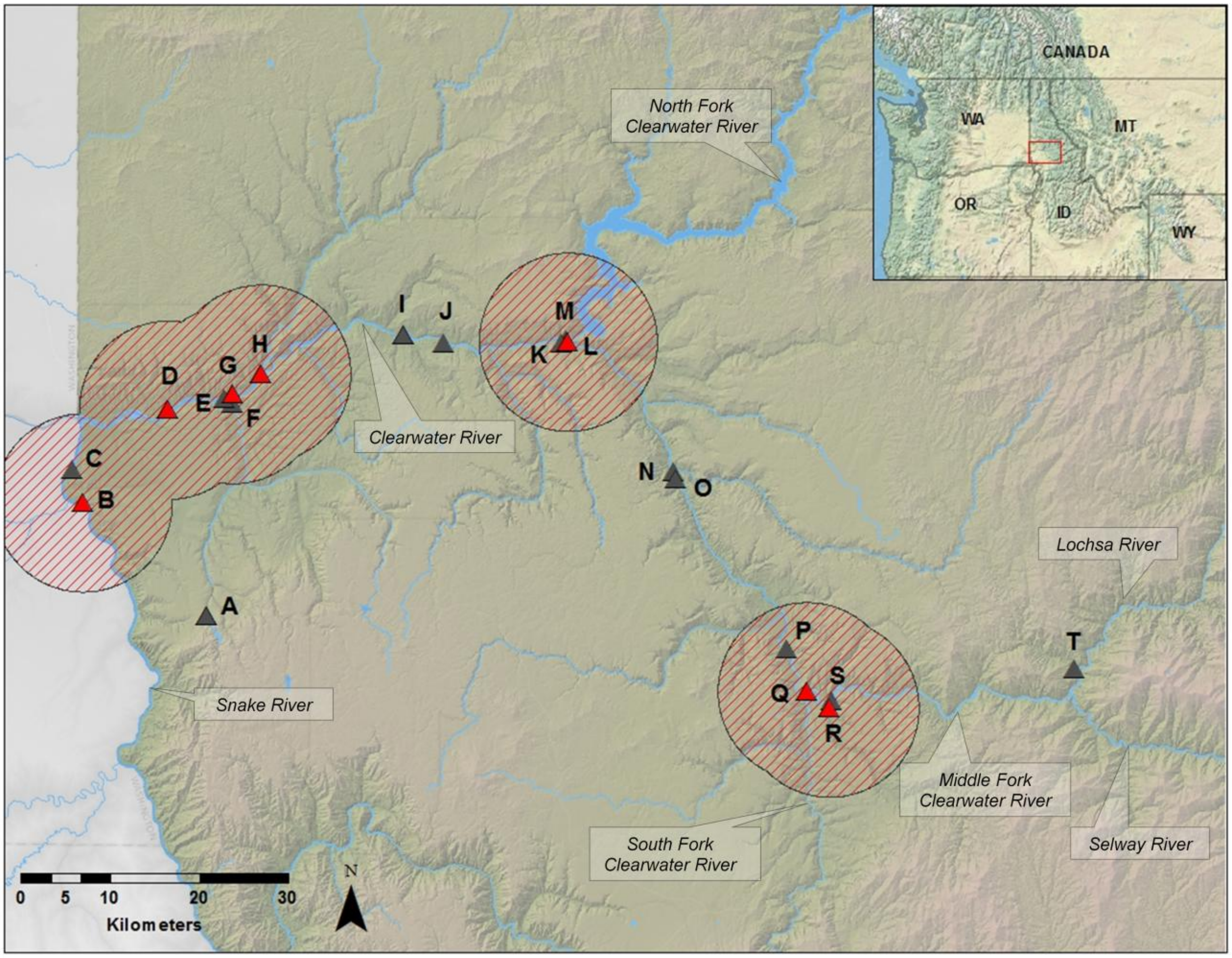

Figure 13. Map showing locations of bighorn Sheep remains in the study area. Red triangles represent locations where bighorn sheep remains were recovered. Circles represent a 10 kilometer buffer.

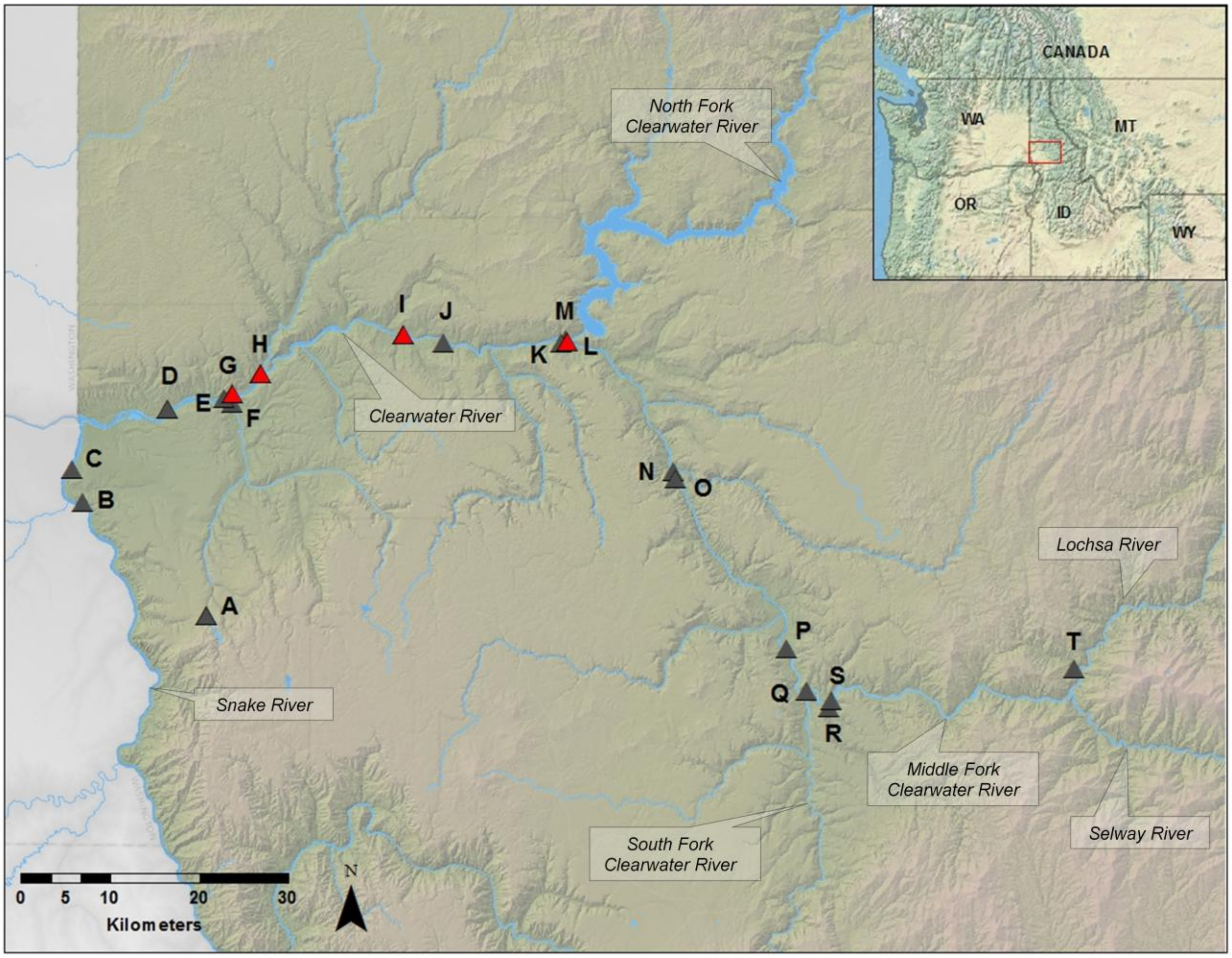

Figure 14. Map showing locations of bison remains in the study area. Red triangles represent locations where bison remains were recovered.

A variety of other mammal species were at least occasionally exploited as well. At least two genera of leporids, *Lepus* spp. and *Sylvilagus nuttallii* were present in the study area (Fig. 15). No *Lepus* remains were identified to species and all are found in downriver sites. *Sylvilagus* remains are present in both down- and upriver sites. Black bears are currently present within the study area, so it is likely they were acquired locally (Fig. 16). Grizzly bears have been regionally extirpated, however, as there are historic accounts of grizzly bears in the region (Moulton 2005), it is likely they were acquired within the study area as early as ca. 10,300 BP.

Leporids within the study area were less well-represented than in assemblages in nearby Washington (Atwell 1989; Lyman 2013), comprising an average of 4.1% of early prehistoric assemblages, 0% of middle prehistoric assemblages, and 2.2% of late prehistoric assemblages. There was no significant difference of screen size on the recovery of leporid remains ($p = 0.6542$). Ursids comprised 57.1% of early prehistoric assemblages, 1.1% of middle prehistoric assemblages, and 2.5% of late prehistoric assemblages. The relative abundance of ursids to other mammal remains during the early prehistoric is due to the large amount of bear specimens in one assemblage.

Across all assemblages, NISP values for leporids (Spearman's *rho* = 0.3196; $p = 0.1042$) and bears (Spearman's *rho* = 0.0865; $p = 0.668$) were not correlated with taxonomic evenness, suggesting neither leporids nor bears contributed to patterns of specialization in the region. No difference in the distribution of leporids (Mann-Whitney rank-sum test, $p = 0.0519$) or bears (Mann-Whitney rank-sum test, $p = 0.602$) was detected between upriver and downriver assemblages.

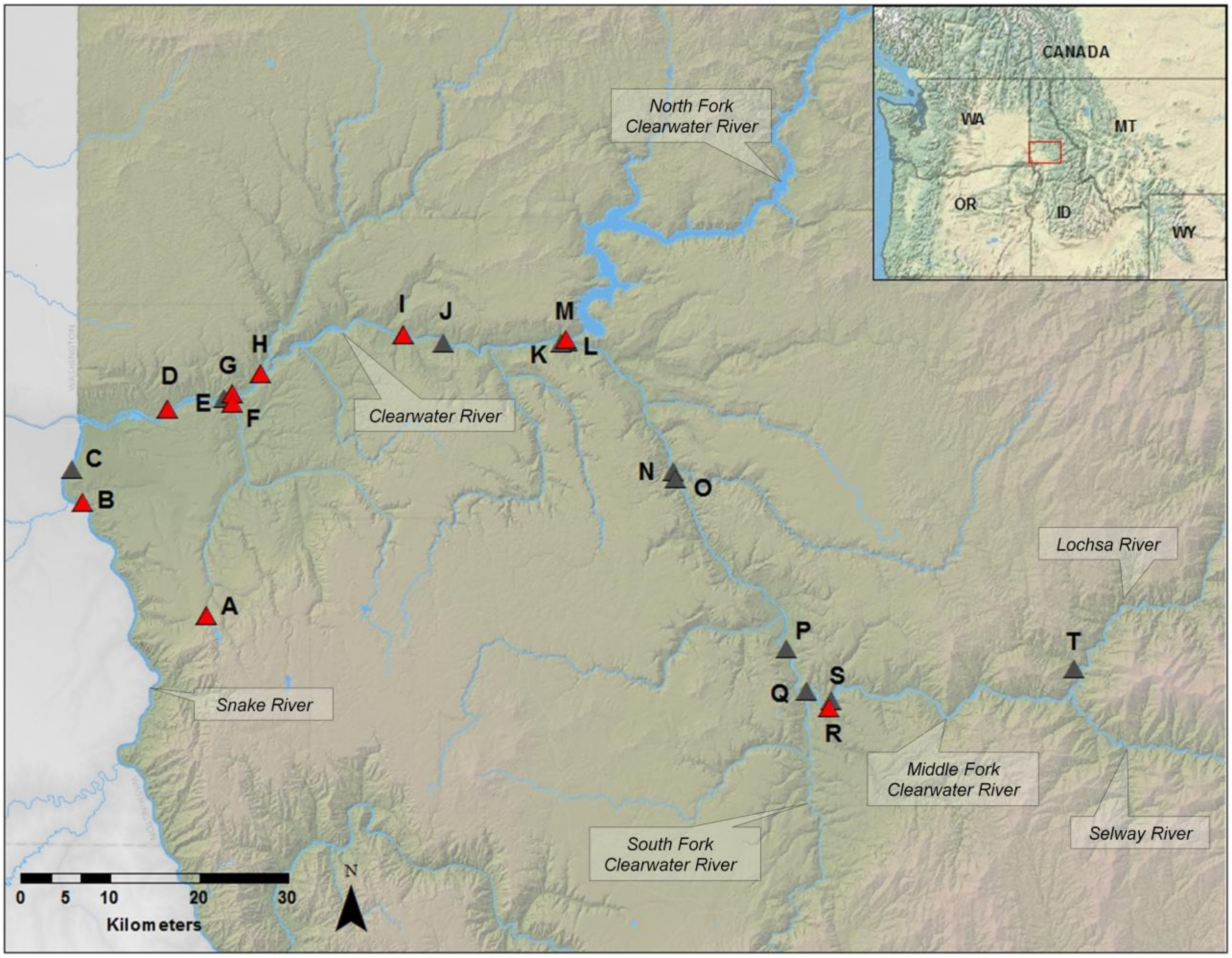

Figure 15. Map showing locations of leporid remains in the study area. Red triangles represent locations where leporid remains were recovered. Sites A, F, M contained Leporidae remains only. Site I contains *Lepus* spp. remains only. Site G contains *Sylvilagus nuttallii* only. Sites B and H contain both *Sylvilagus nuttallii* and *Lepus* spp. remains. Site R contains *Sylvilagus nuttallii* and Leporidae remains. Site D contains remains of all three Leporid types.

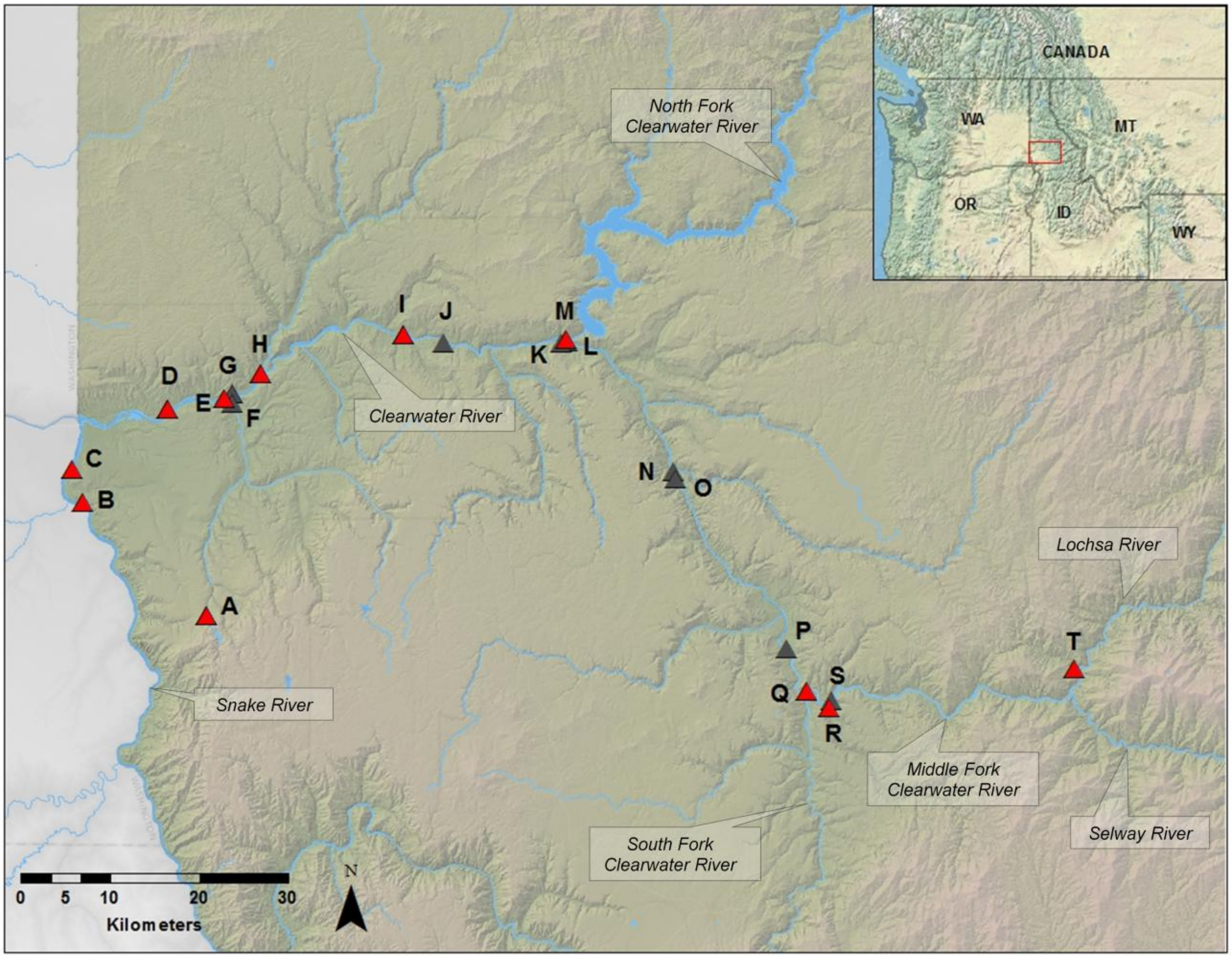

Figure 16. Map showing locations of ursid remains in the study area. Red triangles represent locations where *Ursus* spp. remains were recovered. Site A contains remains of *Ursus americanus*. Site C contains remains of *Ursus arctos*. Site G contains remains of *Arctodus simus*.

Chapter 6. Discussion

Bighorn sheep, bison, and pronghorn, all of which have been extirpated from the study area, have been found in archaeological contexts in the Clearwater and adjacent lower Snake River regions of Idaho. Data suggest that bighorn sheep were present within the study area during at least the last 3000 years, pronghorn were present during the last 6000 years, and bison were present during approximately the last 10,000 years (BP). However, absence of these (or any) species at a site may reflect local absence, poor preservation, or minimal sampling (Lyman 2007, 2009). The abundance of these three species relative to that of deer and elk suggests they were never the focus of specialized subsistence activities and may have been exploited opportunistically.

Contrary to traditional models which suggest more generalized subsistence practices (Jones and Beck 2012; Larson 2012; Lyman 2013; Willey and Phillips 1958), Holocene assemblages from the Clearwater and adjacent lower Snake River regions of Idaho indicate artiodactyl specialization consistent with findings from other faunal assemblages in the Northern and Southern Columbia Basin (Lyman 2013). Plotting taxonomic richness against taxonomic evenness suggests a specialized subsistence even when the number of taxa (richness) is high. The only exception is the Spalding I (early prehistoric) assemblage where site inhabitants appear to have practiced a generalized subsistence and shifted to a more specialized subsistence during the late prehistoric period (represented by the Spalding II assemblage).

Analyses of assemblages from the study area suggest deer were almost always the most important prey item, correlating negatively with evenness values, suggesting a specialized, deer-focused subsistence. The five assemblages with evenness values > 3.5 also have relatively few deer remains, suggesting that other taxa may have been the focus of subsistence efforts in some areas. It is possible that the more arid conditions present in the Columbia Basin between 8500 and 5500 BP (roughly between the early and middle prehistoric periods) corresponded to the increase in relative abundance of pronghorn remains and decrease in relative abundance of bison and elk remains during the middle prehistoric period (Lyman 2007). More early and middle prehistoric assemblages are needed to provide a more robust sample size to investigate this further. As data from both early and middle prehistoric periods are limited to four assemblages each, and because Total NISP was correlated with the number of taxa found, it is possible that more intensive sampling could reveal the use of bighorn sheep and pronghorn during the early prehistoric period in the study area.

Temporal patterns of artiodactyl exploitation suggest artiodactyl-specialized subsistence from early to late prehistoric periods. The four early prehistoric assemblages indicate subsistence practices may have been more generalized than middle and late prehistoric assemblages, but very low sample sizes urge caution in the interpretation of these data. Artiodactyls were evenly distributed in up- and downriver assemblages during the late prehistoric period. Of the five species documented, only pronghorn displayed any variability in spatial distribution, with greater numbers documented at downriver sites. It is possible that differential preservation of faunal remains between downriver and upriver sites has biased these data, further urging caution in their interpretation. In addition, sampling intensity has been higher in downriver versus upriver areas.

Leporids are less well-represented, especially among early prehistoric assemblages, in the Clearwater River region than elsewhere in the Columbia Plateau (Atwell 1989; Lyman

2013). Ursids are present in 13 assemblages, including a black bear at Sweetwater Springs, and a grizzly bear at *Wewukiyepuh*. Neither leporids nor ursids were the focus of subsistence activities.

Late Pleistocene megafauna have been recovered at several sites across North America. Both American mastodons (*Mammut americanum*) and North American mammoths (*Mammuthus* spp.) were widespread in unglaciated North America, with mastodons preferring woodlands and forests and mammoths preferring open grasslands (Grayson 1991). Pleistocene bison (*Bison antiquus*) were also common in North America (Grayson 1991). Short-faced bears (*Arctodus simus*) have been recovered from Washington, Oregon, Utah, and several locations in Canada (Gillette and Madsen 1992; Steffen and Harington 2010).

A short-faced bear (*Arctodus simus*) recovered from the Spalding site is the only extinct Pleistocene megafauna specimen represented from an archaeological context within the study area. The short-faced bear specimen consisted of the proximal end of a 4th metacarpal, and exhibited evidence of butchering (Chance and Chance 1985). Remains of both *Mammuthus* spp. and *Bison antiquus* were recovered from culturally sterile deposits at *Wewukiyepuh* (Schuknecht 2000), and the remains of a Columbian mammoth (*Mammuthus columbi*) were recovered near Kamiah, Idaho (Plastino 1997), indicating that both occurred within the study area as well.

It is possible that the small number of archaeological sites dating to the Pleistocene-Holocene transition is responsible for the dearth of Pleistocene megafauna specimens. Alternatively, megafauna populations may have been declining prior to the arrival of humans into North America, resulting in minimal temporal overlap between megafauna and humans, as observed in the northeastern United States (Boulanger and Lyman 2014).

Future investigations of Clearwater and lower Snake River faunal assemblages should prioritize more extensive and intensive faunal sample collection and identification as well as an evaluation of the impact of both site function and regional Holocene climate on artiodactyl abundance. During faunal analyses, MNI values should be recorded for each taxon in addition to NISP values to avoid bias toward large mammals. In addition, faunal remains from multi-component sites should be assigned to a cultural phase when possible.

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Appendix A: Life Histories of Nez Perce Game Mammals

Artiodactyls

Moose* (*Alces alces*): *sá·slaqs

Moose arrived in North America from Asia during the late Pleistocene around 14000-11000 years ago (Franzmann 1981; Hundertmark et al. 2003). As the Laurentide and Cordilleran ice sheets retreated, an ice-free corridor was formed along the eastern slope of the Rocky Mountains allowing moose to disperse south- and eastward (Hundertmark et al. 2003). Four subspecies of moose inhabit Alaska and the Yukon Territory, western Canada to the Great Lakes, the Rocky Mountains from northern Colorado to southern Alberta, and eastern North America from the Great Lakes to the east coast (Hundertmark et al. 2003). The diet of moose is variable, but in general they utilize seasonally available aquatic plants, forbs, and woody vegetation/trees (Franzmann 1981). Moose are solitary and have one to several distinct home ranges (Franzmann 1981).

Pronghorn* (*Antilocapra americana*): *coq̓aláynin’ (f), lak’á·lix (m)

Pronghorn are the only extant members of the Antilocapridae family which originated in North America ca. 4 million years ago (Byers 1997). Antilocaprinae, the only extant subfamily, first appeared in the late Miocene and *Antilocapra americana* persisted to the present (Byers 1997). An estimated 35 million pronghorn inhabited North America prior to European arrival, and by 1924, the population had decreased to fewer than 20,000 (O'Gara 1978). Pronghorn utilize a variety of plants, including sagebrush during the winter and forbs during the summer (O'Gara 1978). Pronghorn generally form winter herds that disperse in spring; does and fawns form small herds during the summer and bucks form small bachelor herds (O'Gara 1978).

Bison (*Bison bison*): *qoq̓á·lx̣*

Bison first appear in North America during the middle Pleistocene near the Illinoian glacial and Sangamon interglacial periods, with a second immigration during the late Pleistocene (Reynolds et al. 2003). There were two separate populations of Bison in North America during the Wisconsin glaciation: the steppe bison (*B. priscus*), inhabiting Beringia, and *Bison antiquus*, inhabiting areas south of the continental ice sheet (Reynolds et al. 2003). By the beginning of the Holocene, ca. 10,000 years ago, the interbreeding of the two Pleistocene bison produced a shorter-horned bison (*B. occidentalis*), from which the two modern North American subspecies arose ca. 5,000 years ago (Reynolds et al. 2003).

Prehistorically, an estimated 30 million bison inhabited North America from Canada to northern Mexico (Meagher 1986). The distribution of bison is not limited by either altitude or temperature (Meagher 1986). Bison are grazers and primarily utilize grasses and sedges (Meagher 1986; Reynolds et al. 2003). Bison are gregarious and form herds composed of females, calves, young males, and a few older males (Meagher 1986). Most bison are seasonally migratory (Meagher 1986; Reynolds et al. 2003) and home range size varies with age, sex, and food availability (Reynolds et al. 2003).

Elk (*Cervus elaphus*): *tasí·px/tasí·pk (f), wewúkiye (m)*

The *Cervus* genus is thought to have originated in Asia and spread to North America during the Illinoian glaciation ca. 246,000 years ago (Peek 2003; Polziehn and Strobeck

2002). Elk originally occupied most of the United States, but have been extirpated from much of its original range (Peek 2003). There were an estimated 10 million elk in pre-contact North America, but by the early 1900s, the elk population was fewer than 100,000 (NRCS Wildlife Habitat Management Institute and Wildlife Habitat Council 1999). Four subspecies of elk inhabit North America: the Tule elk (*C. elaphus nannodes*) in California, the Manitoba elk (*C. elaphus manitobensis*) that occurred along the eastern edge of the Rocky Mountains from Colorado to Canada, the Roosevelt elk (*C. elaphus roosevelti*) of the Pacific coast from northern California to Canada, and the Rocky Mountain elk (*C. elaphus nelsoni*) which occurs east of the Cascades (NRCS Wildlife Habitat Management Institute and Wildlife Habitat Council 1999). The diet of elk is seasonally varied and consists of grasses, forbs, and woody plants. Elk are highly gregarious, and herd-makeup is dependent on season, sex, vegetation density, and availability of vegetative cover (Peek 2003). Some elk populations migrate between higher elevation summer ranges and lower elevation winter ranges, while other populations are nonmigratory (NRCS Wildlife Habitat Management Institute and Wildlife Habitat Council 1999; Peek 2003). Home range size is highly variable depends, among other things, on forage availability, cover quality, temperature, population density, and human disturbance (Peek 2003).

Mule Deer **(Odocoileus hemionus):** ***yeˀémes (f), té·wisi·n/té·wis (m); and White-tailed deer*** **(*O.* virginianus):** ***tatáp̓ay (f), tip̓í·tawisi·n /té·wis (m)***

Odocoileus spp. first appeared in North America 3.5 million years ago, at the beginning of the early Pliocene (Smith 1991). Mule deer evolved in the xeric badlands and mountains of the west, while white-tailed deer evolved in the mesic, deciduous forests of the east (Mackie et al. 2003). Both mule and white-tailed deer were distributed over most of North America (Anderson and Wallmo 1984; Smith 1991). Mule deer utilize a variety of woody and herbaceous forage (Anderson and Wallmo 1984) and grasses (Mackie et al. 2003), while white-tailed deer utilize grasses, forbs, leaves and twigs, and soft and hard mast (Smith 1991). Both deer species occupy discrete home ranges year after year and, in areas of major topographical relief, migrate between higher elevation summer ranges and lower elevation winter ranges (Anderson and Wallmo 1984; Smith 1991). The social structure of both deer species is organized around matriarchal groups of two or more generations of related females and their offspring, while males form small bachelor groups and are solitary during the breeding season (Anderson and Wallmo 1984; Mackie et al. 2003; Miller et al. 2010; Smith 1991).

Mountain goat (*Oreamnos americanus*): *c̓a x̣í·sx̣is*

Mountain goats first appeared in North America during the Wisconsinan glaciation (Rideout and Hoffmann 1975). The species inhabits alpine and subalpine areas with steep rocky terrain from western Montana, southern Idaho, and the Columbia River in Washington, north along the Rocky Mountains as far as Alaska (Rideout and Hoffmann 1975). Mountain goats are intermediate browsers, consuming a variety of seasonally-dependent grasses, forbs, and browse (Côté and Festa-Bianchet 2003; Rideout and Hoffmann 1975). Salt licks are an important resource for mountain goats, and goats can travel long distances to reach them (Côté and Festa-Bianchet 2003). Male and female mountain goats are spatially segregated, except during the rut, with males being either solitary or forming bachelor groups, and females forming nursery groups with kids, yearlings, and 2-year olds of both sexes (Côté and

Festa-Bianchet 2003). Some mountain goat populations migrate between higher elevation summer ranges and lower elevation winter ranges, while other populations are nonmigratory (Côté and Festa-Bianchet 2003; Rideout and Hoffmann 1975). Home range size is dependent on sex and herd composition, with males having smaller home ranges than females, and nursery groups having larger home ranges than bachelor groups (Côté and Festa-Bianchet 2003).

Bighorn sheep (*Ovis canadensis*): *hiyé·te (f), tin’ú·n (m)*

Wild sheep in North America arrived from Siberia during the Pleistocene and diverged about 600,000 years ago into two extant species, thinhorn sheep (*Ovis dalli*) that occupies Alaska and northwestern Canada, and bighorn sheep (*Ovis canadensis*) that ranges from southern Canada to Mexico (U.S. Fish and Wildlife Service 2003). An estimated 1.5-2 million bighorn sheep were in the western United States prior to the mid-1800s. Today, populations are less than 5% of historical abundance, and many populations have been extirpated from historic ranges (Carpenter et al. 2014). Bighorn sheep generally select open habitat near steep, rocky slopes (U.S. Fish and Wildlife Service 2003) and feed primarily on grasses with a variety of seasonally available shrubs and forbs (Shackleton 1985). Bighorn sheep males and females (with young) generally occupy separate ranges for much of the year with males joining females during the breeding season (Shackleton 1985; U.S. Fish and Wildlife Service 2003). Group size varies between 2 to >100 individuals depending on season and region (Krausman and Bowyer 2003). Seasonal migrations occur between higher elevation summer ranges and lower elevation winter ranges (Shackleton 1985; U.S. Fish and Wildlife Service 2003).

Non-Artiodactyls

Mountain cottontail/Nuttall's cottontail (*Sylvilagus nuttallii*)*: hé·ỷuxc (rabbit)*

The mountain cottontail is found in the intermountain region and its range overlaps with other cottontail species. Mountain cottontails occupy sagebrush habitat. The diet of cottontails varies by species, region, and season. In northern regions, herbaceous plants are consumed during the spring and summer, while woody plants are eaten during the fall and winter (Chapman and Litvaitis 2003).

Black-tailed jackrabbit (*Lepus californicus*) *and white-tailed jackrabbit* (*Lepus townsendii*): *wilá·lix (jackrabbit)*

The black-tailed jackrabbit is the most common jackrabbit species in the western United States, and ranged from Washington and Idaho in the north into central Mexico. White-tailed jackrabbits traditionally inhabit open mountainous regions from southern Canada into northern Arizona and New Mexico. In many regions of the western United States where black-tailed and white-tailed jackrabbit co-occur, white-tailed jackrabbits inhabit upper regions of mountain ranges, while black-tailed jackrabbits are found in the basin and foothill portions of the region. In general, black-tailed jackrabbits occupy many diverse habitats, while white-tailed jackrabbits are associated with prairie grassland habitats and upland grassland-shrubland steppe habitats. Home range size of both jackrabbit species is variable and affected by available food, water, cover, predators, competition, and climate (Flinders and Chapman 2003).

Snowshoe Hare (***Lepus americanus***)***: pálx̣c***

Snowshoe hares occupy a variety of habitat from Canada and Alaska through coniferous forests along the Pacific coast and the Cascade and Rocky Mountains and into northern California and western Nevada. Snowshoe hares are herbivorous and feed on leafy vegetation during the summer and woody browse during the winter. The size of home ranges is variable and is dependent on age, sex, food availability, and population cycle (Murray 2003).

Black Bear (***Ursus americanus***)**:** ***yá·kaˀ***

All members of the genus *Ursus* are descended from the Pliocene *U. minimus* (Schwartz et al. 2003). Ancestral black bears (*Ursus abstrusus*) colonized North America at least 4.3 million years ago (Krause et al. 2008). Historically, black bears occupied most forested regions of North America, while today, black bears occupy less settled, forested regions (Pelton et al. 1999). Black bears are largely herbivorous (Schwartz et al. 2003) with a diet generally consisting of grasses and forbs in spring, fruits and berries in the summer, a mixture of soft and hard mast during the fall, and opportunistic use of insects, carrion, and young ungulates (Larvière 2001; Pelton 2003; Svoboda et al. 2011). Black bears are normally solitary with the exception of sow-cub groups (Larvière 2001; Pelton 2003). The size and shape of black bear home ranges is variable dependant on availability of resources, sex, age, season, and population density, and both daily and seasonal movements are influenced by food availability (Larvière 2001; Pelton 2003). Most black bears hibernate during the winter (Larvière 2001; Pelton 2003).

Grizzly Bear (*Ursus arctos*): *x̣áx̣·c*

Grizzly bears originated in Eurasia and arrived in North America approximately 50,000 years ago (Province of British Columbia 2002). Prior to European settlement, grizzly bears inhabited most of western and central North America from the Arctic Ocean to central Mexico (Pasitschniak-Arts 1993; Schwartz et al. 2003), with approximately 50,000 grizzly bears living in what is now the continental U.S. prior to 1800 (Servheen 1999). By 1975, the grizzly population had been reduced to 700-800 and grizzly bears had been eliminated from 98% of their range (Schwartz et al. 2003; Servheen 1999). Grizzly bears are opportunistic omnivores and feed on a wide variety of seasonally-available taxa including grasses, horsetails, forbs, roots, corms, bulbs, fruits, whitebark pine nuts, insects, mammals, birds, and fish (Pasitschniak-Arts 1993; Schwartz et al. 2003). During the spring and early summer, grasses, forbs, and sedges make up the majority of the diet with winter-killed ungulates as a supplement, berries and roots are eaten during the late summer and early fall, and white bark pine nuts are eaten during the fall (Pasitschniak-Arts 1993; Schwartz et al. 2003). Almost all grizzly bear populations in North America hibernate from late fall until early spring; denning is influenced primarily by sex and pregnancy status, food availability, and weather (Schwartz et al. 2003). The size of grizzly bear home ranges is largely dependent upon the availability of food resources; in areas where bears have access to dependable, high-quality food resources, ranges are smaller (Schwartz et al. 2003). Sizes of home ranges are also dependent upon age and sex, with adult male bears having larger ranges than adult females, and females with cubs having the smallest home ranges (Pasitschniak-Arts 1993; Schwartz et al. 2003).

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Appendix B: Amphibian, Reptilian and Avian Faunal Assemblages from Archaeological Sites in the Study Area

Site	Squamata	Chelonia	Serpentes	Testudinata	Anura	Bird, undet.	Galliforme	Cygninae	Quail	Tetraonidae	Sturnus vulgaris	Assemblage Total
Clearwater Fish Hatchery	-	-	-	-	-	24	-	-	-	-	-	5597
Ahsahka Sportsmen's Access	-	-	-	-	-	-	-	-	-	-	-	3535
Canoe Camp	-	-	-	-	-	9	-	-	1	-	-	285
Pete King Creek	-	-	-	-	-	1	-	-	-	-	-	1308
Kam'-nak-ka	-	-	-	-	-	20	-	1	-	1	2	7368
Tuhkaytahs'peh	-	-	-	-	-	10	-	-	-	-	-	3479
Kooskia Bridge	-	-	-	-	-	-	-	-	-	-	-	5442
Kamiah Waterline Trench	-	-	-	-	-	-	-	-	-	-	-	115
Lolonima'puh	-	-	-	-	-	6	5	-	-	-	-	400
Piik'uh taxxsawxt	-	-	-	-	-	-	-	-	-	-	-	1340
Arrow Beach I-IV	-	-	-	-	-	4	-	-	-	-	-	468
Lenore	-	-	-	-	-	N/A	-	-	-	-	-	N/A
Spalding I	1	-	-	-	1	-	-	-	-	-	-	330
Spalding II	-	11	-	-	-	3	-	-	-	-	-	330
Qi·ˀtípa	-	-	-	-	-	2	-	-	-	-	-	1086
Hatwai I	-	-	-	-	-	4	-	-	-	-	-	179
Hatwai II	-	-	-	-	-	12	-	-	-	-	-	889
Red Elk Rockshelter	-	-	3	1	-	12	-	-	-	-	-	2375
North Lapwai Valley	-	-	-	-	-	-	-	-	-	-	-	1457
Sweetwater Springs II-IV	-	-	-	-	-	-	-	-	-	-	-	868
Wewukiyepuh	-	-	-	-	-	2	-	-	-	-	-	1714
We'eptes Pa'axat	-	-	-	-	-	1	-	-	-	-	-	758

Appendix C: Molluscan and Icthyofaunal Assemblages from Archaeological Sites in the Study Area

Site	Salmonidae	Non- salmonid	Cyprinidae	Catostomidae	Catostomidae/_ Cyprinidae	Osteichthyes	Mussel, undet.	Margaretifera falcata	Snail	Shell, undet.	Fish, undet.	Assemblage Total
Clearwater Fish Hatchery	-	-	-	-	-	-	32	-	-	-	1	5597
Ahsahka Sportsmen's Access	-	-	-	-	-	-	-	24	-	-	-	3535
Canoe Camp	-	-	-	-	-	-	11	1	-	-	-	285
Pete King Creek	-	-	-	-	-	-	-	-	-	-	-	1308
Kam'-nak-ka	2	-	3	1	-	-	72	3	26	-	24	7368
Tuhkaytahs'peh	-	-	2	-	-	-	-	-	-	-	1	3479
Kooskia Bridge	2	3	-	-	-	-	-	259	-	-	259	5442
Kamiah Waterline Trench	-	-	-	-	-	-	-	3	-	-	-	115
Lolonima'puh	-	-	-	-	-	-	-	-	-	18	-	400
Piik'uh taxxsawxt	-	-	-	-	-	-	-	-	-	-	-	1340
Arrow Beach I-IV	-	-	-	4	-	-	-	N/A	-	-	13	468
Lenore	-	-	-	-	-	-	-	-	-	-	1	U
Spalding I	3	-	-	2	3	-	-	-	-	-	13	330
Spalding II	34	-	-	-	5	-	-	-	-	-	25	330
Qi·ˀtípa	-	-	-	-	-	-	-	-	-	583	15	1086
Hatwai I	-	-	-	-	-	3	-	716	-	-	-	179
Hatwai II	-	-	-	-	-	10	-	-	-	-	-	889
Red Elk Rockshelter	-	1	-	-	-	-	-	-	-	-	-	2375
North Lapwai Valley	-	-	-	-	-	-	403	-	-	-	-	1790
Sweetwater Springs II-IV	-	-	-	-	-	-	-	-	-	-	-	868
Wewukiyepuh	-	-	-	-	-	-	-	-	-	-	1	1714
We'eptes Pa'axat	-	-	-	-	-	-	-	-	-	-	-	758

Appendix D: Intrusive Rodent Assemblage from Archaeological Sites in the Study Area

Site	Thomomys	Urocitellus	Microtus	Zapus princeps	Peromyscus	Mouse, undet.	Cricetidae	Rodentia	Sciuridae	Assemblage Total
Clearwater Fish Hatchery	-	-	-	-	1	-	-	2	-	5597
Ahsahka Sportsmen's Access	-	-	-	-	-	-	-	2	-	3535
Canoe Camp	-	-	-	-	-	-	-	-	-	285
Pete King Creek	-	-	-	-	-	-	-	-	-	1308
Kam'-nak-ka	15	-	1	-	2	-	-	16	-	7368
Tuhkaytahs'peh	-	1	-	-	-	-	-	-	1	3479
Kooskia Bridge	2	-	-	-	-	-	-	3	-	5442
Kamiah Waterline Trench	-	-	-	-	-	-	-	-	-	115
Lolonima'puh	-	-	-	-	-	-	-	3	17	400
Piik'uh taxxsawxt	-	-	-	-	-	-	-	-	-	1340
Arrow Beach	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	468
Lenore	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	U
Spalding I	-	-	5	-	-	-	-	2	-	330
Spalding II	3	-	3	6	-	-	-	5	1	330
Qi·ˀtípa	3	3	-	-	-	-	-	31	51	1086
Hatwai I-II	-	-	-	-	-	-	-	-	-	1086
Red Elk Rockshelter	-	2	8	-	-	-	-	1	-	2375
North Lapwai Valley	4	1	-	-	-	-	-	8	-	1790
Sweetwater Springs II-IV	5	8	1	-	-	-	-	17	-	868
Wewukiyepuh	-	-	-	-	-	-	63	15	-	1714
We'eptes Pa'axat	6	-	-	-	-	2	-	35	-	758

Appendix E: Faunal Assemblage from the Sweetwater Springs (10-NP-313)

Item No.	Taxon	Number	Element	Modification	Notes
3.1.15	Medium mammal	10	Long bone shaft fragment	Unburned	
3.1.15	Undetermined	3	Long bone shaft fragment	Calcined	
3.1.15	Undetermined	2	Long bone shaft fragment	Burned	
3.10.1	Medium mammal	1	Long bone shaft fragment	Calcined	
3.10.1	Medium/large mammal	7	Long bone shaft fragment	Unburned	
3.11.1	Medium mammal	1	Auditory bulla	Unburned	
3.11.1	Medium mammal	1	Long bone shaft fragment	Burned/cutmarks	
3.11.1	Medium mammal	1	Long bone shaft fragment	Polished	
3.11.1	Medium mammal	3	Long bone shaft fragment	Unburned	
3.11.1	Undetermined	4	Cancellous bone	Unburned	
3.11.1	Undetermined	2	Undetermined	Calcined	
3.11.1	Undetermined	3	Undetermined	Burned	
3.11.1	Undetermined	1	Undetermined	Part-burned	
3.11.1	Undetermined	7	Undetermined	Unburned	
3.11.7	Cervidae	1	Antler fragment	Unburned	1 in 7
3.12.1	Medium mammal	4	Undetermined	Burned	
3.12.1	Medium mammal	8	Long bone shaft fragment	Unburned	
3.12.1	Small mammal	1	Distal tibia	Unburned	
3.13.1	Medium mammal	3	Long bone shaft fragment	Unburned	
3.13.1	Small mammal	1	Distal tibia	Unburned	
3.13.1	Undetermined	1	Undetermined	Burned	
3.14.7	Medium mammal	5	Long bone shaft fragment	Unburned	
3.14.7	Medium mammal	1	Undetermined	Burned	
3.15.1	Medium mammal	1	Metapodial shaft fragment	Unburned	1 in 2
3.15.1	Rodentia	1	Incisor	Unburned	
3.15.1	Undetermined	8	Cancellous bone	Unburned	
3.16.2	Medium/large mammal	1	Long bone shaft fragment	Part-burned	
3.16.2	Undetermined	3	Cancellous bone	Unburned	
3.17.4	Undetermined	3	Cancellous bone	Unburned	
3.18.1	Rodentia	2	Incisor	Unburned	
3.18.1	Undetermined	1	Undetermined	Unburned	
3.2.1	Undetermined	1	Undetermined	Bone awl	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
3.2.2	Medium mammal	1	Vertebra fragment	Unburned	
3.2.2	Medium mammal	1	Long bone shaft fragment	Polished	
3.2.2	Medium mammal	1	Long bone shaft fragment	Part-calcined	
3.2.2	Medium mammal	5	Long bone shaft fragment	Unburned	
3.2.2	*Ursus americanus*	1	5th left metacarpal	Unburned	
3.20.1	Medium mammal	1	Long bone shaft fragment	Unburned	
3.3.2	Medium mammal	1	Distal phalange	Unburned	
3.3.2	Medium mammal	2	Long bone shaft fragment	Polished	
3.3.2	Medium mammal	2	Vertebra fragment	Unburned	
3.3.2	Medium mammal	1	Long bone shaft fragment	Unburned/cutmarks	
3.3.2	Small mammal	3	Long bone shaft fragment	Unburned	
3.3.2	Unidentified	2	Long bone shaft fragment	Burned	
3.3.2	Unidentified	1	Long bone shaft fragment	Burned	1 in 3
3.3.2	Unidentified	5	Undetermined	Calcined	
3.3.2	Unidentified	12	Long bone shaft fragment	Unburned	
3.4.1	Medium mammal	4	Long bone shaft fragment	Calcined	
3.4.1	Medium mammal	1	Long bone shaft fragment	Burned/Polished	
3.4.1	Medium mammal	11	Long bone shaft fragment	Unburned	
3.4.1	Medium mammal	1	Proximal phalange fragment	Unburned	
3.5.1	Medium mammal	1	Scapula fragment	Unburned	
3.5.1	Medium mammal	2	Long bone shaft fragment	Unburned	
3.5.1	Small mammal	2	Long bone shaft fragment	Unburned	
3.5.1	Unidentified	2	Undetermined	Calcined	
3.5.1	Unidentified	1	Cancellous bone	Unburned	
3.5.1	Unidentified	9	Undetermined	Unburned	
3.5.1	Unidentified	2	Undetermined	Unburned	
3.6.9	*Cervus canadensis*	1	Axis	Unburned	Sub-adult; epiphysis not fused
3.6.9	*Cervus canadensis*	1	3rd cervical vertebra	Unburned	Sub-adult; epiphysis not fused

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
3.6.9	*Cervus canadensis*	1	Cervical vertebra	Unburned	Sub-adult; epiphysis not fused
3.7.2	Medium mammal	1	Long bone shaft fragment	Burned/Polished	
3.7.2	Medium mammal	1	Femur fragment left	Unburned	
3.7.2	Medium mammal	5	Long bone shaft fragment	Unburned	
3.7.2	Medium mammal	1	Scapula fragment	Unburned	
3.7.2	Small mammal	1	Scapula	Unburned	
3.7.2	Undetermined	5	Undetermined	Burned	
3.7.2	Undetermined	5	Undetermined	Unburned	
3.7.2	Undetermined	4	Cancellous bone	Unburned	
3.8.2	Medium mammal	5	Long bone shaft fragment	Unburned	
3.8.2	Medium/large mammal	1	Long bone shaft fragment	Calcined/cutmarks	
3.8.2	Small mammal	1	Incisor	Unburned	
3.8.2	Undetermined	3	Undetermined	Burned	
3.8.2	Undetermined	3	Skull fragment	Unburned	
3.9.6	Medium/large mammal	1	Metapodial shaft fragment	Unburned	1 in 9
3.9.6	Medium/large mammal	21	Long bone shaft fragment	Unburned	
3.9.6	Medium/large mammal	4	Vertebra fragment	Unburned	
3.9.6	Undetermined	1	Undetermined	Burned	
4.1.1	*Cervus canadensis*	1	Incisor fragment	Unburned	
4.1.2	Medium mammal	2	Long bone shaft fragment	Calcined	
4.1.2	Medium mammal	1	Long bone shaft fragment	Polished	
4.10.1	Medium/large mammal	1	Long bone shaft fragment	Unburned	
4.10.1	Small/medium mammal	1	Long bone shaft fragment	Partially burned	
4.10.1	*Thomomys talpoides*	1	Skull	Unburned	Auditory bullae detached
4.10.1	*Thomomys talpoides*	1	Mandible	Unburned	Teeth not in sockets
4.11.1	Small mammal	1	Long bone shaft fragment	Unburned	
4.12.6	Medium mammal	3	Cancellous bone	Unburned	
4.12.6	Medium mammal	1	Long bone shaft fragment	Unburned	
4.12.6	Undetermined	1	Undetermined	Calcined	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
4.13.4	Undetermined	1	Undetermined	Awl fragment	
4.13.4	Undetermined	1	Undetermined	Unburned	
4.2.1	Medium mammal	1	Rib fragment	Unburned	
4.3.1	Medium mammal	1	Long bone shaft fragment	Part-burned	
4.3.1	Medium mammal	3	Cancellous bone	Calcined	
4.3.1	Medium mammal	1	Antler fragment	Unburned	
4.3.1	Medium mammal	6	Cancellous bone	Unburned	
4.4.1	Medium mammal	2	Long bone shaft fragment	Unburned	
4.5.2	Medium mammal	1	Long bone shaft fragment	Burned	
4.5.2	Medium mammal	1	Long bone shaft fragment	Calcined	
4.5.2	Medium mammal	8	Long bone shaft fragment	Unburned	
4.5.2	Medium/large mammal	1	Tooth enamel	Unburned	
4.6.3	Medium mammal	3	Long bone shaft fragment	Unburned	
4.6.3	Undetermined	4	Cancellous bone	Unburned	
4.7.1	Medium mammal	2	Long bone shaft fragment	Part-burned	
4.7.1	Medium mammal	2	Long bone shaft fragment	Unburned	
4.7.1	Rodentia	1	Skull fragment	Unburned	
4.8.1	Medium mammal	1	Long bone shaft fragment	Burned	
4.8.1	Undetermined	1	Tooth enamel	Unburned	
4.8.1	Undetermined	3	Long bone shaft fragment	Unburned	
4.9.1	Medium mammal	3	Long bone shaft fragment	Unburned	
4.9.1	Medium/large mammal	2	Tooth enamel	Unburned	
4.9.1	*Odocoileus* spp.	1	Distal scapula fragment	Unburned	
4.9.1	Rodentia	1	Incisor	Unburned	
4.9.1	Small mammal	2	Skull fragment	Unburned	
4.9.1	Undetermined	1	Cancellous bone	Unburned	
5.1.6	Undetermined	1	Undetermined	Unburned	
5.10.5	Medium mammal	1	Long bone shaft fragment	Part-burned	
5.10.5	Medium mammal	1	Long bone shaft fragment	Unburned	
5.11.6	Medium mammal	1	Long bone shaft fragment	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
5.12.3	Undetermined	1	Undetermined	Polished	
5.13.6	Medium mammal	1	Long bone shaft fragment	Unburned	
5.13.6	Undetermined	1	Cancellous bone	Calcined	
5.13.6	Undetermined	1	Undetermined	Burned	
5.14.7	Medium mammal	1	Long bone shaft fragment	Unburned	
5.14.7	Medium mammal	6	Long bone shaft fragment	Calcined	
5.14.7	Medium mammal	2	Long bone shaft fragment	Burned	
5.14.7	Undetermined	3	Cancellous bone	Unburned	
5.15.5	Medium mammal	8	Long bone shaft fragment	Calcined	
5.15.5	Medium mammal	1	Long bone shaft fragment	Unburned	
5.15.5	Undetermined	6	Undetermined	Unburned	
5.17.4	Undetermined	2	Undetermined	Calcined	
5.17.4	Undetermined	3	Undetermined	Unburned	
5.2.9	Medium mammal	1	Long bone shaft fragment	Unburned	1 in 2
5.2.9	Medium mammal	6	Cancellous bone	Unburned	
5.2.9	Medium mammal	2	Undetermined	Unburned	
5.2.9	Rodentia	1	Innominate left	Unburned	
5.2.9	Small/medium mammal	2	Tooth enamel	Unburned	
5.2.9	Undetermined	1	Undetermined	Calcined	
5.3.13	Large mammal	1	Rib fragment	Unburned/cutmarks	c.f. *Cervus canadensis*; 1 in 2
5.3.8	*Odocoileus* spp.	1	Distal scapula fragment	Unburned	1 in 6 - glued
5.3.8	*Odocoileus* spp.	7	Scapula fragment	Unburned	
5.3.9	Medium mammal	1	Carpal	Unburned	
5.3.9	Medium mammal	1	Long bone shaft fragment	part-	
5.3.9	Medium mammal	3	Long bone shaft fragment	Unburned	
5.3.9	Undetermined	5	Cancellous bone	Unburned	
5.3.9	Undetermined	2	Undetermined	Calcined	
5.4.7	Undetermined	5	Undetermined	Unburned	
5.5.7	Medium mammal	1	Long bone shaft fragment	Unburned	1 in 2
5.5.7	Medium mammal	1	Long bone shaft fragment	Burned	
5.5.7	Undetermined	2	Undetermined	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
5.6.6	Medium mammal	2	Tooth enamel	Unburned	
5.6.6	Medium mammal	1	Long bone shaft fragment	Polished/striations	
5.6.6	Medium mammal	4	Long bone shaft fragment	Unburned	
5.7.6	Medium mammal	12	Long bone shaft fragment	Unburned	
5.7.6	Medium mammal	1	Distal phalange	Unburned	
5.7.6	Undetermined	1	Undetermined	Calcined	
5.8.12	Medium mammal	1	Long bone shaft fragment	Unburned	coyote-sized
5.8.12	Medium/large mammal	1	Long bone shaft fragment	Unburned/cutmarks	deer-sized
5.8.8	Medium mammal	1	Long bone shaft fragment	Part-burned/cutmarks	deer-sized
5.8.8	Medium mammal	2	Long bone shaft fragment	Burned	
5.8.8	Undetermined	1	Undetermined	Unburned	
5.9.6	Undetermined	1	Undetermined	Burned	
5.9.6	Undetermined	1	Undetermined	Calcined	
6.1.7	Medium mammal	4	Long bone shaft fragment	Unburned	
6.1.7	Undetermined	2	Undetermined	Calcined	
6.10.6	Medium/large mammal	1	Long bone shaft fragment	Unburned	
6.11.5	Small/medium mammal	1	Long bone shaft fragment	Unburned	
6.3.3	Undetermined	4	Undetermined	Unburned	
6.3.3	Undetermined	1	Undetermined	Calcined	
6.4.4	Medium mammal	1	Distal scapula fragment	Unburned	
6.5.11	Medium mammal	7	Long bone shaft fragment	Unburned	
6.5.11	Medium mammal	1	Tooth enamel	Unburned	
6.5.11	Undetermined	2	Undetermined	Calcined	
6.6.6	Medium mammal	5	Long bone shaft fragment	Unburned	
6.7.7	Rodentia	3	Skull fragment	Unburned	
6.7.7	Rodentia	1	Femur fragment left	Unburned	
6.9.8	Medium mammal	2	Long bone shaft fragment	Unburned	
7.1.4	Medium mammal	1	Cancellous bone	Unburned	
7.1.4	Small/medium mammal	1	Long bone shaft fragment	Unburned	
7.10.6	Medium mammal	4	Long bone shaft fragment	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
7.11.7	Small/medium mammal	1	Long bone shaft fragment	Part-burned	
7.11.7	Undetermined	3	Cancellous bone	Unburned	
7.13.6	Undetermined	1	Undetermined	Calcified	
7.13.7	Medium mammal	1	Long bone shaft fragment	Unburned	1 in 3
7.14.6	Rodentia	1	Scapula fragment, left	Unburned	
7.14.6	Undetermined	2	Undetermined	Calcified	
7.15.4	Undetermined	2	Undetermined	Calcified	
7.16.6	Medium mammal	14	Long bone shaft fragment	Unburned	
7.2.6	Medium mammal	4	Long bone shaft fragment	Unburned	
7.2.6	Undetermined	1	Undetermined	Calcined	
7.3.6	Medium/large mammal	1	Tooth enamel	Unburned	
7.4.12	Large mammal	1	Long bone shaft fragment	Unburned	1 in 2
7.4.12	Undetermined	4	Undetermined	Unburned	
7.4.7	Medium mammal	3	Long bone shaft fragment	Unburned	
7.4.7	Undetermined	2	Undetermined	Calcined	
7.4.7	Undetermined	2	Tooth enamel	Unburned	
7.5.7	Large mammal	1	Vertebra fragment	Unburned	c.f. *Cervus canadensis*
7.5.7	Undetermined	1	Cancellous bone	Unburned	
7.6.7	Undetermined	1	Undetermined	Unburned	
7.6.7	Undetermined	1	Cancellous bone	Unburned	
7.7.8	Medium mammal	1	Long bone shaft fragment	Part-burned	
7.7.8	Medium mammal	5	Long bone shaft fragment	Unburned	
7.7.8	Medium/large mammal	2	Tooth enamel	Unburned	
7.7.8	Undetermined	1	Undetermined	Burned/Polished	
7.8.5	Medium mammal	7	Long bone shaft fragment	Unburned	
7.8.5	Undetermined	1	Cancellous bone	Unburned	
7.9.4	Rodentia	1	Incisor	Unburned	
7.9.4	Undetermined	1	Undetermined	Calcified	
8.1.11	Medium mammal	1	Long bone shaft fragment	Burned/Polished	
8.1.11	Medium mammal	5	Cancellous bone	Unburned	
8.1.11	Medium mammal	1	Long bone shaft fragment	Unburned	
8.10.5	Medium mammal	2	Cancellous bone	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
8.10.5	*Thomomys talpoides*	1	Mandible, right	Unburned	
8.12.4	Undetermined	1	Cancellous bone	Unburned	
8.14.7	Medium/large mammal	1	Long bone shaft fragment	Unburned	1 in 6
8.16.5	Medium mammal	1	Long bone shaft fragment	Unburned/polished	
8.16.5	Undetermined	1	Cancellous bone	Unburned	
8.17.3	Undetermined	2	Cancellous bone	Unburned	
8.18.1	Undetermined	2	Undetermined	Unburned	
8.2.6	Medium mammal	3	Long bone shaft fragment	Unburned	
8.2.6	Undetermined	3	Undetermined	Calcified	
8.3.4	Undetermined	1	Undetermined	Unburned	
8.4.6	Undetermined	1	Undetermined	Calcified	
8.5.6	Medium/large mammal	2	Vertebra fragment	Unburned	c.f. *Cervus canadensis*
8.5.6	Medium/large mammal	1	Long bone shaft fragment	Unburned	
8.5.6	Undetermined	8	Cancellous bone	Unburned	
8.5.6	Undetermined	4	Undetermined	Unburned	
8.6.8	Medium mammal	1	Tooth enamel	Unburned	
8.6.8	Medium mammal	2	Long bone shaft fragment	Unburned	
8.6.8	*Thomomys talpoides*	1	Mandible fragment, right	Unburned	
8.7.5	Medium mammal	6	Long bone shaft fragment	Unburned	
8.7.5	Medium/large mammal	1	Tooth enamel	Unburned	
8.7.5	Rodentia	1	Mandible fragment, right	Unburned	
8.8.7	Medium mammal	1	Long bone shaft fragment	Burned/cutmarks	
8.8.7	Medium mammal	10	Long bone shaft fragment	Unburned	
8.8.7	Rodentia	3	Incisors	Unburned	
8.9.6	Medium mammal	3	Long bone shaft fragment	Part-burned	
9.1.6	Medium/large mammal	1	Tooth enamel	Unburned	
9.1.6	Undetermined	2	Undetermined	Unburned	
9.11.6	Small/medium mammal	1	Long bone shaft fragment	Unburned	
9.13.3	Medium mammal	2	Long bone shaft fragment	Unburned	
9.13.3	Undetermined	3	Undetermined	Unburned	
9.13.4	*Odocoileus* spp.	1	Distal phalange	Unburned	glued - 1 in 6
9.14.3	Medium/large mammal	1	Tooth enamel	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
9.14.3	Small mammal	2	Long bone shaft fragment	Unburned	
9.2.7	Large mammal	8	Long bone shaft fragment	Unburned	
9.2.7	Medium mammal	2	Long bone shaft fragment	Unburned	
9.2.7	Undetermined	2	Undetermined	Calcined	
9.2.7	Undetermined	2	Cancellous bone	Unburned	
9.2.7	Undetermined	7	Undetermined	Unburned	
9.3.7	Medium mammal	4	Long bone shaft fragment	Unburned	
9.3.7	Undetermined	2	Cancellous bone	Calcined	
9.4.7	*Lagomorpha*	1	Humerous fragment	Unburned	
9.4.7	Medium mammal	3	Long bone shaft fragment	Calcined	
9.4.7	Undetermined	3	Cancellous bone	Unburned	
9.5.7	Medium mammal	15	Long bone shaft fragment	Unburned	
9.5.7	Undetermined	1	Undetermined	Calcined	
9.5.7	Undetermined	3	Cancellous bone	Unburned	
9.5.7	Undetermined	1	Tooth enamel	Unburned	
9.5.8	*Odocoileus* spp.	1	Distal metatarsus, left	Unburned	
9.6.9	*Geomys* spp.	1	Skull fragment	Unburned	
9.6.9	Medium mammal	1	Long bone shaft fragment	Unburned/cutmarks	1 in 2
9.6.9	Small/medium mammal	7	Long bone shaft fragment	Unburned	
9.7.6	Medium mammal	1	Long bone shaft fragment	Unburned	
9.8.7	Medium mammal	1	Tooth enamel	Unburned	
9.8.7	Medium mammal	1	Long bone shaft fragment	Unburned	
9.9.7	Medium mammal	4	Long bone shaft fragment	Calcined	
9.9.7	Medium mammal	2	Long bone shaft fragment	Unburned	
10.10.5	Undetermined	1	Undetermined	Unburned	
10.12.5	Undetermined	1	Undetermined	Unburned	
10.13.4	Large mammal	1	Vertebra fragment	Unburned	
10.13.4	Undetermined	1	Cancellous bone	Unburned	
10.17.2	Undetermined	5	Cancellous bone	Unburned	
10.18.1	Undetermined	1	Cancellous bone	Unburned	
10.3.9	Medium mammal	1	Long bone shaft fragment	Partially burned/polished	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
10.4.10	Medium mammal	2	Long bone shaft fragment	Unburned	
10.4.10	Medium/large mammal	1	Scapula fragment	part-burned	c.f. *Cervus canadensis*; 1 in 3
10.4.10	Undetermined	1	Undetermined	part-burned	
10.5.8	Medium mammal	6	Long bone shaft fragment	Unburned	
10.5.8	Undetermined	6	Undetermined	Unburned	
10.5.8	Undetermined	2	Cancellous bone	Unburned	
10.7.5	Medium mammal	1	Tooth enamel	Unburned	
10.7.5	Medium mammal	1	Long bone shaft fragment	Calcined	
10.7.5	Medium mammal	2	Long bone shaft fragment	Unburned	
10.7.5	Undetermined	5	Undetermined	Unburned	
10.8.6	Medium mammal	2	Long bone shaft fragment	Unburned	
10.8.6	Undetermined	1	Undetermined	Calcined	
10.9.6	Medium mammal	1	Long bone shaft fragment	Unburned	
10.9.6	Rodentia	1	Incisor	Unburned	
10.9.6	Undetermined	4	Undetermined	Unburned	
11.1.10	Medium mammal	1	Long bone shaft fragment	Burned	
11.1.10	Small/medium mammal	1	Tooth enamel	Unburned	
11.1.10	Undetermined	1	Cancellous bone	Calcined	
11.1.8	*Odocoileus* spp.	1	Distal tibia, right	Unburned	
11.10.6	Medium mammal	8	Long bone shaft fragment	Unburned	
11.10.6	*Microtus spp.*	1	Mandible fragment, right	Unburned	
11.10.6	Undetermined	1	Undetermined	Calcined	
11.11.5	Medium mammal	1	Long bone shaft fragment	Unburned	
11.12.3	Medium mammal	2	Long bone shaft fragment	Unburned	
11.14.4	Medium mammal	3	Long bone shaft fragment	Unburned	
11.14.4	Undetermined	1	Undetermined	Calcined	
11.2.10	Medium mammal	4	Long bone shaft fragment	Unburned	
11.2.10	Small mammal	1	Long bone shaft fragment	Unburned	
11.2.10	Small/medium mammal	5	Long bone shaft fragment	Unburned	
11.2.10	Undetermined	7	Cancellous bone	Unburned	

Appendix E Continued

Item No.	Taxon	Number	Element	Modification	Notes
11.3.9	Medium mammal	16	Long bone shaft fragment	Unburned	
11.3.9	Undetermined	3	Undetermined	Calcined	
11.3.9	Undetermined	1	Cancellous bone	Unburned	
11.3.9	Undetermined	11	Undetermined	Unburned	
11.3.9	*Urocitellus* spp.	2	Mandible, left and right	Unburned	
11.3.9	*Urocitellus* spp.	2	Scapulae, left and right	Unburned	
11.3.9	*Urocitellus* spp.	2	Tibia fragments, left and right	Unburned	
11.3.9	*Urocitellus* spp.	1	Femur, right	Unburned	
11.5.7	Medium mammal	1	Molar	Unburned	
11.5.7	Medium mammal	3	Long bone shaft fragment	Unburned	
11.5.7	Undetermined	2	Undetermined	Calcined	
11.5.7	*Urocitellus* spp.	1	Molar	Unburned	
11.6.7	Medium mammal	2	Long bone shaft fragment	Unburned	
11.6.7	Medium/large mammal	1	Tooth enamel	Unburned	
11.6.7	Undetermined	2	Undetermined	Calcined	
11.6.7	Undetermined	7	Cancellous bone	Unburned	
11.7.6	Medium mammal	6	Long bone shaft fragment	Unburned	
11.7.6	Medium/large mammal	1	Tooth enamel	Unburned	
11.7.6	Small/medium mammal	1	Long bone shaft fragment	Unburned	
11.7.6	Undetermined	1	Undetermined	Calcined	
11.8.6	Medium mammal	12	Long bone shaft fragment	Unburned	
11.8.6	Medium mammal	1	Long bone shaft fragment	Unburned	
11.8.6	*Odocoileus* spp.	1	Proximal metapodial fragment	Unburned	
11.9.7	Medium mammal	3	Long bone shaft fragment	Unburned	
		Total:868			