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FEASTING ON FIDO:  
CULTURAL IMPLICATIONS OF EATING DOGS AT BRIDGE RIVER

By

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B.A., The University of the South, Sewanee, Tennessee, 2006

Thesis

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## ABSTRACT

Dogs represent a unique facet of the faunal assemblage at the Bridge River site (EeRI4), a prehistoric aggregated winter housepit village in southern British Columbia's Middle Fraser Canyon. As part of the Bridge River site investigation of emergent material wealth based status inequality of the hunter-gatherer-fisher economy, the 2008 and 2009 excavation of the village recovered the skeletal remains of domestic dogs within two distinct cache pit features in Housepit 24's Activity Area 3. The two dogs unearthed from these separate cache pits features show dichotomous roles for man's best friend; one, possibly as a prized companion, and the other as a food resource. This thesis focuses on the elements recovered from Feature 5 showing visible signs of trauma which include perimortem fractures, carnivore gnaw-marks, and cut-marks. The region's ethnographic record provides evidence of utilizing domestic dogs as a resource for food, clothing, hunting, packing, and trade. Evidence suggests that the contents of the Feature 5 cache pit resulted from a single event associated with feasting, and would represent a symbolic display of status. The use of dogs as a delicacy in the feasting apparatus is unique to the Bridge River village's archaeological record compared to the Keatley Creek site, where analyses concluded many of the dogs died of natural causes. The purpose of this thesis is to determine the depositional event that created the canid assemblage in Bridge River's Housepit 24; its sociocultural significance within the village; and its meaning within the broader context of the Canadian Plateau.

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## CHAPTER 1

*“I have been honoured with numerous entertainments of the kind amongst the other tribes... and all conducted in the same solemn and impressive manner; from which I feel authorized to pronounce the dog-feast a truly religious ceremony, wherein the poor Indian sees fit to sacrifice his faithful companion to bear testimony to the sacredness of his vows of friendship, and invite his friend to partake of its flesh, to remind him forcibly of the reality of the sacrifice, and the solemnity of his professions...”* George Catlin 1830s (Mattiessen 1989:223-25)

### INTRODUCTION

The roles of *Canis familiaris* span the broad spectrum of domesticates, from companion to beast of burden to food resource, presenting archaeologists with a distinct challenge. As the only domestic animal present in North America prehistorically, dogs are a unique facet of any faunal assemblage, and interpreting their existence at a site reveals cultural information beyond mere dietary habits. Studying the function of domestic dogs in the social practices of complex hunter-gatherers on the Canadian Plateau adds to the larger investigation of emergent material wealth based status inequality at the Bridge River village site (EeR14), near Lillooet, British Columbia, Canada. The purpose of this thesis is to interpret the presence and cultural implications of domestic dog remains in Housepit 24 at the Bridge River site. The presence of two domestic dogs, one exhibiting signs of trauma, indicate these dogs may have met a different fate than their cousins at Keatley Creek (Crellin 1994; Crellin and Heffner 2000).

The work at Bridge River is an extension of the work at nearby Keatley Creek, and strives to test the hypotheses of the evolution and development of dense aggregate villages and socioeconomic inequality on the Plateau (Hayden 1997a; Prentiss *et al* 2003, 2005a; 2005b, 2007, 2008). The archaeological record at the Bridge River village provides substantial evidence supporting a late emergence of social complexity and the development of material wealth based

status systems prior to the institutionalized social inequality found in the ethnographic record (Prentiss personal communication; Prentiss *et al* 2012; Teit 1906). Along these lines, newly established houses, which were found to have been built late and only briefly occupied prior to village abandonment, show greatest accumulation of material wealth (Prentiss *et al* 2012; Prentiss personal communication).

It is within the wealthiest housepit, Housepit 24, that the large cache pit feature in Activity Area 3 was found to contain skeletal remains of domestic dog showing evidence of trauma consistent with use as a food resource. This research on domestic dog remains found at the Bridge River site offers a unique perspective of a single tool of material wealth and prestige, providing evidence of social practices in play during the emergence of material wealth based inequality and the transition to institutionalized inequality.

Through the use of established osteological methodology, the conclusion of this research argues that domestic dogs represent a managed food resource at the Bridge River site, and possibly throughout the Lillooet region. In discussing this topic it is difficult to step away from the modern western view of dogs as companion; the role as managed food resource is one of many for dogs around the world. Dogs were and are considered an important and respected part of the cultural system. It is hypothesized that these dogs were a valuable asset within the Bridge River community, and would exist as material wealth for their owners. The cost of maintaining dogs as a food resource would engender their use as a prestige item in the socioeconomy and exchange network active throughout the Mid-Fraser Canyon. Feasting events serve as the conduit for exchange in transegalitarian systems, and the Bridge River dogs were employed as a delicacy in the feasting apparatus.

This thesis is organized into five chapters. Chapter 2 is an introduction to the environmental and cultural context of the Middle Fraser region of the Canadian Plateau. It details the past and present environmental conditions on the Plateau, as well as the cultural background of Bridge River itself, including a review of the current research project on emergent material wealth based status

inequality. Chapter 3 reviews domestic dogs in the archaeological record with emphasis on ethnographic details from the Middle Fraser River region to prepare for the disquisition into the use of domestic dogs as a cultural resource.

Chapter 4 examines the theoretical background of transegalitarian social systems and the functioning of a prestige economy within which domestic dogs would be utilized as a form of material wealth and cultural capital (Bourdieu 1977, 1984). Feasts are discussed as part of these prestige economies, because the instrument of feasting is used as a cultural tool and works in collusion with the transegalitarian structure. Understanding the potential for feasting as a mechanism by which food resources and prestige items are converted into cultural capital could give insight into the emergence of institutionalized inequality within the Plateau socioeconomy.

The methods and materials utilized in this study of dogs from Housepit 24 are presented Chapter 5. The osteological, isotopic, and DNA analyses of the dog remains will lay out the evidence suggestive of a single event of feasting represented by the assemblage. Chapter 6 will solidify the evidence for use of dogs as a managed food resource at Bridge River, elaborate on the arguments and cultural implications of dog feasting at the site, and provide conclusion summarizing the hypotheses and arguments, as well as offering suggestions for further research on dogs at Bridge River and in the Mid-Fraser Canyon.

### Hypotheses

This thesis strives for three conclusions by illuminating the processes that resulted in the canid assemblage of Housepit 24 and expounding on the details of each element investigated in the lab. The primary hypothesis asserts domestic dog remains in Feature 5 indicate the consumption of dogs at Bridge River, and that dogs were a managed food resource for the village. There are detailed ethnographic records of dogs utilized as a food resource in the Lillooet territory. Archaeological evidence across the Mid-Fraser suggests dogs may have served as a managed food resource throughout the region.

## CHAPTER 1: INTRODUCTION

The secondary hypothesis argues the Feature 5 pit represents a single depositional event associated with feasting within Housepit 24. Dogs potentially represent a delicacy of the feasting apparatus, and are most certainly utilized as a form of material wealth within the larger political prestige economy. The assertion could be made that elites at Bridge River developed dogs into a managed food resource. The development of material wealth based status systems could have perpetuated dog into the role of a delicacy in the feasting apparatus.

## CHAPTER TWO ENVIRONMENTAL AND CULTURAL BACKGROUND

Broken into three sections, this chapter reviews the environmental and cultural background of the Mid-Fraser region of the Interior Plateau, where the Bridge River site lies. The first section describes the region's paleoenvironments and modern environment. The second section details the Canadian Plateau Culture Area and the cultural phases of the Plateau. The third section reviews the current work at the Bridge River site seeking data on the development of material wealth based inequality.



**Figure 2.1: Photograph of Bridge River approximately 2 kilometers north of the Bridge River village archaeological site**

### Environment of the Mid-Fraser Region

The Canadian Plateau, also known as the Northern or Interior Plateau, is the conceptualized northern half of the Plateau region of Northwestern North

America, in contrast to its southern counterpart the Columbia or Southern Plateau. This geographic area within the modern Canadian state of British Columbia stretches from the Coast and Cascade Mountain Ranges east to the Rocky Mountains, and from the great bend of the Fraser River on the northern edge to 15 kilometers north of the border of the United States (Richards and Rousseau 1987). This large cultural region of the Mid-Fraser Region is known for its grand topography and dynamic ecological zones, detailed as the tributaries and drainages between the Thompson River confluence at Lytton and the Chilcotin River at Big Bar (Hayden 1992, 1997a).

The deep and narrow U-shaped river valleys along the Fraser were carved by Pleistocene glaciers and post-glacial erosion, depositing beds of glacial till and creating valley benches, on which the Bridge River site sits. The Cascade and Coast ranges consist of varying sedimentary and metamorphic rock with extrusive igneous formations (Chatters 1998).

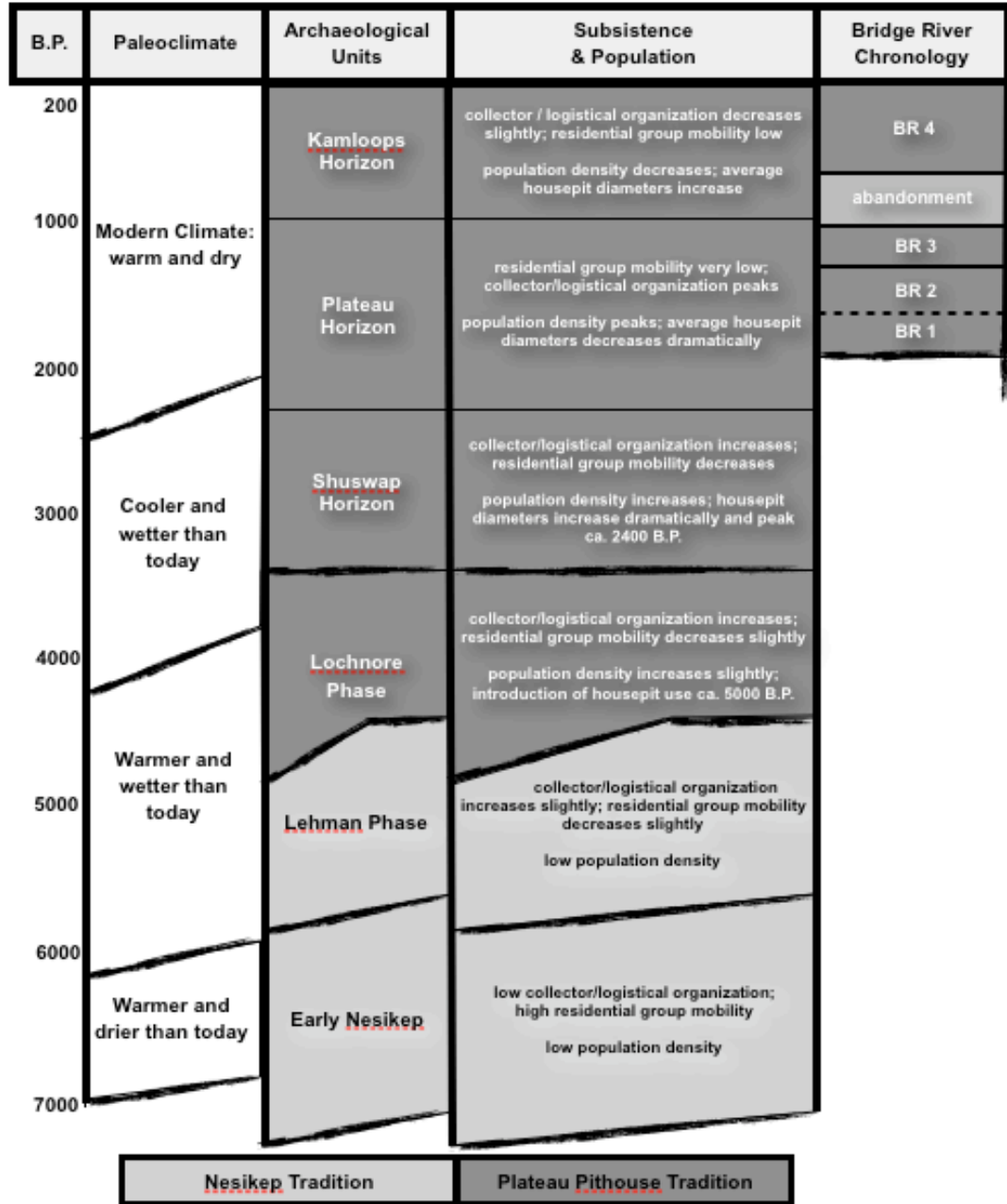
The Coast and Cascade Mountains act as a moisture barrier, creating a rain shadow east of their crest. Average precipitation in the northern range is over 250 centimeters annually decreasing to less than 150 centimeters for the southern mountains. In contrast, the area east of the Cascade Range receives between 25-30 centimeters annually, most of which accumulates as snow in middle and high elevations during the winter (Chatters 1998). This accumulation melts in late spring and early summer filling streams flowing south and east, and reaching the Pacific Ocean via the Fraser River draining west. Semi-arid conditions created by the rain shadow result in vegetation dominated by open douglas fir and ponderosa pine forests, with xeric grasses and sagebrush in lower elevations (Chatters 1998). The extreme temperatures known in the region reach lows of  $-52^{\circ}\text{C}$  in winter and summer highs of  $42^{\circ}\text{C}$  (Goodale *et al* 2008; Hayden 1997a). Average temperatures at Bridge River are around  $-6^{\circ}\text{C}$  in the winter and  $32^{\circ}\text{C}$  during summers.

Chatters (1998) details the paleoenvironmental changes over the past 11,000 years from the warmest and driest conditions starting between 11000 B.P. to 9500 B.P. Increases in precipitation and forestation occur from 9500 B.P. to

6400 B.P., and warming continues through the period of 6500 B.P. to 4500 B.P. showing more productive salmon fisheries. Between 4500 B.P. and 2800 B.P., the climate cools, but the wet conditions remain. Warmer and dryer trends began around 2800 B.P. leading to current conditions; forests receded to higher elevations and became less dense and bunch grasses replaced dense shrub steppe. Fauna in the area includes over 300 bird species including several varieties of grouse, waterfowl, and raptors. There are numerous anadromous species of fish, with the most influential being salmonids. Several varieties of invertebrates, namely mollusks and crustaceans inhabit streams. There are eight ungulates present in the region: elk, mouse, caribou, mule deer, white-tailed deer, mountain sheep, mountain goat, and pronghorn. Other mammals include brown and black bears, beaver, fishers, marten, wolves, coyotes, wolverines, weasels, porcupines, marmots, rabbits, shrews, voles, ground and tree squirrels, and several varieties of mice.

### Cultural Background of the Mid-Fraser Region

The Canadian Plateau Culture Area is known for its rich hunter-gatherer economies, with an integral focus on salmon fisheries along with other subsistence practices. Much of the information on the region is gleaned from several twentieth century ethnographies, most notably are Teit's studies of the Lillooet and Thompson Indians (1900, 1906, 1909). The three First Nations groups convergent on the Middle Fraser River Canyon are the St'atlimc, or Fraser River Lillooet Indians; the Nlaka7pamux, or Upper Thompson Indians; and the Secwepemc, or Shuswap Indians. The ethnographic and archaeological records show no discernible difference between the three groups in material culture, manufacturing technologies, hunting methods, food stuffs, or resource procurement. Great similarities exist in rituals, festivals, and common oral traditions; all avowing a common descentance from Coyote (Hayden 1997a). The linguistic groups of the First Nations tribes all belong to the Interior Salish language family.



**Figure 2.2: Summary of Paleoclimate, Cultural Chronology (Rousseau 2004), Subsistence Practices, Population Densities, and Housepit Sizes (Rousseau 2004; Prentiss et al 2005, 2008)**

The cultural prehistory of this region is widely known for its distinctive complex hunter-gatherer-fisher culture spanning the last 10,000 years. There are two traditions researched on the Canadian Plateau divided into six archaeological descriptive units. The Nesikep tradition is divided into the Early Nesikep (ca 7000 B.P. - 6000 B.P.), the Lehman Phase (6000 B.P. - 4500 B.P.),



and the beginning of the Lochnore Phase (ca 5000 B.P. - 3500 B.P.); although, this transition is still under debate (Kuijt and Prentiss 2004, Prentiss and Kuijt 2004). The Plateau Pithouse tradition begins with the Lochnore Phase (ca 5000 B.P. - 3500 B.P.), then the Shuswap Phase (3500 B.P. - 2400 B.P.), the Plateau Phase (2400 B.P. - 1200 B.P.), and the final Kamloops Phase (1200 B.P. - 200 B.P.). Only the periods relevant to the theoretical issues of this thesis, those of the Plateau Pithouse tradition, will be detailed in the cultural background. For the purposes of this thesis, the following cultural chronology of the Plateau Pithouse tradition is amended from Rousseau's (2004) synthesis on the progression of successful of technological, subsistence, and settlement strategies (*in* Prentiss and Kuijt 2004).

### Plateau Pithouse Tradition

The Plateau Pithouse tradition, PPt, is marked by four principal characteristics: (1) semi-subteranean pithouses in winter seasonality or semi-permanent villages; (2) semi-sedentism with occasional to full logistically organized, seasonally scheduled subsistence and settlement strategies; (3) hunter-gatherer subsistence modes with emphasis on salmon fishing; (4) food storage technologies and facilities. The ethnographic evidence on the Interior Salish groups' life-ways is representative of the PPt. Rousseau (2004:13) describes the emergence of the PPt as "a dynamic and evolving cultural continuum, with all the major archaeological units within representing periods of relative adaptive stability separable by punctuated periods of rapid change."

The first evidence of the PPt appears between 4500 B.P. and 3500 B.P. when populations began to practice semi-sedentism residing in pithouses, developed a greater reliance on stored food, and exploited seasonal resources. These characteristics associated with the Shuswap horizon replaced the distinctive microblade technology of the Lochnore Phase, which has no evidence of pithouses or storage technologies. The resemblance to the Pithouse I period at the Baker site on the Columbia Plateau strongly associated with changes in climatic conditions is apparent in the starting date around 4500 B.P., low density

settlements of small pithouses in resource-rich areas, broad spectrum opportunistic foraging subsistence strategy, and strong similarities in lithic technologies (Chatters 1995; Prentiss and Kuijt 2004; Rousseau 2004).

### The Shuswap Horizon

The Shuswap horizon begins circa 3500 B.P. when cool and wet environmental conditions peaked. The cool and wet climate strengthens anadromous salmonid habitats, and evidence of increased salmon consumption is apparent in isotopic analyses of human remains (Chatters 1998; Prentiss and Kuijt 2004; Rousseau 2004). Forests expanded and grasslands shrank, leaving large ungulates with limited grazing in river valleys and their tributaries. The gradual shift in subsistence strategies reflects the gradual rise in temperature and fall in precipitation throughout the period. There is a change from residential group mobility and immediate consumption practices toward more semi-sedentism and delayed consumption practices. The resource-rich valley bottoms offered opportunities for increased sedentism and immediate consumption, and the populations rose compared to the preceding Lochnore phase. Other characteristics of this period include use of lithic raw materials from local sources, small villages with large housepits, uncommon reoccupation of sites, and low regional populations. There is little evidence of inequality during the Shuswap like that associated with larger groups under greater population stresses. The materialization of abundant resources during the Shuswap horizon were advantageous to the development of the Plateau horizon's logistically organized collector lifestyle that began around 2400 B.P.

### The Plateau Horizon

Material culture and subsistence practices changed rapidly on the Canadian Plateau around 2400 B.P. marking the beginning of the Plateau horizon, deemed the peak of the Plateau's hunter-gatherer-fisher cultures and the height of aboriginal population. This horizon shows changes from a Classic Collector strategy in most areas toward a more Complex Collector system,

beginning on the Northwest Coast and in the lower valley and delta of the Fraser River at the beginning of the period, and spreading in the interior during the second half of the horizon around 1800 B.P. (Prentiss and Kuijt 2004, Prentiss *et al* 2005). More proficient tool production including lithic-reduction techniques, the maturation of bone and antler technology, and the development of an Interior Plateau art tradition indicate craft specialization. Bow and arrow use also appears during this time, with use of the atlatl phasing out after two centuries of concurrent use.

Settlements on the Interior Plateau were established in resource-rich areas in close proximity to salmon fisheries and exploited floral resources, similar to areas chosen in the Shuswap horizon. Generally, village sizes grew which is indicative of reoccupation over many generations, with sizes of housepits trending toward smaller diameters between 4 and 8 meters and averaging 6 meters (Rouseau 2004).

Many village sites in the Mid-Fraser region were larger and more densely populated than other areas on the Plateau, containing as many as 100 housepits measuring between 8 and 20 meters, averaging 10 meters in diameter (Hayden 1997a). The Classic Lillooet period, dating between circa 2000 B.P. and 1000 B.P., delineates the emergence of political and socioeconomic complexity in the archaeological record at both the Bridge River and Keatley Creek villages. The Lillooet Phenomenon describes the organization of small, medium, and large pithouses into communities, with the strong likelihood of social complexity in conjunction with population aggregation (Arnold 1996; Prentiss *et al* 2008). The dense settlement pattern with indicates of ranked society in villages and household organization, intensification of select resources including salmon, and participation in extensive exchange networks encompass the characteristics of the Mid-Fraser region at this time (Hayden 1997a, 1997b, 2000b; Hayden and Ryder 1991, Prentiss *et al* 2005; Prentiss *et al* 2008).

The bountiful and seemingly inexhaustible resources that engendered the florescence of cultures in the region during the Plateau horizon also gave rise to a trans-Rocky Mountain exchange network (Prentiss *et al* 2010; Rouseau

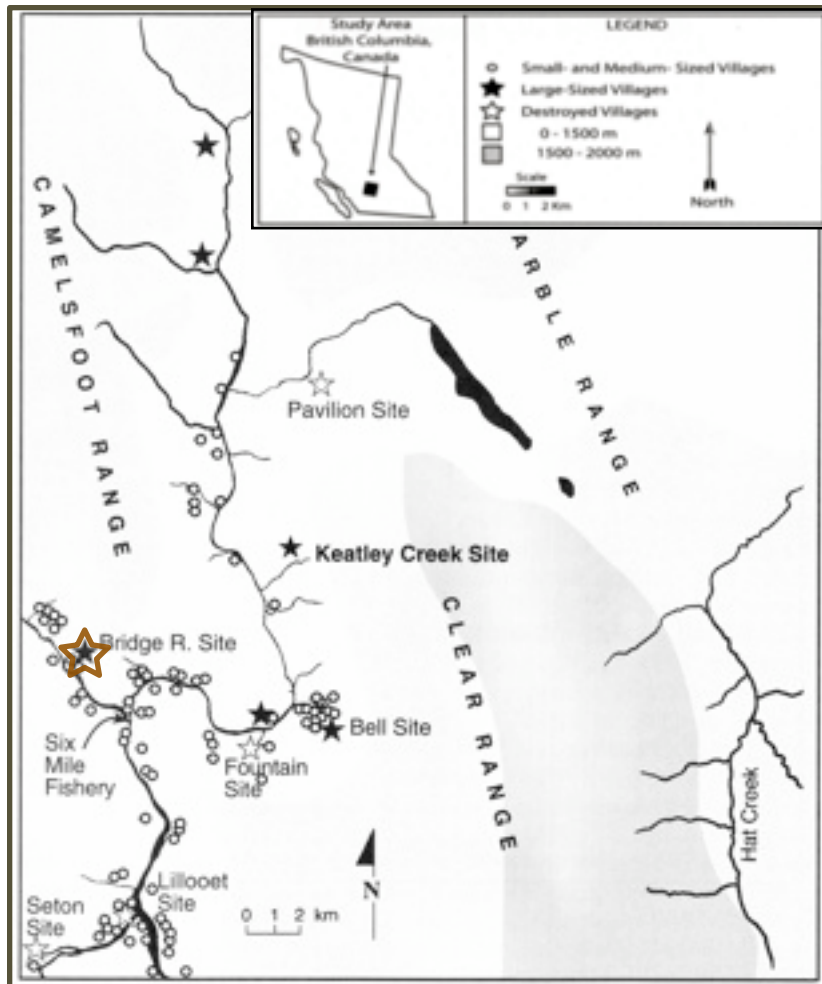
2004). The existence of nephrite, argillite, top of the world cherts, dentalium and olivella shells, and spread of bow and arrow technology across the Plateau, Northern Plains, Eastern Kootenay, and Rocky Mountain Regions indicate an interaction in trade and technology throughout western North America. Hayden and Schulting (1997) focus their attention on Northwestern North America and the exchange of Dentalium shells, nephrite, copper, steatite, obsidian graphite, galena, crafted prestige items, and the presence of domestic dogs entitling this exchange network the “Plateau Interaction Sphere,” or PIS. (Hayden and Schulting 1997, Rousseau 2004). Hayden and Schulting (1997:52) use Caldwell’s (1964) definition of an interaction sphere to interpret the relatively similar Plateau cultures as the PIS because of the relatedness and interaction of several separate cultures retaining their distinctive subsistence technology and local crafts while sharing behaviors, materials, rituals, styles, and values. According to Hayden and Schulting (1997; Hayden 1990; Hayden 1997b) the development of the PIS is due in large part to a self-aggrandizing elite class establishing and maintaining socioeconomic relationships across the Plateau. Rousseau (2004:18) argues that the PIS represents a “conscious collective need” or reciprocal trade network for the movement of food and raw materials essential to life ways throughout the region. The establishment of an exchange network, whether it developed out of aggrandizing or risk-pooling, offers a lucrative system that could eventually support and perpetuate an elite class that assumes trading responsibilities, and contribute to the emergence and persistence of inequality and growth in complexity. The differing theoretical models reflected in the interpretation of the PIS reveal the similar various theoretical approaches to the emergence of inequality in the region. The active debate on the time frame and cause of social complexity and emergent status inequality among the Plateau peoples is discussed further in “The Emergence of Status Inequality in the Mid-Fraser” section following the section on the Kamloops horizon.

### The Kamloops Horizon

The Kamloops horizon represents the final prehistoric cultural period showing great similarities to the Plateau horizon, although there is an apparent population decline after 1000 B.P. Subsistence strategies and settlement patterns remained logistically organized but less so than during the Plateau horizon. The significant differences with the preceding period are a decline in salmon resources and exploitation of upland plant resources, although salmon did remain the dietary staple supplemented by deer, small animals, roots, and berries (Lepofsky and Peacock 2004). The development of material culture and the Plateau art traditions continued with elaborations in the decoration of utilitarian items. There are also variations in housepit floor plans showing oval, round, rectangular, and square configurations averaging diameters between 5 and 22 meters and a mean of 8.66 meters. Most exhibit well defined peripheral earth rims, centrally located hearths and storage pits, and some have side instead of roof entrances, although some display both (Richards and Rousseau 1987, Rousseau 2004). Rousseau (2004) asserts that the return to medium and large pithouses reflect larger extended family groups occupying single residences, which is supported by the ethnographic record (Teit 1900, 1906, 1909). This model is consistent with the Classic Lillooet family corporate group of the Plateau horizon described by Hayden (1997a, 2000b).

The cause of the gradual decline of populations and abandonment of villages on the Plateau at the cusp of the Kamloops horizon is under contention. Rousseau (2004) presents three hypotheses currently under research: over exploitation of resources during Plateau horizon, long-term changes in salmon ecology and habitat, and epidemic disease. Hayden and Ryder (1991) posit the Texas Creek landslide dammed the Fraser River and hindered salmon runs between 1200 B.P. and 1000 B.P., causing the abandonment of the Mid-Fraser Region. Kuijt (2001) persuasively argues that the landslide event predates 4200 B.P., and that little evidence of a catastrophic event in the Lillooet area exists. The population decline in the Mid-Fraser is similar to many regions of the Canadian Plateau, as well as the Columbia Plateau, at that time. The heavy

dependence on mid-altitude and upland resources during the Plateau horizon greatly stressed the local resources between 2000 B.P. and 1200 B.P. (Kuijt and Prentiss 2004; Lepofsky and Peacock 2004). Bow and arrow technology that was also adopted during the Plateau horizon would deplete game resources with the more effective hunting technology and offer access to previously unattainable resources (Prentiss *et al* 2007; Rousseau 2004). Changes in the habitat and ecology of salmon in the region show similar results when stressed. Salmon runs are extremely susceptible to over harvesting, extended periods of drought, as well as disease (Quinn 2005). Few subsistence options exist in the vicinity of the Bridge River site other than salmon, so a reduction in salmon access would greatly affect subsistence at the village. The reduction in salmon access and expanded terrestrial resource use is consistent with local resource depression



**Figure 2.3:** Map of the Lillooet Area and Middle Fraser River

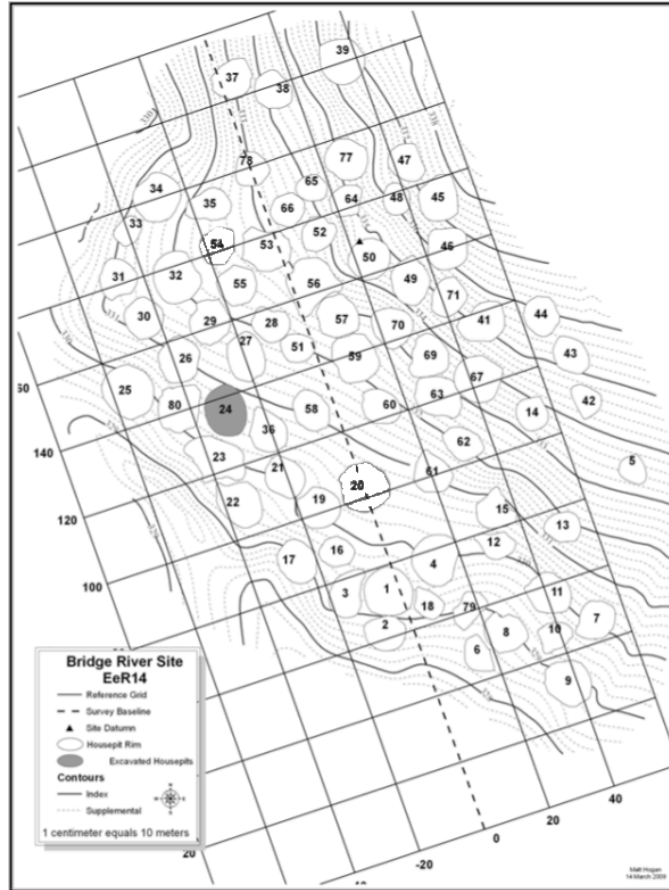
(Prentiss *et al* 2007). The end of the Kamloops horizon and the Plateau Pithouse tradition comes with the advent of Europeans around 200 years ago. There are numerous rich ethnographic accounts of the Mid-Fraser region provided by Teit (1900, 1906, 1909, 1930).

### The Bridge River Site

The aptly named Bridge River site is situated on a broad terrace above the Bridge River roughly 5 kilometers northwest of the river's confluence with the Fraser River, near the town of Lillooet, British Columbia. This confluence is known as the 6-Mile Rapids, and remains a significant salmon fishery for the Lillooet area. The large housepit village consists of approximately 80 housepit depressions seemingly organized into two "neighborhoods", a northern and a southern (Prentiss *et al* 2008). Recent work using extensive geophysical mapping, test excavations, stratigraphic analysis, and radiocarbon dating



**Figure 2.4: Aerial photograph of Bridge River village Site**



**Figure 2.5: Map of the Bridge River Site with Housepit 24 highlighted**

established a village occupational history, revealing that the Bridge River village was established at 1797-1614 cal. B.P. (Prentiss *et al* 2008). Figure 2.5 shows the locations of housepits in the village, with Housepit 24 highlighted in grey.

The evolution of the village is broken into four major periods: Bridge River 1 and 2 spanned circa 1800 B.P. to 1300 cal B.P.; the burgeoning Bridge River 3 was short from circa 1300 to 1100 cal B.P.; followed by a period of abandonment spanning 600-700 years; and Bridge River 4 began circa 400-500 cal B.P. and lasted into the historical period (Prentiss *et al* 2008). Figure 2.6 is an occupational history map showing the progression of the aggregate winter village. The occupation of the Bridge River village is akin to the broader cultural patterns of other Mid-Fraser villages. There was the initial settlement of the winter village near the abundant salmon fishery of the 6-Mile Rapids around 1800 B.P., with varying house sizes and little archaeological evidence of variations in



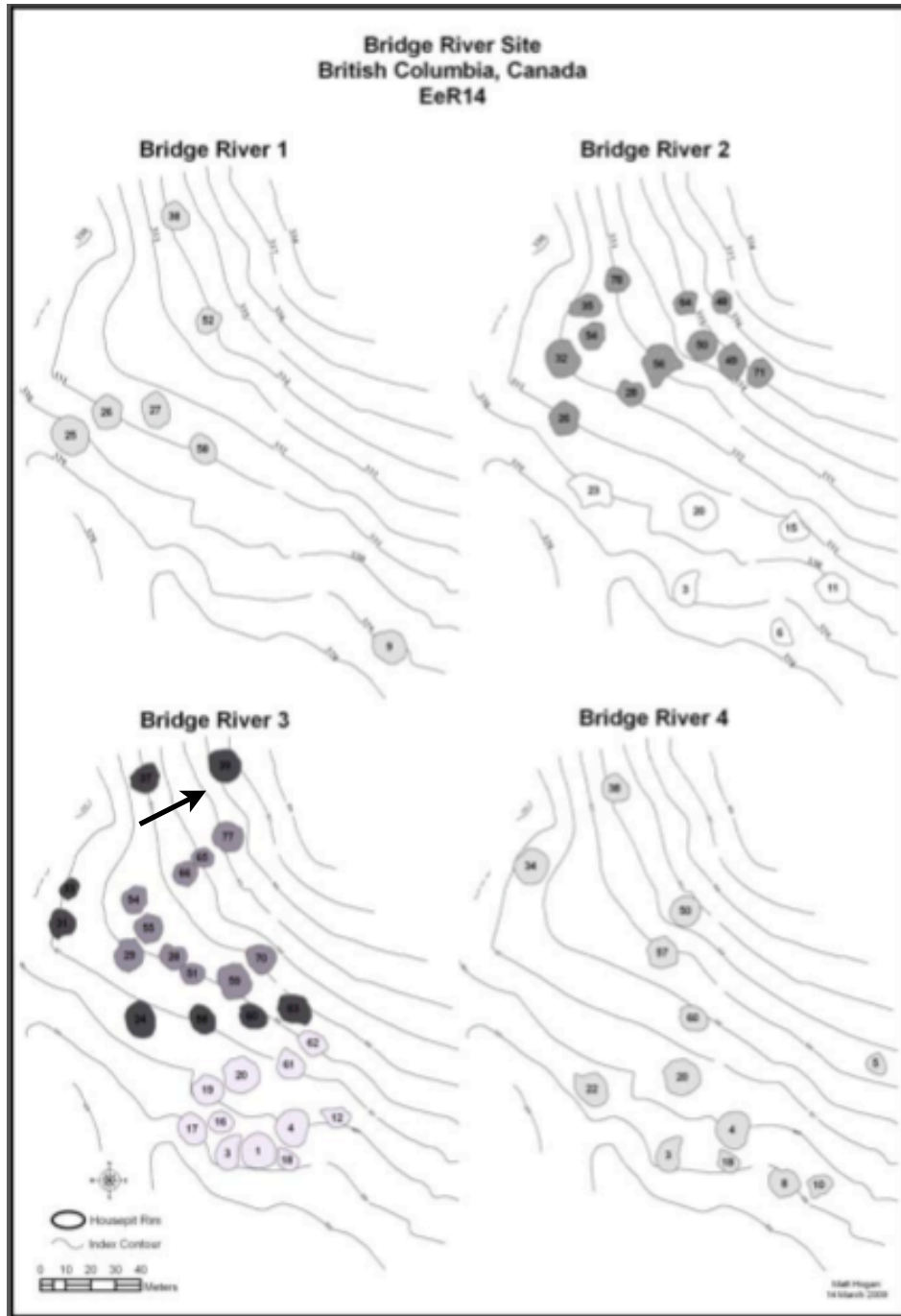


Figure 2.6: Time Line Map of the Bridge River Site illustrating the progression of the site over time. Arrow points to Housepit 24.

status markers. Bridge River 3 shows rapid population growth and village expansion, mirroring Prentiss *et al's* (2007) Period II of great socioeconomic development in Mid-Fraser region. This period is considered the heyday of the Bridge River village when populations peaked with at least 29 occupied

housepits (Prentiss *et al* 2008). The steep river valley where the village lies offers its inhabitants few resources other than remarkable access to salmon at the 6-Mile Rapids and the Bridge River. Faunal analysis shows a significant reliance on salmon resources over ungulates and geophytes (Bochart 2004; Carlson 2010). The remarkable dependency on salmon and its abrupt decline is associated with abandonment of the village after 1100 B.P. (Prentiss *et al* 2008). The heavy reliance on salmon access could also explain the unique cultural tradition of using dogs as a protein resource, when salmon runs were not as productive. With access to few other resources compared to Keatley Creek, limited access to salmon has a marked impact on the population at Bridge River. Resource stress arguably advanced the process of emergent status inequality already seen in several housepits in Bridge River 2 and 3 periods (Arnold 1993; Prentiss *et al* 2007; 2008; Wiessner 2002). Figures 2.5 and 2.6 highlight Housepit 24 among the approximately 80 housepits in the village.

Research conducted in 2004, 2008, and 2009 at Bridge River reveals the most substantial evidence for significant accumulation of wealth in Housepit 24. Multivariate statistical analysis of status inequality also reveals Housepit 24 contains the highest number of wealth ranking indicators (Prentiss *et al* 2008, 2012; Prentiss and Foor 2010). Assessments of fire-cracked rock and cache pit contents suggested a high density occupation of Housepit 24, which features only one floor and one roof deposit dated to a Bridge River 3 occupation (Prentiss *et al* 2010). Geophysical mapping revealed multiple activity areas in Housepit 24, three of which were tested (Figure 2.6). Activity Area 3 on the western rim contained two cache pits, Features 1 and 5, which contained the domestic dog remains. Investigating the significance of these dog remains in the “wealthiest” housepit at the shift from peak occupation to abandonment of the village can reveal the interplay of material wealth and famine food resources in the transition to more complex systems of socioeconomic inequality.

### CHAPTER THREE DOMESTIC DOGS ON THE PLATEAU

The research on domestic dog remains is carried out in tandem with the investigation of emergent inequality at Bridge River and the development of complexity in the region. The use of dogs as a prop in the action of players on the Plateau is important to research on institutionalized inequality. There is a need to assess how these characteristics of complexity would manifest in the archaeological record as material culture. These dog remains are the materialization of social practices used in instituting and perpetuating social ranking, as a prestige item and as a food resource (Bourdieu 1977; Crellin 1994; Dietler 2001; Hayden 2001). The rich ethnographic record, most notably from Teit's (1906, 1909, 1930) journals of the Plateau, and of the Lillooet people specifically, offer substantial insight into the roles of domestic dogs. Before seeking to interpret the dog remains from Bridge River's Housepit 24, the roles of domestic dogs in the Mid Fraser and neighboring Northwest Coast is presented here. Work done by Snyder (1991) on dogs as a food resource among Plains Tribes adds depth to the ethnographic research.

The earliest archaeological investigation of dogs in North America was carried about by mammalogist Dr. Grover M. Allen (1920) from Harvard University who recognized 17 varieties of native American dogs. Northwestern North America has evidence of two distinct breeds of dogs, the village dog and the Salish wool dog, known for its very thick, fine, and woolly hair (Allen 1920; Crockford 1994, 1997; Crockford and Pye 1997; Teit 1906). These dogs are famous for the use of their wool in the production of blankets among coastal groups (see Crockford 1994, 1997). Teit (1906) stated that the Lillooet, Thompson and Shuswap dogs differed from Coastal and Lower Fraser dogs; and there has been no investigations into the presence of wool dogs in the Interior. Interestingly, the 2008 excavation at Bridge River unearthed two small spindle whorls in Housepit 54 (Prentiss personal communication). There are multiple ethnographic accounts of Interior Salish groups possessing dogs, "[d]ogs were

numerous among most of the interior Salish groups,” stating that Lillooet and Thompson dogs resided inside pithouses, and Shuswap dogs were kenneled (Crellin 1994). These dogs were similar in appearance, and DNA evidence shows that the dogs found at Bridge River are related to the dogs of Keatley Creek (Yang *et al* 2010). Hayden and Schulting (1997:74) posit the roles of dogs mirror those of slaves and are closely associated with elite status, “in at least some respects, dogs functioned like slaves to display individual power and wealth through sacrifice.”

### Roles of Domestic Dogs

This brief review of the roles of domestic dogs in the region is adapted from Crellin’s (1994) extensive research generated by the remarkable discovery of fifteen dogs, including one fully articulated individual, in Housepit 7 at Keatley Creek (Crellin 1994; Crellin and Heffner 2000; Hayden and Schulting 1997). Crellin (1994) builds upon Driver’s (1976) categorization of relationships between indigenous peoples and dogs, adding protection and companionship to Driver’s hunting, transportation, clothing, ritual, and food categorizations.

### Hunting

Hunting was an important aspect of life in the Mid-Fraser, a means of gaining wealth and prestige, not to mention dinner. A good hunter could achieve status and gain power and wealth through successful hunting; and the great prestige laid upon a good hunter justifies the worth of a skilled hunting dog (Carlson 2010; Hayden 1997a). Teit (1906:226) writes of the Lillooet:

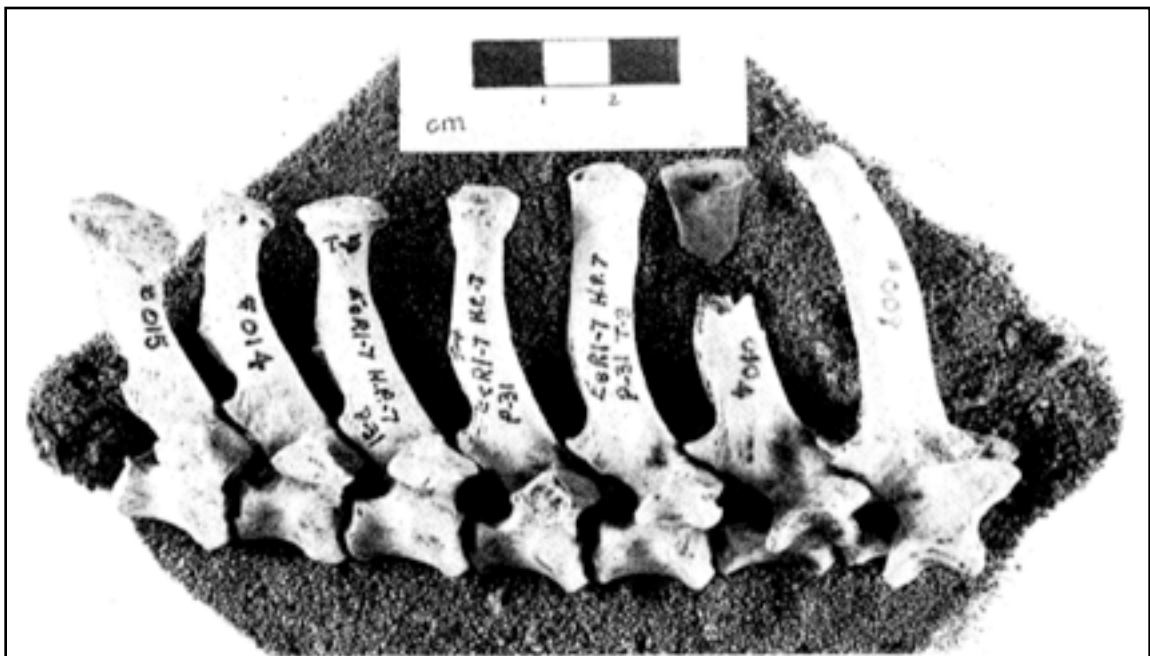
“[d]ogs were extensively used for running down deer and bear... Trained hunting dogs were taken good care of. Some men washed them regularly, purged them with medicine, and even wiped and cleansed their noses.”

There is some speculation that hunting dogs had a diminished role because of the limited access to larger game hunting and the reliance on salmon in the

Bridge River valley (Crellin 1994). Evidence suggests that hunting became more prevalent in the later occupations of the Bridge River and Keatley Creek villages (Carlson 2010; Prentiss *et al* 2008). This aspect will be discussed in greater detail in the Discussion Chapter. Post (1938:33) writes that there was great care in breeding good hunting dogs, and it was common for studs to be loaned out. He goes on to state the value of a good hunting dog was equal to one buffalo and six deer skins. Teit (1900) writes that a good hunting dog was worth a large dressed elk skin at the Hudson's Bay Company trading post in Kamloops. Hayden (1996b) speculated relationships with skilled hunting dogs were well developed, compared to relationships with "village" dogs according to ethnographic sources; and it could be further speculated that a prized dog would be treated with more care in burial than a village dog. Hunting dogs would be more valuable hunting than as dinner.

### Transportation

Dogs also served as beasts of burden, and pack dogs were common among the Shuswap in areas where no water ways existed (Teit 1909). There is contrast with the Lillooet in Teit's (1906) ethnographies stating that "[d]ogs were



**Figure 3.1:** Keatley Creek Dog 1's thoracic vertebrae showing pathology (Crellin 1994:241).

not used for packing and for pulling sleds. The country was too mountainous and there were no great ice-ways, as most of the large lakes and rivers did not freeze over” (Teit 1906:230). The fully articulated dog uncovered at Keatley Creek shows significant evidence of use as a pack animal, with the thoracic vertebrae remodeled to point posterior as opposed to the natural anterior facing orientation (Crellin 1994; Crellin and Heffner 2000). Figure 3.1 shows the remodeling of the spinal process of the first thoracic vertebra on the right.

### Clothing

Dog skins were utilized as items of clothing, with multiple descriptions of dogs skins worn by “poorer” families. “Many of the poorer people had to be content with only the breech-cloth, moccasins, and a deer or dog skin blanket to cover the body” (Teit 1900:220). There is also ethnographic evidence of arrow quivers made of dog skin with the tail swinging for decoration (Crellin 1994). The establishment of claims by family groups to prime resource locations, such as hunting grounds and fisheries, eventually lead to clan or crest ownership of these resources, furthering the wealth gap (Crellin 1994). Dog skins would certainly be more easily attainable items compared to deer and elk; dogs were plentiful and accessible, and would conceivably cost less to obtain and process. Dog skin clothing reveals the socioeconomic status of the wearer, just as a copper labret ring would signify higher status (Bourdieu 1977). These dog skins would equate to reduced material wealth on the Plateau during Teit’s ethnographic research.

### Ritual

In stark contrast to the low status dog skin clothing represents, dogs were utilized in festival and ritual context as an esteemed instrument of ritual activities. Potlatches become a hugely influential force within Plateau culture, “[s]ome of these [Lillooet] potlatches were great affairs; and clans tried to outdo one another by the quantity and value of their presents, thus showing to all the country that they were most powerful, wealthy, and energetic” (Teit 1906:258). Feasting and its social implications will be reviewed further in Chapter 4: Theory.

The Dog Dance Ceremony among the Western Shuswap, and variations among the Chilcotin and Fraser River Carrier, become another significant ritual event (Teit 1909). The ceremony was performed by the Dog Dance Society, Dogs, Crazy Dogs, Dog-Dancers, or Wolves - Tseka'ma, all secret social groups within a society; organizations like these would have been common, and belonging to such groups could bring power to an individual. The inclusion and, more importantly, the exclusion of people from the group solidifies power (Bourdieu 1977, 1984; Hayden 1997b). A man dressed in wolf skins started the ceremony by singing the Dog Song and dancing in a circle among the audience. Other group members joined him in singing, and playing drums, sticks, and rattles. The dancer's excitement accelerated becoming more violent, attacking and biting spectators; then another man of the society dressed in wolf skin led a dog as he danced. The excited dancer attacked the dog at the height of fury, then both dancers devour the dog in a fit of rage (Teit 1909:579-80). Other variations of the ceremony include a man dressed as a dog becoming enraged while scouting out buried meat and devouring it; women of the society sang the Dog Song to calm the upset "dog-man."

There are similar accounts of a Dog Eating Ceremony on the Northwest Coast. The Northwest Coast dog eating ceremony involved dancers becoming inspired by spirits to commit acts of violence and attack dogs used in the ceremony. McIlwraith (1948:132-3) noted that although many of the dogs may not have been consumed as food during the acts, many were killed for the ceremonies: "sometimes half the dogs of the village must be slaughtered before one is found with skin to match ." George Catlin wrote of his sincere appreciation for witnessing the ceremony:

"Since I witnessed it on this occasion, I have been honoured with numerous entertainments of the kind amongst the other tribes, which I have visited towards the sources of the Missouri, and all conducted in the same solemn and impressive manner; from which I feel authorized to pronounce the dog-feast a truly religious ceremony, wherein the poor Indian sees fit to sacrifice his faithful companion to bear testimony to the sacredness of his vows of friendship, and invite his friend to partake of its flesh, to remind him

forcibly of the reality of the sacrifice, and the solemnity of his professions...(Mattiessen 1989:223-25)

### Protection and Companionship

Post-modern social theory preaches the difficulty of resolving our own ideas of the cultural phenomenon with those being researched, and dogs are no exception. Catlin's perception of the Dog Eating Ceremony is derived from his own ideas of role of dogs as companions from conventional western culture; but protection and companionship are major roles dogs played historically and prehistorically. There are multiple accounts of the domestic dog's role as companion and symbol of material wealth, although companionship is difficult to quantify in economic terms. Teit (1900:244) asserted "native dogs were rather poor watch dogs", and served little as protectors, yet there is a recorded instance of Chilcotin dogs alerting their masters to an incoming raid.

Lamb (1957:212) recounts ethnographic evidence from Harmon (1800-1816) that dogs were treated with the same affection as companion dogs today:

"The people on the west side of the Rocky Mountains, appear to have the same affection for [dogs], that they have for their children; and they will discourse with them, as if they are rational beings. They frequently call them their sons or daughters; and when describing an Indian, they will speak of him as father of a particular dog which belongs to him. When these dogs die, it is not unusual to see their masters or mistresses place them on a pile of wood, and burn them in the same manner as they do the dead bodies of their relations; and they appear to lament their deaths, by crying and howling, fully as much as if they were their kindred."

McIlwraith (1948:174-5) writes an account of a childless couple, the last survivors of their ancestral family, transmitting their ancestral names to their dog, validating the bestowal with presents; "[c]onsequently, the animal is a chief and can do what he likes."

The ritual use of dogs in funerary rites exemplifies the role dogs play as companion to their masters. Crellin (1994:35) recounts an incident in the ethnographic record from the Thompson that following a surprise attack "all of the



dogs were killed and buried with their owners, so far as these were known; but those whose masters were not known were killed and buried separately.” Teit (1909:592-593) wrote,

“As among the Thompson tribe, many things were interred with the body... Slaves were sometimes killed and buried with the dead. Most graves had poles erected over them, to which was attached some of the deceased’s property... The best or favourite dog of the deceased was killed at the grave, and the body hung up on a pole or to a tree near by.”

The reburial of the bones later could include grave offerings of sacrificed dogs, suggesting dogs may be more numerous among the wealthy, and thus possible dogs are a status symbol of wealth (Crellin 1994). Once horses were introduced to the economy of the region, they replaced dogs in the funeral rituals; “[t]he tails of all the horses killed and eaten at the funeral feast were also hung on the grave-pole” (Teit 1909:593). This suggests it is possible that dogs were also eaten at the funeral feast before the introduction of the horse (Crellin 1994). It is important to note the Shuswap are the only group to use the specific term “funeral feast”. The possibility that the dog remains in Housepit 24’s Activity Area 3 represent a funeral feast is a vital point to investigate.

### Food Resource

The use of dogs as a food resource, and more importantly as a delicacy in feasting are central to this inquiry into the development of socioeconomic inequality in the Mid-Fraser. “Unlike the Thompson and the Shuswap, the Lillooet ate dog flesh extensively, and many families raised dogs for their flesh and skins.” (Teit 1906:223). It was not a unique trait of the Lillooet to utilize dogs as a customary source of protein, the neighboring Thompson and Shuswap ate dogs during famine, tribes on the Northwest Coast and on the American Plains participated in dog feasts (Crockford 1997; Snyder 1991; Teit 1909:517). Crellin (1994) speculates that due to diminished roles of dogs as transporters and hunters in the Mid Fraser region, many dogs may not have been essential to the economy due to the major reliance on salmon and trading for dressed skins, and

were expendable. “The practice of consuming nonessential dogs may have originated simply as an adaption to the occasional failure of an important seasonal food resource” (Crellin 1994:47). The cyclical nature of salmon runs, in terms of peaks and shortages, would call for a need to balance those times of famine with other food resources in areas like Bridge River where sources of protein were scarce (Sneed 1971). Many of the large ungulates exploited for their hides and as a protein resource were not found in the Lillooett territory, and could explain why this group kept dogs for their “flesh and skins” (Crellin 1994; Teit 1906).

Along these lines, Snyder’s (1991) investigation of ethnographic, archaeological, and nutritional evidence for the use of domestic dogs as a managed food resource on the North American Plains is quite pertinent to this research. Her detailed study provides proximate composition of meat resources including East Asian dog, modern stray dog, coyote, beaver, deer, bison, and raccoon meat samples (Snyder 1991:372). The data are from published reports, and based on 100g of raw meat, with the exception of the roasted beaver and raccoon. The East Asian dog provides 19.5 more grams of fat and 148 more calories than deer. The high caloric value of dog meat is maintained throughout the winter and spring, making it a good famine food resource. Domestic dogs are able to retain greater amounts of fat due to their ability to scavenge in populated villages, while deer and other hunted species deplete their stored fat throughout the winter and early spring (Snyder 1991). Snyder (1991) also details ethnographic evidence of the processing methods dogs for consumption among the Plains groups, where by hair was singed off, the “pluck” and viscerals removed, the carcass quartered into portioned sizes, and then boiled with the skin.

Simon Fraser’s journal (1806-1808) recounts several feasts among Interior Salish groups which included dog flesh as a dish (Lamb 1960). While camped with the Thompson after leaving the Lillooet village, Fraser writes:

“The chief invited us to his quarters; his son, by his orders, served us upon a handsome mat, and regaled us with salmon and roots.

Our men had some also, and they procured, besides, several Dogs which is always a favourite dish with the Canadian voyagers” (Lamb 1960:84).

“We had salmon, berries, oil and roots in abundance, and our men had six Dogs” (Lamb 1960:87)

“The Indians sang and danced and were very civil. They gave the men three Dogs.” Lamb 1960:93)

In lower Thompson territory:

“When we arrived at the village we met with much attention. They gave (us) two excellent Dogs which made delicious meals for the men, besides fish and berries in abundance” (Lamb 1960:116).

Among the Lillooet:

Mr. Stuart & such of the men as wished paid a visit to the camp. Mr. Stuart procured many curiosities, and the men brought back some dogs which, to their palates, proved a delicious dish” (Lamb 1960:121).

“Found poor but civil Indians” and “they regaled us with Dog’s Flesh” (Lamb 1960:120).

Crellin (1994) points out that it is unclear from Fraser’s journals whether indigenous groups are feasting on dogs as common practice, or selling the dogs to Europeans whose reputation for consuming dog flesh preceded them. These accounts do offer evidence that dogs were utilized as a valued dish in welcoming celebrated guests, and further support hypothesis that dogs were considered a delicacy.

#### The Archaeological Record of Dogs on the Northwest Coast

Crockford’s (1997) seminal work on dogs of the Northwest Coast, *Osteometry of Makah and Coast Salish Dogs*, thoroughly details evidence of domestic dog remains from archaeological record. There were two different domestic dog breeds present on the Northwest Coast prehistorically: the “village”

dog and the Salish wool dog, which she postulates was the only distinct dog breed in accordance with modern standards. Work done by Crockford and Pye (1997; Crockford 1997) provides an exhaustive forensic reconstruction of the both the Salish wool dog and the “village” dog. The wool dog, now extinct, was bred for its illustrious wool coat utilized in the creation of wool blankets (Amoss 1993). Crockford and Pye (1997) estimate the average shoulder height of the Salish wool dog to be 44 cm. The village dogs of the Northwest Coast are related to dogs in the Interior Plateau, and were relative in size to a modern Dalmatian, with an average size of 52 cm at the shoulder. Figure 3.2 is the forensic reconstruction of the extinct Salish wool dog and the village dog by artist Cameron J. Pye (Crockford and Pye 1997).

In her osteometric investigation of dogs, Crockford (1997) found evidence of population control techniques and the culling of female dogs. When looking at ratios of male to female dogs at different ages, research shows the substantially higher proportion of male crania and mandibles of an older age represented in the archaeological record as compared to females, indicating many female dogs did not survive to adulthood. It is possible that the same practices are present in the Mid Fraser, and eating dogs was a practical use of culled females in coordination with times of famine or ritual.

#### The Archaeological Record of Dogs on the Interior Plateau

The presence of domestic dogs in the Mid-Fraser’s archaeological record has been recorded for six sites: Bell (EeRk4), Gibbs Creek (EeRk7), Ollie (EeRk9), East (EeRI40), Keatley Creek (EeRI7), and Bridge River. The information provided from some site reports is less detailed than the Keatley Creek and Bridge River sites (Crellin 1994; Langemann 1987). There are a total of thirty one dogs in the Mid-Fraser Canyon sample (N=31) found in both cache pits and on floor stratigraphy, some with evidence of trauma including gnawing, burning, and cut marks.

Domestic dog remains were found in three housepits at the Bell site, Housepits 1, 6 and 19; fused hind limb bones, a fractured mandible with teeth in



**Figure 3.2:** Archaeo-forensic reconstruction by Pye of the western North American village dog and Salish Wool dog (Crockford and Pye 1997)

Housepit 1; one deciduous lower third premolar and one permanent lower third premolar in Housepit 6; and one calcined fused caudal vertebra in Housepit 19 (Langemann 1987). Gibb's Creek Housepit 1 contained evidence of three dogs, a fetus, a small subadult less than one year, and an adult 2 years or more.

Elements recovered were the fetal right tibia, articulated fused cervical vertebrae, the right occipital, fused phalanges, and fused metacarpals (Langemann 1987).

The East site sample contained four rib fragments, severely weathered, burnt, and gnawed; unfortunately an age was not estimated from these specimens.

The Ollie Site had evidence of three dogs in Housepit 3, also, one fetus, one 3 to 4 month old, and a young adult between 1 and 2 years. Specimens include the occipital, atlas, cervical and thoracic vertebrae, a rib, both scapula, metapodia, right mandible frag with deciduous premolar 4 and unerupted first molar in place, unfused proximal humerus, fused proximal and distal tibia, fused proximal and distal femur, fused distal fibula, and fused vertebrae (Langemann 1987).

Previous work at the Bridge River site done by Stryd (1980) unearthed an unfused calcaneus, an axis, a thoracic vertebra with a fused anterior centrum epiphysis, three right fused proximal tibiae, and two fused proximal left femora for a minimum number of four dogs from Stryd's (1980) Housepit 65. Crellin (1994) details the remains of twelve dogs from Housepit 7 at Keatley Creek, as well as

remains of three dogs from Housepits 3, 109, and 110. Ages range from less than five months old to above eight years. Appendix D, Table D.1 details the domestic dog samples information for each site.

### Summary

The knowledge about the roles of domestic dogs in the archaeological record is growing, and by better understanding the use of dogs in the Mid-Fraser we can better understand their people. Ethnographic and archaeological evidence of roles of protection and companionship, hunting, transportation, clothing resource, ritual, and food resource. Most pertinent to this investigation is understanding cultural use as food resource, which is substantiated by ethnographic evidence from the Lillooet region (Crellin 1994; Killy 1946; Snyder 1991; Teit 1906). Although, these details are antithetical to conclusions made about domestic dogs discovered at the neighboring Keatley Creek site, where many of the dogs found in Keatley Creek's Housepit 7 were found to have died of natural causes (Crellin 1994). The dog remains from Bridge River do not represent the first archaeological evidence of the use of domestic dogs in the region as in a cultural context (Crellin and Heffner 2000; Langemann 1987), but they do represent the largest sample to support evidence of the processing of dogs as a managed food resource. The case study at Bridge River presents an intriguing dichotomy of roles for dog prehistorically buried within a meter from each other: one as a food resource and one, possibly, as a prized companion, and both as material wealth.

## CHAPTER FOUR THEORY

In order to better grasp the cultural implications of the domestic dogs found at Bridge River, there is a need to place dogs within the larger transegalitarian socioeconomy. The previous chapter reviewed the diverse roles dogs play in the Mid-Fraser Canyon on the Interior Plateau and the proximate Northwest Coast. Their use as a food resource is not unique to the region, although Teit (1906) states that the Lillooet kept dogs for their flesh and skin. Focusing on dogs as a managed food resource in this chapter can clarify one function of domestic dogs as a form of material wealth, and how dogs as a delicacy would be utilized in a developing system of wealth based status inequality. As a managed food resource dogs would be expensive “meat on the hoof,” and the power innate in controlling such a resource warrants a framework for apportioning and management. The active sociopolitical structures in transegalitarian hunter-gatherer communities incorporate forums for the exchange of goods and services used in subsistence practices, and feasts are those forums.

This chapter is organized into three sections beginning with a review of the current theoretical discourse on the emergence of status inequality in Northwestern North America in “The Emergence of Complexity.” The following section details “Prestige Economies and The Feasting Apparatus,” where a theoretical exposition of feasting as a social tool is discussed, as well as a review of the cordial ontological debate over perspectives on feasting presenting mainly by Dietler and Hayden (2001).

### The Emergence of Complexity

The ethnographies of the Lillooet area provide a wealth of substance to understanding complex hunter-gatherer-fisher societies. As Ames (2011) declares, these ethnographies can and should serve as written text of prehistory in the Northwest. The villages like Bridge River occupied by *St'át'imc*, the Upper

Lillooet, traditionally functioned as classic collectors as defined by Binford (1980), and organized their social structure using a system of achieved and ascribed status hierarchies. Teit (1906) describes the system whereby hereditary chiefs headed the descent groups or clans. Achieved status chiefs served as heads of other functional groups in the society, such as war chief and hunt chief. Property rights to critical fishing stations, hunting territories, and lithic sources belonged to these elite families of both ascribed and achieved status.

The development of these complex social structures and the institutionalized inequality inherent in ascribed status systems is an important issue taxing anthropological archaeologists today. The current theoretical dialogues are fast approaching a comprehension of the emergence of complexity through research on material wealth based status and its transition to inherited social inequality (Prentiss personal communication; Prentiss 2011; Prentiss *et al* 2008). The Lillooet villages offer superior preservation and opportunity to investigate this transition from egalitarian hunter-gatherers to a more transegalitarian and complex structure (Hayden 1994, 1997b; Prentiss 2011; Prentiss and Kuijt 2004; Prentiss *et al* 2008, 2010 ). The work at Bridge River adds understanding of the processes by which socioeconomic inequality developed in these dense aggregate winter villages on the Canadian Plateau.

The common thread throughout this discourse of emergent complexity is the initiation of competition between groups for resources, albeit the time frame and the source of competitive behavior differs (Arnold 1996; Ames 2006; Hayden 1997b; Prentiss *et al* 2008). Cultural systems and structures not seen before are defined as *emergent*. There are currently three theoretical models contending for jurisdiction over the cause of complexity on the region: managerial or adaptationist models, agency models, and Darwinian evolutionism. The third strives to integrate concepts of managerial and agency theories into a staged process and distinguishes historical contingency as a large factor in that approach (Prentiss *et al* 2005a, 2005b, 2007, 2011).

Ecological (Binford 2001; Fitzhugh 2003) or managerial models argue that inequality is established through a need for management of relationships



between resource productivity and demographics (Prentiss 2008; Wiessner 2002). The solving of problems related to population pressure, climate change, communication, and resource decline define many of the managerial models (Arnold 1996; Brumfield and Earle 1987). Many of these adaptationists are limited in their explanations of emerging hierarchies, lacking accountability of human agency and the function of cultural institutions, focusing too intently on ecological factors. Although the valuable point is made that cultural systems can only change to practices of hierarchical inequality when stronger leadership is beneficial to the population in times of stress (Wiessner 2002).

Agency models embrace the action of players, and environmental and demographic factors are secondary to manipulatable production of others (Arnold 1996, 2000; Hayden 1995, 1997b; Hayden and Ryder 1991). Wiessner (2002:234) investigates the “recursive interaction between structure and agency,” and illuminates the intricate systems of egalitarian societies disregarded in other literature. From her research of Papua New Guinea Enga history, Wiessner (2002:250-1) concludes the institutionalization of hierarchical inequality was not the product of aggrandizing agents, because individual success is too heavily linked to group ideals, and due to the nature of enculturation through vertical transmission within the small hunter-gatherer groups, these societies are extremely conservative (Boyd and Richardson 1985; Prentiss 2011; Shennan 2002). Although she argues against Hayden’s (1990, 1996b, 1997b) aggrandizing model that disregards the intricate social structures of egalitarian societies in place to censure aggrandizers and promote group welfare, she does acknowledge that actions of individuals could be prompted by self interests. “The innovations promoted were ones that leaders felt could be played to their own advantage; the innovations that stuck were those that worked for the individual and the group” (Wiessner 2002:251). Hayden criticizes Wiessner’s use of “inequality” and “egalitarianism” to “the more archaeological definitions that focus not on the availability of prestige positions, egalitarian ethos, or lip service to egalitarian ideals but on behavior and the ownership and distribution of prestige goods and/or debts within a society” (Wiessner 2002:256).

Hayden's (1997a, 2000a, 2000b, 2005) work at the Keatley Creek site located 10 kilometers east of the Bridge River site builds on Stryd's research (1972, 1980). Hayden (1990, 1996b, 1997b:112) persistently argues for an earlier and more rapid development of complex cultural patterns generated by "ambitious, aggressive, accumulative, triple A personalities types" amassing wealth through manipulation of surplus resources during the peak climatic episode around 3000 and 2300 B.P. Arnold (1996:98) terms this theory the "prosperity model of competitive action." Hayden (1997a: 112) states

"I have argued that general members of egalitarian communities will recognize claims of ownership over prime resources only when they have enough food for themselves, or when they do not feel threatened by other people having exclusive rights to the exploitation of important resources"

(see also Hayden 1995; Price and Brown 1985; Price and Feinman 1995). Once seemingly inexhaustible resources were available and food storage production and technologies were developed, these aggrandizers' competitive actions gave rise to aggregated housepit villages like Keatley Creek, and that residential corporate group structures remained stable and economically successful until 1000 B.P. (Hayden 1997b; Hayden *et al* 1996; Hayden and Ryder 1991). This is in contrast to assessments that groups will not yield to aggrandizers until altered resource conditions are stressed and there is a population-resource imbalance (Wiessner 2002; see also Arnold 1993, 1996). Hayden's argument gives the impression that one individual, or a handful of Triple A personalities, with the philosophy of every comic book villain, "to rule the world," transformed the social structure of the region from egalitarian to institutionalized social inequality in a matter of good salmon fishing years creating surpluses to manipulate.

There is an agreement that "Triple A" personalities did exist, and that they were socioeconomically successful in manipulation and aggressive behavior; and this model is in concert with agency and practice theory (Arnold 1996; Bourdieu 1977; Wiessner 2002). The discord comes from the stimulation of acceptance of aggrandizing elites within the egalitarian ethos. Many others see the need for overt stress, population pressure and environmental change to stimulate the

acceptance of these discriminating behaviors of inequality, and that stratification could not develop without exogenous factors (Cohen 1985; Halstead and O'Shea 1982).

The focus on the important interaction of agency and social structure, the gradual evolution of the social structure to alter cultural norms prompted by human agency, is more akin to the principles of punctuated equilibria and Darwinian evolutionism (Arnold 1992; Bourdieu 1977; Gould 1982; Prentiss 2010; Prentiss *et al* 2003, 2004; Wiessner 2002). Prentiss and colleagues (Prentiss *et al* 2003, 2005a, 2005b, 2007, 2008; Prentiss and Kuijt 2004) argue for a shorter, more recent, and noncontinuous occupation of large villages in the region, and promote an evolutionary model that supports the interaction of environmental factors and agency that marshalled a three staged process of emergent inequality, as evidenced by work at Bridge River. Their model for the development of large aggregated villages and socioeconomic complexity occurs in three phases, owing changes to environmental and climatic conditions becoming increasingly warm and dry and historically contingent distinct responses of villages and the hunter-gatherer groups (Prentiss *et al* 2003, 2005a, 2005b, 2007). The first phase, Period I, begins with the rapid aggregation of villages near abundant salmon and root resources circa 1900 B.P. to 1500 B.P. showing varying house sizes and little archaeological evidence of status variation within them (Prentiss personal comm.). From 1500 B.P. to 1200 B.P., Period II shows considerable village expansion, population growth with apparent economic success, and probable increases in the number of social groups; salmon intensification persisted while root roasting declined. The likelihood of social complexity occurring during this period is high due to the large aggregation of people in villages, although the archaeological record at Keatley Creek has little evidence of formal hereditary ranking or stratification (Prentiss *et al* 2007). Status indicators and prestige items at Bridge River begin to appear in higher numbers within smaller houses during this time (Prentiss *et al* 2008). Period III represents the decline of the Mid-Fraser villages circa 1200 B.P., and is marked by reduction in salmon access, expanded terrestrial resource use that is

consistent with local resource depression. Signs of status inequality become prominent at this time of resource depression; Keatley Creek and Bridge River housepits illustrate ranked patterns in organization and prestige items (Prentiss *et al* 2007; Prentiss personal communication).

Multivariate analysis of the Bridge River site supports the model of a late emergence of social inequality, and provides evidence of the development of material wealth based status inequality without obvious indicators of inheritance (Prentiss *et al* 2008; Prentiss and Foor 2010; Prentiss *et al* 2012). The assessment of interhousehold variability in demography, accumulation of wealth, and occupational longevity indicate affluence among newly established houses. This revelation suggests material wealth based inequality may not have been hereditary at Bridge River prior to 1100 cal B.P. and the abandonment of the village. There is inherent support for Wiessner's (2002) thesis of the intricate egalitarian social structure's ability to maintain the semblance of equality. The development of new cultural traditions facilitated by rich environmental conditions permitted variability in household size and quantity of household possession despite prevalence of implicit rules reinforcing egalitarian behavior patterns (Prentiss 2011:28). Signs of resource depression between 1300 to 1150 B.P. around Bridge River show direct evidence of interhousehold inequality in select housepits followed by population growth within them (Prentiss 2011). Inequality is potentially an after effect of household groups' ability to accumulate food and celebrate success (Prentiss personal communication). When resource stress occurred and there was uncertainty in the procurement and stability of resources, competition ensued.

The important concept of *exaptation* carries great relevance to the development of inequality on the Plateau. In macroevolutionary terms, *exaptation* is describes a trait that evolves for one reason and is later used for another reason (Prentiss personal communication). Social inequality is not the direct result of a steady population rise, but is associated with population packing at villages and subsequent resource depression (Prentiss *et al* 2007). It is a combination of resource stress in packed villages that gives rise to social

inequality, but only after the gradual restructuring of egalitarian socioeconomy develops to allow such complex systems to exist for the benefit of the group - the newly defined corporate family group rather than the egalitarian band. Ames (2006) details how families strived to preserve household stability through household production activities and exchange partnerships within the socioeconomy. Strong leadership within households would pursue advantageous political ventures where exchanges and competition would be converted into effective socioeconomic power (Ames 2006).

It is commonly accepted that inequality rises out of competition (Arnold 1993; Bourdieu 1976; Hayden 1997b). Arnold (1992:62) defines complexity “as a change in control over the labor of the domestic economy. The separation of household labor or products from head-of-household management where individuals outside of the family units begin to manipulate these resources represent a sign of socioeconomic restructuring process.”

The “restructuring process” is implemented using societal tools to engender the power, wealth, and influence often referred to as “status.” It is the development of these social structures that creates inequality, and perpetuates the accumulation of wealth in all its forms, dogs included. Even though egalitarian hunter-gatherers are inadvertently classified as “less complex” due to their position on the scale of complexity, the social structures working to retain egalitarianism are quite intricate and sophisticated (Wiessner 2002). Mechanisms are in place to reduce aggrandizing behavior and keep group health and wealth at the fore front of the system. It is within this egalitarian social structure that changes must take place, building on this platform of basic alliance formation and mutual assistance within the band (Hayden 2009). Experimentation of new strategies of semi-sedentism developed around 4300 BP, and the collector based subsistence systems became increasingly logically organized and decreasingly mobile (Chatters and Prentiss 2005; Prentiss and Chatters 2003; Prentiss and Kuijt 2004). This experimentation and transition from mobile to semi-sedentary provides the stage for increases in social

interaction among groups in the Mid-Fraser Canyon, as family group sizes grew and aggregation in winter housepit villages continued to increase.

Although, there are numerous examples of cultural traditions pointing out no clear linkage between socioeconomic complexity, surpluses, and sedentism, there is a strong link to residential stability and the development of complexity on the Plateau (Ames 1991; Arnold 1996). Semi-sedentism for groups on the Plateau provides the opportunities for hunter-gatherers to become tied to their territory and invest fixed facilities such as cache pits for food storage. This form of investment in fixed facilities and storage technologies are utilized in resource management and control (Hayden 1992). It engendered the ability to amass surplus foods and prompted the need for a system to control them. Arguably, the development of food storage technology to collect and store food is a quintessential part of complexity in the Mid-Fraser (Hayden 1995). These stores of food had to be managed from every aspect: collection and preparation through distribution. Clarke (2001:149-154) defines complexity in degrees rather than distinct categories, with the shift between hunter-gatherer strategies and complex societal strategies. Hunter-gatherers deal with fluctuating food supplies, affecting the alliance formation and mutual association within groups to deal with such situations. Feasting as a means of food sharing among the clan members with little aggrandizing or competitive behavior maintains solidarity within the small band. As the degree of complexity changes, there is an increase in competition for labor rights, as well as spouses, land, and politics. Feasting becomes the forum where competition between clans occurs, a place for advertising wealth and aggrandizing attributes such as delicacies. Accordingly, the development of social inequality is related to the socioeconomic systems used in the distribution and redistribution of resources. Resources are not just food, but the basic needs of subsistence strategies are directly related to the accumulation and procurement of food. As Arnold (1996:108) states “the power building process is inherently economic.” It is the systems of redistribution of resources, food or prestige goods, that creates political power. Inequality arises from and “always

involves the transfer of goods from the hands of direct producers to political elites” (Brumfiel 1992:556; from Arnold 1996: 108).

### Prestige Economies and the Feasting Apparatus

As the socioeconomic process of restructuring the control of labor in the domestic economy shifted to management outside of the household, social mechanisms were established for such purposes, and prestige economies became a direct development of emergent complexity in the Northwest (Arnold 1996; Hayden 1994). The establishment of relationships between village groups would promote access to a broader variety of non-local goods, such as rare lithic raw materials, artifacts, and foods. Exchange of these items, as seen in the ethnographies, transfers wealth between and among groups in the village and throughout the region, engendering differences in wealth and status.

Practice theory and the interplay of Bourdieu’s (1977, 1984) forms of capital are most relevant for conceptualizing the nature of prestige economies, as well as the use of delicacies in the feasting apparatus. Although framed from modern society, the social interaction of material wealth and cultural knowledge to define power as proclaimed in the theory of practice are pertinent in any setting. Even though capital is the framework for the analysis of divisions between social groups, the sociological factors that govern capital shaping the groups are equally important. These factors of cultural exchange explain the reasons why different groups are more likely to form, and what interactions take place to form the groups when villagers aggregate in winter. These groups could be elite groups as well the secret societies comprised of elite members (see Hayden 1997a; Wiessner 2002). Shelley and Troyer (2001) explain group dynamics in initially undefined and partially defined groups, asserting that interacting dynamics of groups are based on similar attributes between group members. Carley (1991) explores group stability through the interactions and assimilation of groups based on this communication of knowledge. The model asserts that changes in the distribution of knowledge as individuals acquire and communicate information create social change and eventual stability within a

group context. The constructural perspective comes from Blau's (1977) social differentiation theory, which maintains that knowledge mediates social dimensions and interactions. Therefore, the processes relating to the acquisition of knowledge that prompt behavior generate the relationship between group characteristics and behaviors of the group's member. These processes of exchange are constantly active in social interactions where members of the community surround themselves with like individuals that offer them equal or greater return on social investments.

Bourdieu (1984) argues that the forms of *economic*, *cultural*, and *social* capital intersect to mutually define distinctions and hierarchy within the community (Lipuma and Meltzoff 1989). *Cultural* capital, in broad terms, stands for the forms of education, knowledge, skill, materials, and any other advantage people possess within the socioeconomy, which can be considered *cultural* wealth. There are three states of *cultural* capital: the *embodied* state, the *objectified* state, and the *institutionalized* state (Bourdieu 1984). These different states of *cultural* capital hold different values, and engender stratification. *Embodied* capital is represented by the general knowledge of how to act during cultural and social events, such as which recipe to use for certain rituals meals and the nuisances of preparing that meal. This plays heavily into *diacritical* feasting. *Objectified* capital refers to the material culture that holds value within the community, such as prestige items, lithic raw materials, nonlocal materials, and of course dogs. Positions of achieved status, such as hunt chiefs and war chiefs represent *institutionalized cultural* capital. Due to their respected skills, these achieved status chiefs were selected leaders by consensus within the community. *Social* capital refers to the social connections utilized in socioeconomic exchange to gain more wealth culturally. It can be simply defined as who you know (Carley 1991). The intersection of these different forms of capital ties in to the creation of stratification of socioeconomic differences based on access to the different forms of capital or wealth. Those who have more access to wealth form the top tier, while those who are most deprived of these forms of wealth are at the bottom (Bourdieu 1977: 114). Teit (1900; 1906) writes



that one half to two-thirds of the native populations were considered elites. There would have to be subtle distinctions using these forms of *cultural* and *social* capital.

Clan members and household leaders need a platform for these exchanges of wealth and alliances. Feasting events are such a mechanism to establish, maintain, and manipulate social relations and wealth (Dietler 1996). They act as a forum to promote short term aggregation of dispersed groups where the conversion of resources into cultural capital can take place (Bourdieu 1977; Hayden 1990, 1994; Jackson 1991). Within the larger political economy of the region, feasts act as “the nodal context that articulate regional exchange systems” (Dietler 1996:91). As social tools, they are a way to acquire commitments of labor, establish debts, give gifts to build power, and create solidarity among group members (Hayden 1994).

For the purposes of this study, a feast is defined as any meal not eaten solely for sustenance, but as a facet of a larger social event (Clarke 2001). The feasting apparatus is the social mechanism directly related to the distribution of food resources through the larger social event posed for manipulating power. The subtle effectiveness of feasting as a tool is its ability to convert food resources, a form of *cultural* capital, into socioeconomic and political currencies (Dietler 2001; Hayden 2001). The social interactions active in feasting become “highly condensed social fact” providing a link between the domestic and political economies through embodying relations of production and exchange (Appadurai 1981: 494; Dietler 1996). They are the ideal situation for the creation and manipulation of culturally constructed values and meanings (Wiessner 2001). Cohen (1979) wrote that

“the most emotionally compelling and effective political symbols are those not overtly political, but ambiguous “bivocality” melding intense personal experiences of existential identity issues with broader structures of power.”

All aspects of the feasting apparatus involve the manipulation of power, and the recognition of social boundaries and structure inherent in power while producing

a sense of community (Deitler 1996). Feasts engender distinctions between groups and showcase social boundaries between age, gender, and kinship, as well as status and class. These distinctions are displayed in all aspects of feasting, from the seating arrangements of group members to the exclusion of individuals from any or all aspects of an event (Keating 2000). Feasts can also provide access to gods and ancestors, which offer additional ways of defining the structure of relationships between social groups of a community (Friedman 1984). This multifaceted event provides participants the ability to gain status through food. Status can be gained through displaying and consuming prestigious foods (knowledge as *embodied cultural capital*), by having permanent access to the best quantitatively and qualitatively foods (materials as *objectified cultural capital*), and by allowing certain groups to have access to valued foods (de Garine 1996). In the feasting apparatus, and specifically in *diacritical* feasting, the use of differentiated cuisine and styles of consumption serve as a diacritical symbol to enfranchise and reify concepts of ranked differences in social status. The shift from quantity to matters of style and taste mirror the shift from asymmetrical commensal bonds between unequal partners to statements of exclusion, moving beyond the obligations of reciprocal hospitality as the basis for differential status and power (Bourdieu 1984; Dietler 2001).

Feasting events provide the platform for exchanges within the socioeconomy through modes of *consumption* (Arnold 1996; Dietler 1996; Mauss 1966). *Consumption* removes food from circulation in the economy by distributing food to guests, which represents the stores of calories gathered through previous labor commitments organized by the proprietor of the food store. The calories consumed then need to be replenished, thus providing a necessity for a debt of calories to be repaid through new labor commitments. Food sharing enables host families to build power, wealth, and status by this ability to organize labor successfully.

Distinctions between feasts can be made through functional typologies and practical benefits gained for the hosts of feasting events. Dietler's (2001) and Hayden's (1996a, 2001) typologies categorize feasts in a schematic fashion

to elucidate the political dimensions, functions, and practical benefits to show the establishment, maintenance, and manipulation of social relations in the acquisition and manipulation of power. Although, these categorizations of feasts are artificial in that types overlap and serve multiple purposes (Perodie 2001). Classifying types of feasts into the functional uses helps to better define feasting as a social instrument in complex society, and focus this research is on the development of social inequality.

Dietler (2001) provides three types of feasts in his model of commensal politics: *empowering* feasts; *patron-role* feasts; and *diacritical* feasts. *Entrepreneurial/empowering* feasts provide the stage for individuals to generate symbolic capital that can translate into an ability to influence group decisions or actions. It becomes a means for aspiring individuals to ensure and hold roles of status. *Patron-role* feasts are used to reaffirm institutionalized relations of hierarchical social power. *Diacritical* feasts provide platforms to naturalize concepts of ranked differences in social status through differentiated cuisine or styles of consumptions. This translates into the nuisances of style and taste, which stands as a statement of exclusion.

Hayden (1996a; 2001; Perodie 2001) categorizes eight feasting types: *solidarity*, *reciprocal*, *solicitation*, *promotional*, *competition*, *political support*, *acquisition of political positions*, and *work-party* feasts. *Solidarity* feasts promote cooperation within the group, enhance economic productivity and security, build mutual support between groups members engaged in conflict with other groups, and solidify group leaders with hierarchical difference between group members downplayed. *Reciprocal* feasts initiate and maintain alliances between groups for security, marriage, and economic benefits; there is an air of amiable competition for the sake of good impressions. *Solicitation* feasts serve to solicit favors and support from more powerful individuals, and involve unidirectional exchange where gifts are given without reciprocal obligations. A feasting event utilized for self promotion is known as a *promotional* feast, where group success and prosperity is advertised to attract potential labor, allies, exchange partners, and other supporters. *Competition* or *competitive* feasts are characterized as

large, lavish events where the sponsor tries to maximize contracted obligations and profit by distributing large amounts of food and property in order to create material profit because distributions are returned with interest at future events. *Political support* feasts serve to promote political support, much like *acquisition of political positions* feasts are a requirement of formal criterion for political advancement. To obtain labor for specific labor intensive projects, such as pithouse building, a *work-party* feast is used. These feasting event types obviously overlap in function, and the defining characteristics become muddled. Although, according to Perodie (2001) the important social function of all feasts serve the sponsors' self-interest and ambitions, and strive to increase power by: attracting and binding labor, forming alliances for political support and added security, as well as developing cyclical prosperity trends to invest surpluses to multiply wealth.

Hayden (1996a) argues that it is only among complex hunter-gatherers using abundant and invulnerable resources that private ownership and competitive feasts seem to occur (Hayden 1996a:142). He(1996a) breaks his *competitive* feast into three further sub-categories, (1) *celebratory* feast: held to reinforce social bonding between individuals of approximately equal social standing; (2) *reciprocal aid*: work-party exchange feasts; and (3) *commensal* (table) feasts: which can be either an (a) *economic* feast; (b) *redistribution* feast, or (c) *diacritical* feast. The basic characteristics of *competitive* feasts provide for the ability to attain, produce, and use goods for competition. The destruction of high cost wealth items appear in *competitive* feasting as a display of power and wealth. Features of self-aggrandizing behavior such as competitive displays and boastful speeches, as well as practical self-interested motivations with direct material gain, indirect benefits of power, and the attraction of highly skilled labor can all be attained through competitive feasting (Hayden 1996a; 2001).

Perodie (2001) organizes Hayden's feasting types into three basic categories: no return feasts, equal return, and greater return. Arguably, all feasting events are greater return feasts because of the inherent nature of the

event in the social structure, forms of *cultural* and *social* capital beyond food are exchanged and roles are reified serving self promotional means.

Hayden (1990) hypothesizes the beginnings of agriculture and horticulture developed out of this transition to competitive food sharing techniques. There was a need by aggrandizing elites to possess distinct and prestigious foods utilized in feasting, to amass wealth and status through the competitive feasting apparatus. Elites maintained control over the labor, production, and consumption of these specialized food resources, and the conscious act of inventing and developing delicacies to control and distribute in feasting went in hand with the high quantities of surplus foods. Although, many scholars would disagree with this notion, arguing it is difficult to document such an hypothesis. More than likely, the social reorganization associated with cultivated food production was a consequence of agricultural development rather than a cause of it (Price and Bar-Yosef 2011).

## CHAPTER FIVE MATERIALS AND METHODS

This chapter presents the methods and materials used in this study of domestic dogs from Bridge River. The examination of physical evidence is pursuant of the broader theoretical inquiry on material wealth based status inequality at Bridge River, and the use of dogs as a form of material wealth in that system. The 2008 and 2009 excavations of Housepit 24 recovered evidence of domestic dogs within two cache pit features of Activity Area 3. Some of these elements show visible signs of trauma including cut marks, gnaw marks, and perimortem fracturing consistent with processing as a cultural resource.

In addition to the primary osteological analysis detailing characteristics of each *Canis familiaris* specimen, more involved tests of isotopic composition to determine diet and DNA analyses establish genetic relationships to other canids. These analyses reveal details for the interpretation of the socioeconomic roles of dogs in the Middle Fraser Region. This chapter is organized into the following sections: a review of methods used in this investigation; an introduction to the major facets of Housepit 24's canine assemblage; an osteological analysis of the remains from both the Feature 1 cache pit and the Feature 5 cache pit including the rudiments of age, sex, height, and weight; a brief review of trauma present; a review of the isotopic analysis; an assessment of the DNA analysis; and a brief review of additional material recovered from Housepit 24.

### Methods

This detailed study of domestic dogs began as part of the broader investigation of faunal material completed for the excavations at the Bridge River site (Carlson 2010; Prentiss *et al* 2009). The full faunal assemblage, including *C. familiaris*, was analyzed in the Prehistoric Archaeology Laboratory of the Department of Anthropology at the University of Montana, Missoula, Montana. The Philip L. Wright Zoological Museum of the University of Montana provided the comparative collections, and the museum's curator, David Dyer, provided

critical assistance. A complete coyote skeleton was provided by the Philip L. Wright Zoological Museum to assist in detailed comparative analysis of domestic dog remains. All elements were evaluated for taxonomic class, species, and element (Gilbert 1990). Characteristics of each specimen were recorded into a faunal database: size (organized into categories of 1-9mm, 10-19mm, 20-29mm, 30-39mm, 40-49mm, 50-59mm, and 60+milimeters), weight, weathering (see Behrensmeyer 1978), and modifications (Reitz and Wing 1999). Macroscopically visible trauma was confirmed through microscopic analysis using a stereoscopic microscope at a power of 10. Carlson (2010) provides detailed analyses of the complete faunal data collected from the Bridge River site in 2008. The 2008 and 2009 site reports provide additional information on all materials from Bridge River (Prentiss et al 2009, 2010).

The two additional isotopic and DNA analyses of the dog remains took place away from the University of Montana. Two rib fragments were sent to Dr. Michael Richards at the Max Plank Institute for isotopic analysis to determine the ancient diet of the dogs represented (Cail *et al* 2010). Ten coprolites samples were sent to Dongya Y. Yang and Camilla F. Speller at Simon Fraser University, Burnaby, BC in the dedicated ancient DNA laboratory to assess the genetic relationship between the domestic dogs of Bridge River and other ancient and modern dog populations both locally and worldwide (Yang *et al* 2010).

#### Introduction to the Canine Assemblage

There are a total of 179 *C. familiaris* identified specimens (NISP = 179) that form the canine assemblage in Housepit 24. Specimens that did not exceed the faunal analysis notation of “compares favorably” to *C. familiaris* are not included in this analysis. Of the 179 specimens, 24.02% (N=43) are complete, leaving 75.98% (N=136) incomplete or fractured specimens. The weight of the canine assemblage totals 367.01 g. See Appendix A for a full table of specimens recovered and their descriptions.

All of these canid remains were recovered from Activity Area 3 of Housepit 24 within two cache pit features, Features 1 and 5, which are within two meters

of each other in the southwestern sphere. The fourteen coprolites were found throughout floor and pit stratigraphy of the housepit. Feature 1 contained the incomplete cranium and a few elements of feet, while Feature 5, a large bell-shaped cache pit, contained post-cranial remains as well as both halves of a mandible. Figure 5.1 illustrates the locations of activity areas and the contours of Housepit 24. The North Wall Profile of Activity Area 3 (Figure 5.2) provides a profile view of the stratigraphy of Activity Area 3, while the Housepit 24, Area 3 Stratum II Map (Figure 5.3) illustrates the location of features and the larger and most noteworthy specimens recovered from cache pits. Appendix A presents the measurements of the canine assemblage.

Originally, it was thought that entire canine assemblage represented one dog, but the presence of two left

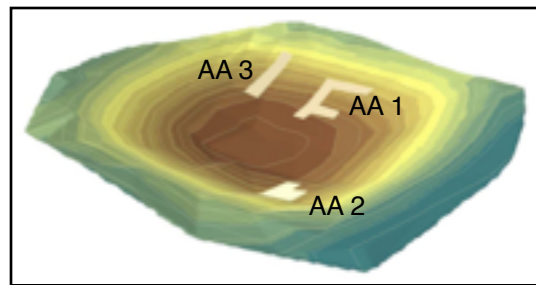


Figure 5.1: Contour map of Housepit 24 with excavation units superimposed (view facing SW)

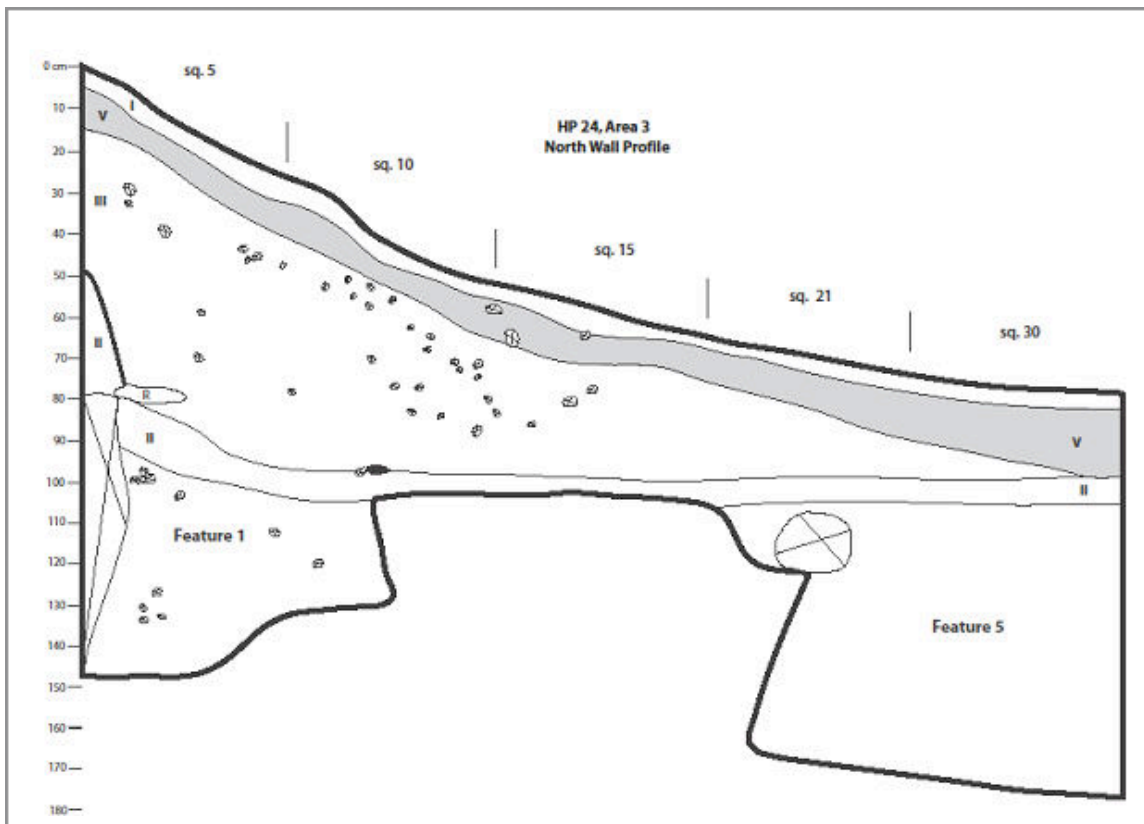
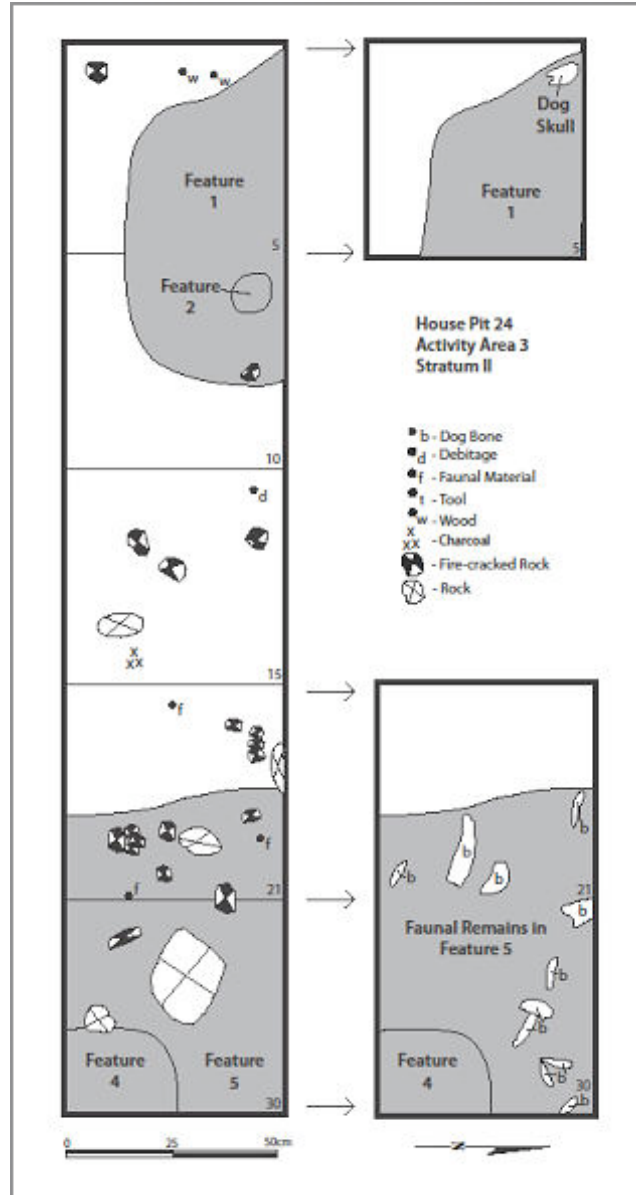


Figure 5.2: Housepit 24, Area 3 North Wall Profile





**Figure 5.3: Housepit 24, Area 3 Stratum II Map**

calcanei indicates a minimum number of two individual dogs (MNI = 2). It is significant to note that the two calcanei were recovered from the separate cache pit features. The larger left calcaneus was found in Feature 1, while the smaller calcaneus was found with the other post-cranial remains in Feature 5. The MNI of two is substantiated by the results of coprolite DNA analysis indicating two different domestic dogs were present in Housepit 24; as well as sex estimations evidenced by measurements of the male cranium and female pelvis denoting two dogs of different sexes.

Identification as *Canis familiaris*

There are certain characteristics of *Canis familiaris* that distinguish dogs from other canids such as *Canis lupus*, gray wolves, and *Canis latrans*, coyotes. The four major traits used to identify the Bridge River canine remains as domestic dog include (1) the overall robusticity of the elements as compared to coyotes (2) the concavity of the posterior border of the coronoid process on the mandible, and (3) the absence of the mandibular first premolar (Colton 1970; Gilbert 1990; Krantz 1949).

The cranium is generally smaller than a wolf and more robust than a coyote. The post-cranial elements are intermediate between wolf and coyote specimens, smaller than that of a wolf and shorter and more robust than that of a coyote. The most distinguishable characteristics are found on the mandible. The posterior border of the coronoid process on the mandible is usually concave in dogs and straight in wolves and coyotes, although some domestic dogs have straighter posterior borders. Figure 5.4 shows the concave posterior border of the coronoid process in the Bridge River canine mandible, as well as the non-existent lower first premolar.

The lack of the lower first premolars is a trait of New World aboriginal dogs roughly estimated at 50%; there is no reference to the presence or absence of the first premolars in wolves and coyotes in North America (Colton 1970).



**Figure 5.4: Medial aspect of left mandible with arrows pointing to concave posterior border of coronoid process and lack of first premolar**

Osteological Analysis

The osteological analysis of the *Canis familiaris* skeletal remains unearthed in the 2008 and 2009 Bridge River field seasons offers clues to the

use and treatment of domestic dogs at Bridge River. The first two sub-sections of this analysis detail the *C. familiaris* specimens from Feature 1 and Feature 5, respectively, including descriptions of modifications to bones. For purposes of continuity, all specimen identification will be based on terminology from *Mammalian Osteology* (Gilbert 1990). The third sub-section is an overview of the osteological rudiments of sex, age, height, and weight estimations.

Several of the bones exhibit signs of natural and cultural modifications in the forms of perimortem and postmortem fractures, pathology, cut-marks, and gnaw-marks. Cultural modifications to the bone are defined as changes to the specimen caused by human action, and weather modifications are those changes in the bone caused by natural processes of weathering and decomposition. There are examples of pathological modifications to bone caused by biological remodeling of specimen following trauma and infection, and distinctions of perimortem and postmortem fracturing are based on human osteological analytical methods (Bass 1973; Cox and Mayes 2000; Katzenberg, Saunders 2008; White and Folkens 2000) and zooarchaeological analytical methods (Reitz and Wing 1999).

### Feature 1

Feature 1 contained the cranium; one carpal; one metacarpal; two tarsals; and one left calcaneus. The dog cranium recovered from Feature 1 was found laying on its right side *in situ*, as shown in Figure 5.5. The cranium, Figure 5.6, is missing the maxilla, the left zygomatic process, and the anterior half of the right zygomatic process. The rostrum fracture appears as a weather related fracture rather than trauma, resulting in the missing maxilla. The breaks of the zygomatic processes also occur along suture sites suggestive of partial fusion seen in a younger adult dog. The left side of the cranial vault presents a puncture measuring 8.5 mm in diameter consistent with damage sustained during excavation. The damage caused fractures to radiate from the puncture site. The coronal suture that extends from the sagittal crest is unfused with a gap between frontal bones of the left and right side, and possibly explained by damage done



Figure 5.5: Photo of Housepit 24, AA 3, Feature 1 with *Canis familiaris* cranium in situ.



Figure 5.6: Photo of the dorsal aspect of *Canis familiaris* cranium. White arrows point to natural modification of the bone cause by infection.



Figure 5.7: Photo of the right side of the *Canis familiaris* cranium



Figure 5.8: Photo of the left side of the *Canis familiaris* cranium

by weathering and subsequent excavation. Figures 5.7 and 5.8 show the cranium missing zygomatic processes and the maxilla. There are ten shallow marks located on the parietal, five on either side, averaging 5 mm in length. These marks resemble marks found on the ischiadic tuberosities, and are not cut marks, but anatomical features of the bone where soft tissues such as blood vessels modified the. The right side of the temporal fossa, or cranial vault, and the sagittal crest exhibit periostitis, and signifying an infection in the area. Periostitis is an inflammation of the periostium, or outer layer of the bone, caused by an infection of the overlying tissue. In this case the over lying tissue is the temporalis muscle. Appendix B provides a detailed table of cranial measurements.

The elements of the feet found with the cranium measure as follows: the calcaneus measures 42.27 mm and weighs 3.7 g, the carpal measures 14 mm and weighs 0.5 g, the metacarpal measures 13.91 mm and weighs 0.5 mm; the fourth tarsal measures 16.61 mm and weighs 1.7 g, and the remaining tarsal measures 12.38 mm and weighs 0.3 g.

### Feature 5

The majority of the canine assemblage was contained in Feature 5: both sides of the mandible; atlas and axis; two bones of the hyoid, proximal fragments of both humeri; fragment of proximal radius; three carpals and five metacarpals; one rib and four rib fragments; four sternabrae; both innominates; fragments of both femurs; fragments of both tibias and the right fibula; one left calcaneus; three tarsals; five metatarsals; two sesamoids; sixteen phalanges; fifteen vertebrae fragments; and five caudal vertebrae. There is a significant amount of postmortem fracturing on many of the long bones and bones of the hind feet. Weathering is more significant for these bones, with portions of the feet and long bones missing.

Both halves of the mandible show little evidence of weathering, and significant signs of trauma. The identical cusps and tooth wear signify these two halves belonging to the same individual. Figure 5.9 shows the lateral aspect of



**Figure 5.9: Photo of lateral aspect of the right side of the *Canis familiaris* mandible**

the right half of the mandible with a puncture 9.4 mm long and 6.7 mm wide on the coronoid process in addition to radiating fractures from the puncture. The edges around the puncture denote the trauma occurred perimortem from a force entering on the medial aspect of the mandible. An alternate cause of this puncture could be flaking of the bone when muscles were forcibly removed. The border of the coronoid apex also shows damage. Shallow pitting on the lateral aspect indicate scavenging and carnivore gnawing. Pits of this size and shape are consistent with gnawing by dogs.

The left half of the mandible (Figure 5.10) has similar evidence of scavenging in addition to significant cut marks on the medial aspect below the large carnassial tooth on the horizontal ramus. There is also damage to the anterior of the mandible where three incisors would fit. Figure 5.11 shows the significant cut marks on the mandible, which are undoubtedly cultural modifications. See Appendix C for a the detailed measurements of the mandible.

The majority of teeth are present in the mandible, with only the third molar missing on the right side of the mandible and the three incisors on the left side of



Figure 5.10: Photo of medial aspect of the left side of the *Canis familiaris* mandible



Figure 5.11: Photo of cut marks on medial aspect of left side of the mandible





Figure 5.12: Photo of *Canis familiaris* atlas

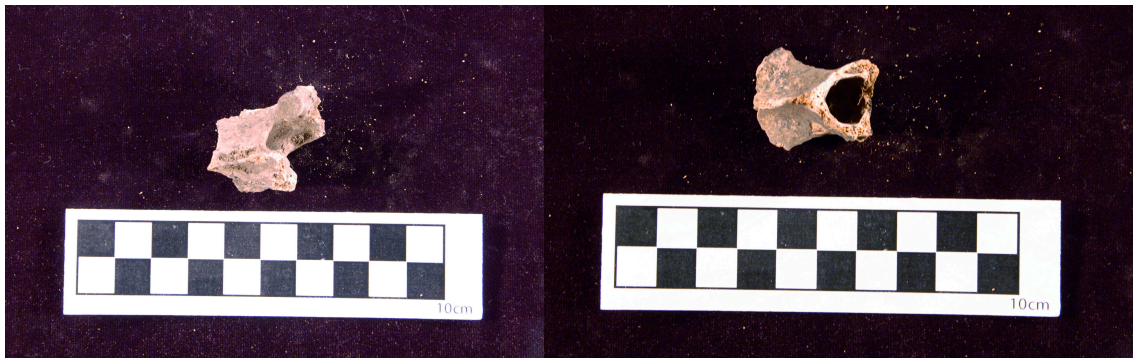


Figure 5.13: Photo of lateral aspect of *Canis familiaris* axis

Figure 5.14: Photo of anterior aspect of *Canis familiaris* axis

the mandible. There is an insignificant amount of wear to the teeth, which supports the age estimation of a young adult dog (Gilbert 1990). Appendix C contains the complete table of tooth measurements.

The atlas and axis were found during the 2009 field season in the northern edge of Feature 5. They were found *in situ* partially articulated. The atlas, shown in Figure 5.12, measures 69.58 mm wide and weighs 8.9 g. One wing of

the atlas shows an oblique fracture occurring post mortem; its estimated total width is 81 mm. Unfortunately, the axis is significantly weathered; fragments measure 17.06 mm, 29.55 mm, and 15.63 mm, with a combined weight of 4.4 g. It is difficult to note features of the cervical vertebrae fragments due to their severely weathered state. Figures 5.13 and 5.14 show the lateral and anterior aspects of the weathered axis. Two of the nine bones of the hyoid apparatus, measuring 22.77 mm and 24.84 mm, and each weighing 0.1 g were recovered. The presence of these small bones could indicate tissue of the dog's throat being placed into the cache pit still attaching these small bones to the atlas and axis; the possibility of dog remains being buried with connective tissues will be discussed in further detail in the brief review of trauma.

No thoracic or lumbar lumbar vertebrae were recovered. Six caudal vertebrae were recovered from Feature 5. One caudal vertebra shows signs of trauma consistent with a healed fracture, and two caudal vertebrae fused during the healing of that fracture. The event occurred well in advance of death giving the tail time to heal and the bone remodeling to take place. Figure 5.15 shows the healed fracture as a deformation of the proximal end of one caudal vertebra.



**Figure 5.15: Photo of *Canis familiaris* caudal vertebra with pathology**

Eight rib fragments, four complete sternabrae, and one sternabra fragment of the thorax are present. Rib fragments measure 114.08 mm and weigh 3.7 g, 92.65 mm and 1.8 g, 53.06 mm and 1.7 g, 53.55 mm and 1.7 g, and 17.4 mm and 0.5 g, and 45.25 mm and 0.95 g, and two fragments over 60 mm were sent for isotopic analysis. One large rib fragment exhibits signs of severe trauma associated with carnivore gnawing (Figure 5.16). The four complete sternabrae measure 15.83 mm and weigh 0.4 g, 17.78 mm and 0.5 g, 15.37 mm and 0.4 g, 14.7 mm and 0.6 g.



Figure 5.16: Photo of *Canis familiaris* rib fragment exhibiting carnivore gnawing



Figure 5.17: Photo of articulated acetabulofemoral joint of *Canis familiaris* in situ



**Figure 5.18** Photo of lateral aspect of right ilium of *Canis familiaris*

A majority of the pelvis was recovered from Feature 5. The left ilium is missing, and the characteristics of the fracture line are consistent with a perimortem damage. The remainder of the left innominate, or os coxa, is in intact including the left acetabulum; it weighs 16.5 g. The right innominate is fractured through the acetabulum and pubis, leaving it in two large pieces and three smaller fragments of the acetabular rim; it measures 84.68 mm and weighs 19.8 g. Figure 5.17 illustrates the right acetabulofemoral joint articulated *in situ*, suggesting that the right hind limb was placed in the cache pit with connective tissue attached keeping the limb articulated. The symphysis pubis is fractured with a small fragment of the left pubis remaining fused to the right pubis. The epiphyseal edges of the iliac crest is not fully fused (Figure 5.18), suggesting that the dog belonging to the pelvis is of a younger age, which is consistent with the lack of wear on the teeth. A series of



**Figure 5.19:** Photo of grooves on ischiadic tuberosity of *Canis familiaris*



Figure 5.20: Photo of *Canis familiaris* fractured pelvis illustrating the missing ilium

vascular grooves on the ischiadic tuberosities are present perpendicular to the crest (Figure 5.19), not cut marks as initially interpreted. The left and right innominates were recovered in the same cache pit, but not articulated (Figure 5.20).

Of a possible twelve long bones, fragments from nine were recovered. These include proximal fragments of both humeri, one radius, one ulna, both femurs, both tibias, and one fibula. Most of the fragmentation of long bones is due to weathering, excluding the humeri, which show significant cultural modification.

Both humeral diaphyses exhibit perimortem irregular spiral fractures and are missing epiphyses (Figures 5.21 and 3.22). This type of fracture occurs from the twisting of the bone ends in opposite directions. Edges of the spiral fractures are sharp and clean, a characteristic of fracturing while bone is still green (Bass 1973; Reitz and Wing 1999). It is possible that the epiphyses weathered away due to the fibrous nature of immature epiphyses consistent with immature age of other elements of this individual dog, although more likely they were scavenged.



Figure 5.21: Photo of *Canis familiaris* lateral aspect of right humerus fragment



**Figure 5.22: Photo of *Canis familiaris* medial aspect of right humerus fragment**

The right humerus fragment also shows evidence of carnivore gnawing on the proximal end; and is suggestive of scavenging following the fracture. The left humerus fragment measures 83.43 mm and weighs 11 g; the right humerus fragment measures 77.1 mm and weighs 10.7 g.

The right proximal ulna fragment recovered from Feature 5 measures 92.82 and weighs 8.2 g. Another ambiguous ulna fragment measures 17.08 mm and weighs 0.3 g. One proximal fragment of the radius was recovered, measuring 15.89 mm and weighing 3.7 g.

Both femurs are fragmented through the diaphyses due to weathering and decomposition of the bone, although the general state of the bone is stable. The left proximal femur fragment measures 53.85 mm. The right proximal femur fragment measures 33.3 mm and weighs 7 g, and the right distal femur fragment measures 27.28 mm and weighs 17.2 g. The total estimated length of the right femur is at least 60.58 mm (Figure 5.23).

Fragments of both tibias are present, while only two fragment of the left fibula is identified. The left tibia is more complete than the right. Its distal



**Figure 5.23: Photo of right femur of *Canis familiaris* in fragments**

fragment measures 54.43 mm and weighs 6.4 g, the proximal fragment measures 32.94 mm and weighs 1.9 g, and the diaphysis deteriorated into multiple fragments (Figure 5.24). The right tibia fragments include a proximal fragment measuring 72.24 mm and weighing 10.01 g, and diaphysis fragment measuring 88.74 mm and weighing 7.5 g (Figure 5.25).

Elements from front feet and hind feet are present in the assemblage, including sesamoids, although phalanges and sesamoids are difficult to distinguish between front and hind feet. Multiple first, second, and third phalanges were present in addition to multiple carpals. There is one accessory carpal, 13.9 mm and 0.5 g; one astragalus, 23.04 mm and 1.8 g; one left calcaneus, 40.23 mm and 3.7 g; one central tarsal, 15.67 mm and 0.8 g; one second carpal, 13.9 mm and 0.9 g; fourth carpal, 9.06 mm and 0.3 g; one first left metacarpal, 50.26 mm and 2.6 g; one second metacarpal, 39.27 mm and 1.3 g; one right fourth metacarpal, 56.4 mm and 2.2 g; one right fifth metacarpal, 49.2 mm and 2 g; one third tarsal, 14.7 mm and 0.6 g; one fourth tarsal, 8.08 mm and 0.1 g; two distal metatarsal fragments weighing 1.5 g; one proximal metatarsal





Figure 5.24: Photo of *Canis familiaris* left tibia in two large fragments



Figure 5.25: Photo of *Canis familiaris* right tibia diaphysis showing postmortem fracturing associated with weathering

fragment, 22.09 mm and 0.9 g; eight metatarsal fragments weighing 2.7 g; two second metatarsal fragments, 0.8 g; one fourth metatarsal, 70.07 mm and 3 g; three first phalanges, 21.16 mm and 0.8 g, 20.2 mm and 0.45 g, 24.28 mm and 0.4 g; three first phalanx fragments; five second phalanges, 12.33 mm and 0.4 g, 11.68 and 0.4 g, 9.24 and 0.4 g, and 24.74 mm and 1.7 g; five third or distal phalanges, 16.74 mm and 0.3 g, 12.11 mm and 0.1 g, 12.76 mm and 0.6 g, 10.9 mm and 0.15 g, and 15.5 mm and 0.1 g. Measurements and weights of all carpals, metacarpals, tarsals, metatarsal, phalanges, and sesamoids can also be found in Appendix A. The metacarpals of the right foot are shown in Figure 5.26. The second right metacarpal is fractured and missing the proximal end. The other three metacarpals were found with the fractured metacarpal, and show no signs of trauma. The left fifth metacarpal was the only metacarpal from the left front foot to be recovered. Two sesamoids measuring 8.17 mm and 8.86 mm and weighing 0.2 g and 0.1 g respectively suggests the feet were placed in the ground with some connective tissues remaining attached, since these small bones would most likely be lost in the reburial of bones alone.



**Figure 5.26: Photo of *Canis familiaris* right metacarpals**

### The Osteological Rudiments

Categorizations and social classifications begin with the basic parameters of sex, age, and size. Recognizing the institutionalized classification in the treatment of dogs reveals additional aspects of social practices. These osteological rudiments offer information crucial to understanding dogs' social role at Bridge River and on the Interior Plateau. Different dogs may be considered more suitable for certain tasks, and the relationships with those dogs could be different. The discovery of two left calcanei, one in each feature, and the contrastive aspects of the two cache pit assemblages lead to the conclusion that there are two different dogs represented in Housepit 24's two cache pit features with two different roles. The dog's cranium in Feature 1 was discovered laying on its side at the bottom of the cache pit (see Figure 5.5) compared to the processed and de-articulated nature of bones in Feature 5, signifying different treatment of these dogs after death and in their burial. DNA analysis reveals the presence of coprolites from two different but related mtDNA dog lineages in Housepit 24. With the supposition established that there are two dogs represented, the osteological rudiments of each dog's sex, age, and size can be estimated. The ramifications of osteological rudiments will be briefly introduced, but Chapter 4 will provide a more exhaustive discussion.

#### Sex Estimation:

Sex estimation methods for this study are based on the evaluation of non-metric traits on the skeletal elements of the two dogs (Shigehare *et al* 1997, The and Trough 1976). Sex could be easily determined with the presence or absence of the penis bone, if the dog skeletons were excavated intact, which is not the case at Bridge River. Research by Shigehare *et al* (1997) on Japanese shiba dogs offers methods for assessing sex using sex-determinant, quantitative characteristics. They posit using a metric determinant function applied to the entire skeleton combined with non-metric trait evaluation offers the most accurate results for sex determination in shiba dogs. Unfortunately, the lack of measurement indices and metric data on domestic dogs of the Canadian Plateau

limits the ability to utilize such a determinate function (Crellin 1994; Crockford 1997; Crockford and Pye 1997). Also, the fragmentary nature of Housepit 24's canine assemblage restricts the application of a metric determinant function applied to entire skeletons. Although, the probability of error is high for non-metric sex determination when only using one feature, there are multiple features available in this assemblage that are useful in estimating sex (Shigehara *et al* 1997). The morphological characteristics of the nuchal crest and the sagittal crest show sex based differences on the cranium from Feature 1; and the morphological characteristics of the masseter fossa on the lateral aspect of the mandible and the proportion of the sub-pubic angle among the elements from the Feature 5 dog also exhibit sex based differences (Shigehara *et al* 1997; The and Truth 1976). Research suggests these sex based differences are related to behavioral and biological differences between male and female dogs.

Crockford's (1997) extensive research on dogs of the Northwest Coast provides evidence of disproportionate sex ratios in the village dog populations, postulating there was a cultural practice in place to control the dog populations by culling female dogs at a young age. These cultural practices might have been in place at Bridge River, and in the Mid-Fraser; and like so many social practices, the use of dogs as a cultural resource developed out of a practical need.

Males generally show a well developed swelling of the inferior part of the external frontal crest and in the protuberance of the sagittal crest, whereas females show constriction of the frontal region (Shigehara *et al* 1997). The superior nuchal line in the occipital region is not straight in males. As seen in Figures 5.6, 5.7, and 5.8, the sagittal crest is well developed, and the superior nuchal line is not straight. The right nuchal line shows some remodeling associated with periostitis, but it is clear that the flaring of the nuchal line is a bilateral morphological characteristic. The masseter fossa, which marks the lower margin where the middle of the masseter muscle is inserted on the mandible is well developed in males forming a distinct condyloid ridge. In contrast, females exhibit a masseter fossa that gently shifts downward showing no acute angle. Both lateral aspects of the mandible from Feature 5 (Figures 5.9

and 5.10) do not exhibit a condyloid ridge and have no acute angles, suggesting it belongs to a female. This estimation is supported by the obtuse sub-pubic angle of the reassembled pelvis from Feature 5 (Figure 5.20), which measures greater than 90 degrees indicative of a female dog.

#### Age Estimation:

Age estimations are based on age indicators across the skeleton, and these markers of maturity on skeletal remains exhibit age specific changes. This analysis is based on osteological techniques utilized in bioarchaeological investigations of human remains as well as general techniques of wildlife biology and zoology: cranial suture closure, epiphyseal union, and tooth wear (Gilbert 1990; Meindl *et al* 1985; Sumner-Smith 1966). All characteristics observed suggest an estimated age of younger than three years for both dogs.

The observed open suture sites on the cranium are: the coronal suture, and the zygomatic processes (Gilbert 1990). The Feature 1 dog's cranium shows multiple fractures along suture sites compatible immature fusion of a younger adult dog (Figures 5.6, 5.7, 5.8). The clean fracture along the suture site of the remaining zygomatic process is also consistent with partial fusion of a younger adult dog.

The post cranial remains in Feature 5 exhibiting unfused suture sites are: the iliac crest, the proximal humeral epiphyses, and left tibial epiphyses (Gilbert 1990). There is fraying of the epiphysis of the right ilium, along the iliac crest (Figure 5.18), although many of the specimen in the Philip L. Wright Collection are only partially fused (Dyer personal communication). Neither proximal humeral epiphyses is present in the assemblage, and is broken below the epiphyseal line making the evaluation of the epiphyseal fusion impossible. Both humeri do exhibit trauma in the form of spiral fractures, as well as carnivore gnawing in the case of the right humerus, although the related trauma is not likely to cleanly separate fully fused epiphyses. Therefore, the conclusion is partial fusion of the proximal humeral epiphyses. The proximal epiphysis of the left tibia

is absent (Figure 2.24), consistent with the other potential immature fusion among other long bones.

The most common age estimation method analyzes the wear on teeth (Gibson *et al* 2000; Gilbert 1990; Horard-Herbin 2000). Unfortunately, the maxilla is missing on the cranium, so this method could not be utilized on the Feature 1 dog. Feature 5's dog shows a general lack of wear on the mandibular teeth (Figure 5.9 and 3.10), indicative of a dog under the age of three years. This estimation corresponds with the suture site estimations of a young adult dog less than three years of age, and serves as the dominant age defining characteristic of the Feature 5 dog.

#### Size Estimation:

Height and weight estimations are a useful, imaginative tool important in understanding the dogs of Bridge River. Understanding differences in the development of domestic dogs over time is important to ecologists and biologists researching evolution and selection in the domestication of dogs, as well as in understanding the morphological function, utility, and osteological differences (Brickman 1929; Clark 1995; Cluton-Brock 1999; Crockford 1997; Gibson *et al* 2000; Germonpre *et al* 2009; Kieser and Groeneveld 1992; Morey 1986, 2006; Onar 2005; Onar and Belli 2005; Onar *et al* 2002; Shigehara *et al* 1997; The and Trouth 1976; Trouth *et al* 1977). The relational aspect of the size of dogs to their people informs research further on the human-animal bond's development and evolution (Beck and Katcher 2003; Hines 2003; Morey 2006; Netting *et al* 1987). Calculating the size of the Bridge River dogs makes possible estimations of the cost of keeping dogs, in addition to evaluating the potential yield of meat a Bridge River dog could provide as a food resource, knowing that the ethnographic record provides such evidence (Killy 1946; Snyder 1991; Teit 1906). It is important to remember that the measurements generated through these functions are simply estimations.

There are multiple osteometric functions available to estimate shoulder height based on measurement of long bones, and this study utilizes the greatest

**Table 5.1: Estimated Shoulder Height of Feature 5 Dog**

Element	Greatest Length (mm)	Function	Estimated Shoulder Height (cm)	Average (cm)
First Right Metacarpal	56.4	= 0.94 x GL - 1.56	51.46	
Third Right Metacarpal	57.2	= 0.83 x GL - 2.03	45.45	
Fourth Right Metacarpal	56.4	= 0.84 x GL - 2.6	44.78	47.64
Fifth Right Metacarpal	49.2	= 0.98 x GL - 1.56	46.66	
Fourth Right Metatarsal	70.07	= 0.75 x GL - 2.68	49.87	

Functions from Driesch (1976)

length measurement of the first, third, fourth, and fifth right metacarpals and the fourth right metatarsal from the Feature 5 dog ( Driesch 1976; Harcourt 1974). Unfortunately, because the Feature 1 dog is only represented by the cranium and a few tarsals, the shoulder height could not be calculated due to the lack of the necessary long bones and metapodials. Table 5.1 displays the measurements, functions, and estimated shoulder height of the Feature 5 dog. The second right metacarpal is incomplete and would not yield an accurate estimation, so it is not used. The Bridge River Feature 5 dog height estimation of 47.64 cm is well within the range of “village” dogs of the Northwest Coast, which is 52 cm (Crockford 1997; Crockford and Pye 1997). Harcourt’s (1974) methods yield a larger estimation of shoulder height based on the humerus length, which had to be calculated using the atlas length of 38 mm (Clark 1996):

$$(GL(atlas) \times 4.57) - 11.5 = GL(humerus)$$

The humerus measurements estimated a shoulder height of 52.96 cm, which is 5.3 cm taller than estimations calculated using an average of metacarpal measurements alone.

The weight estimation of the Feature 5 dog is calculated with the formula from Onar’s (2005) study of dogs unearthed from Van-Yoncatepe Necropolis in Eastern Anatolia using femoral circumference at the midpoint on the long axis:

$$\text{Weight in grams} = 10^{(2.88 \times \log(f)) - 3.4}$$

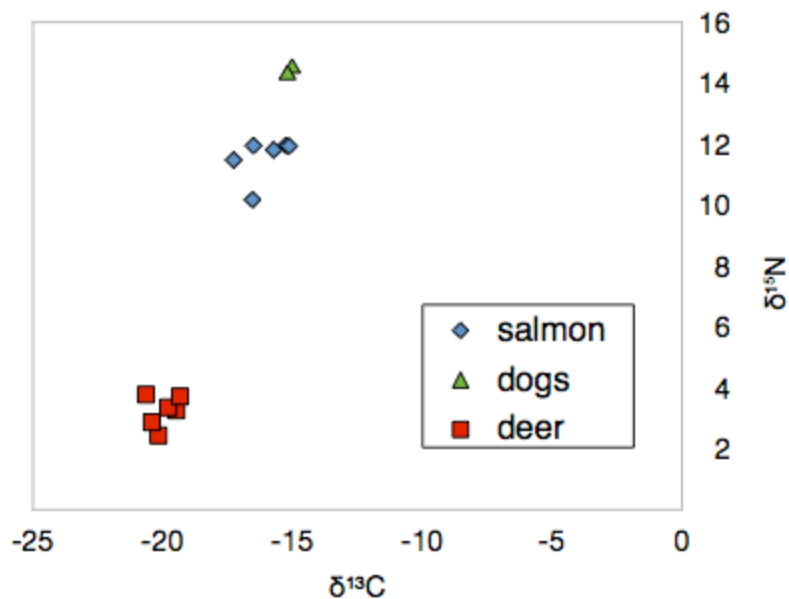
The mid-shaft circumference of the femur calculated to be 52.78 mm, and the weight estimation formula yields an estimated body weight of 36.37 kg. This

estimated body weight is large for a dog of this stature, and suggests the formula for Anatolian dogs needs adjustments for Interior Plateau and Northwest Coast dogs in order to yield more accurate results. Shigehara *et al* (1997) note that there is a higher coefficient of variance for the diameter of the femur and the minimum breadth of the middle of the humerus in female Shiba dogs than variance in length. This variation in stoutness could be the case for the inflated weight estimation of the Feature 5 dog.

### Isotopic Analysis

Stable isotope analysis of bone fragments informs this study as to the prevailing diet of the Bridge River canines. Two rib fragments were sent to Dr. Michael P. Richards at the Max Plank Institute in Leipzig, Germany. Results from stable isotope analysis of the rib fragments from Feature 5 reveal  $\delta^{13}\text{C}$  levels at -15.055% and -15.2335%, with respective  $\delta^{15}\text{N}$  levels at 14.4965% and 14.2815%. Figure 5.27 illustrates  $\delta^{13}\text{C}$  levels and  $\delta^{15}\text{N}$  levels for the Bridge River faunal assemblage recovered in 2008. The rib fragments yielded levels in close proximity to salmon, with  $\delta^{13}\text{C}$  levels clustering around -16.1077% and  $\delta^{15}\text{N}$

**Figure 5.27: Stable Isotope Analysis of Bridge River Dog Remains**



Analysis provided by Dr. Michael P. Richards (Prentiss *et al* 2009)

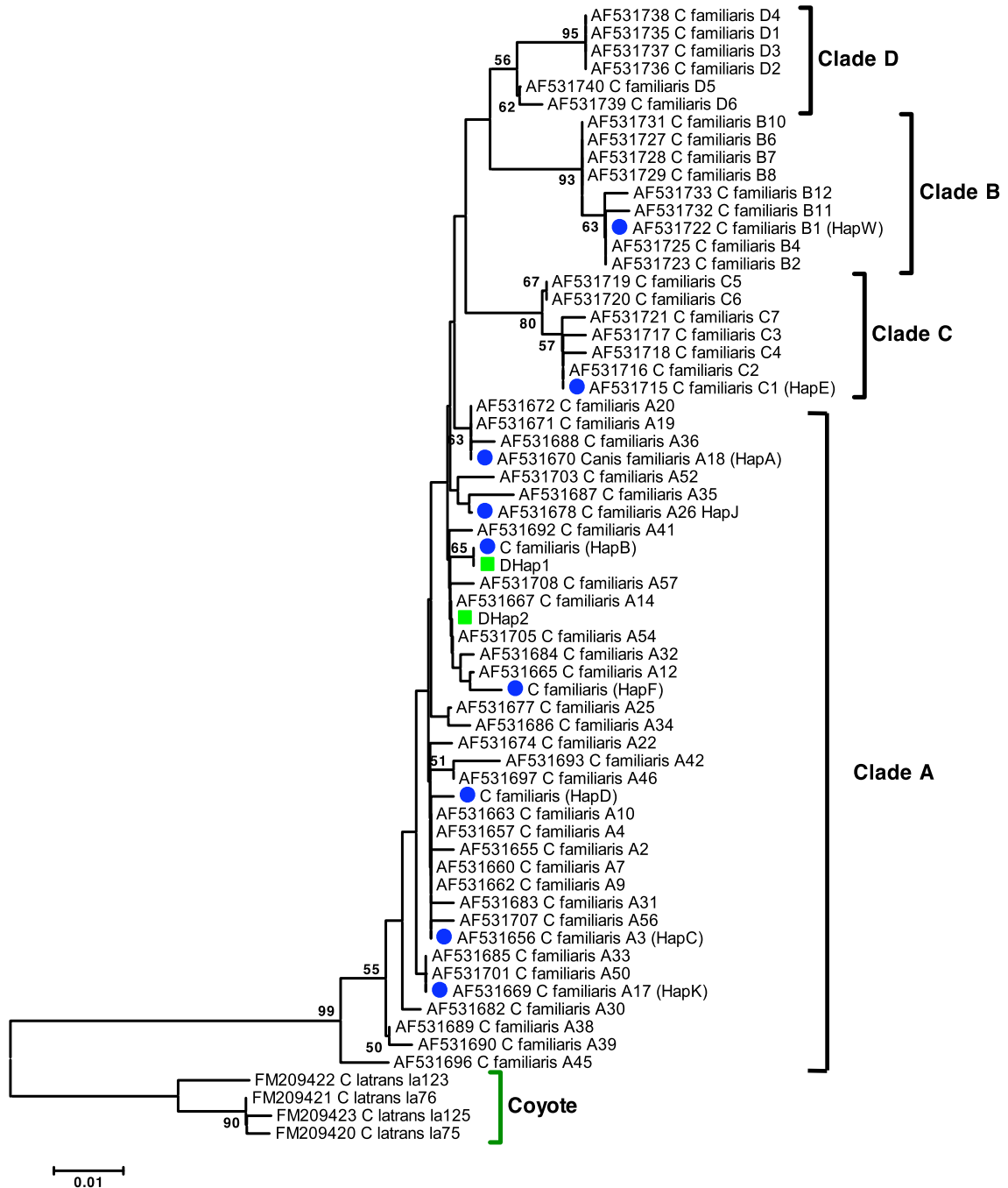


levels around 11.5555%, indicating a substantially marine diet for dogs. These results are supported by archaeological and ethnographic evidence of dogs being fed a diet of salmon (Crellin 1994; Crellin and Heffner 2000; Hayden and Schulting 1997). Coprolites found in Housepit 24 and utilized in the DNA analysis contained salmon vertebrae. Hewes (1973:140) estimated the cost of feeding a dog took an average daily ration of one kilogram of salmon.

#### Preliminary Analysis of Ancient DNA

The use of DNA analysis has offered researchers advantageous means of examining genetic variation in domestic dogs, providing insight into their human counterparts' behavioral patterns (Barta 2006; Clutton-Brock 1984; Groves 1999). Fourteen canid coprolites were found in floor and pit strata in all three Activity Areas of Housepit 24. It is important to note finding coprolites in Housepit 24 floor and pit strata signifies dogs were residing within housepits with families, which has only been a speculation up to this point (Hayden 1997a). Samples of ten coprolites were sent to the dedicated ancient DNA laboratory at Simon Fraser University, Burnaby, British Columbia for analysis by Dongya Y. Yang and Camilla F. Speller (Yang *et al* 2010). The analysis revealed two different *Canis familiaris* mitochondrial DNA sequences were recoverable from the ancient coprolites, as well as mtDNA sequences from *Oncorhynchus nerka*, salmon. The research also makes known the relationship of these two Bridge River dogs to other canids on the Canadian Plateau and in the world.

DNA analyses distinguished two mitochondrial lineages present in the ten coprolite samples provided. Two different *Canis familiaris* mtDNA haplotypes, DHap1 and DHap2, were identified from the coprolites, and these are closely related to the primary East Asian dog clade, Clade A (Barta 2006; Leanoard *et al* 2002; Savolainen *et al* 2002). It is accepted that domestic dogs indigenous to the Americas originated from East Asian populations, related to migration over the Bering Land Bridge (Barta 2006; Leonard *et al* 2002). There is an expectation of morphologic and genetic variation to regionally specific dog



**Figure 5. 28 Phylogenetic tree displaying the relationships between obtained haplotypes and selected modern *Canis* and ancient haplotypes (Savolainen *et al.* 2002; Barta 2006). From Yang *et al* (2010).**

population groups due to the isolation of some populations and general distance between populations (Crockford 1997; Vilà *et al* 1997).

The phylogenetic tree produced by Yang *et al* (2010) using Mega4 software (Kumar *et al.* 2008), Figure 5.28, illustrates the relationships between

obtained haplotypes and select modern canid and ancient haplotypes (Savolainen *et al.* 2002; Barta 2006). Green squares in Figure 5.29 represent the two haplotypes from the Bridge River Housepit 24 dog coprolites, and the blue circles represent the haplotypes recovered from other Interior Plateau and Northwest Coast dog remains (Barta 2006); accession numbers and haplotypes are listed for GenBank samples. Haplotype DHap1 are identical to sequences from other domestic dog remains recovered from other Canadian Plateau and Northwest Coast sites: Devil's Run (DgRm-1), Dionisio Point (DgRv-3), Namu (EISx-1), and most notably Keatley Creek (EeRI-7). This is the first identification of the second haplotype, DHap2, in ancient Northwest Coast and Interior Plateau dogs, which is found in the majority of the Bridge River samples, although, Yang *et al* (2010) points out that the DHap2 only differs by a single base pair from *C. familiaris* HapF (Figure 2.29), also observed at Keatley Creek (Barta 2006: 'HapF').

Mitochondrial sequences from *O. nerka* recovered from visible salmon bones as well as digested salmon present in the coprolite samples themselves indicates that the dogs of Housepit 24 had access to sockeye salmon, which is congruent with stable isotope analysis; and given the Bridge River village's proximity to the 6-Mile Rapids fishery and evident subsistence on salmon.

### Summary

The goal of this study is to better understand the two dogs represented by skeletal remains of Housepit 24's Feature 1 and Feature 5, the cause of their death and their place in Bridge River society in life. Through understanding the role of dogs at Bridge River, we can better understand the people of Bridge River, and the emergent inequality that developed at this period in time. As in the paleoforensic studies that bioarchaeologists pursue, zooarchaeologists can provide information about the lifeways of dogs and their people through the same investigatory framework. This chapter showed these two dogs, one male and one female were younger than the age of three at time of death, and the Feature 5 female dog's cause of death is a single traumatic event.

## CHAPTER SIX ANALYSES

Due to the varied roles domestic dogs play in all cultures, they serve as unique artifacts for the interpretation of social practices. By examining these roles played in the transegalitarian socioeconomy, we hope to better understand the processes of material wealth based status inequality and gain insight into the establishment of inequality as an institution at Bridge River. This discussion chapter assembles the ethnographic and archaeological evidence supporting the use of dogs as a managed food resource in the aggregate winter housepit village. Information gleaned from studies of dog population control on the neighboring Coast led to inquiries into age related use patterns in the Mid-Fraser (Crockford 1997). The adaptation and use of a life table matrix seeks out these cultural patterns of dog use at certain ages, and provides intriguing results.

This chapter is broken into three sections: a review of trauma present, a life tables matrix, and the theoretical implications. The review of trauma present on the dog's skeletal remains links to the ethnographic details of processing dogs as a food resource. The life table matrix and its graphs illustrate the clear age related death patterns for dogs in the Middle Fraser. This evidence demonstrates that across the region, the population of dogs may have been managed, and the cultural implications of this study add substance to the theoretical discourse on emergent material wealth based status inequality.

The two domestic dogs represented in the assemblage recovered from Housepit 24 are represented by a total of 179 specimen (NISP=179). The Feature 1 Dog is represent by a few bones of a paw and the cranium. The Figure 6.1 photo of the dog's cranium *in situ* illustrates the position of the dog's cranium placed in the pit on its side. The Feature 1 dog is estimated to be a young adult male. Figures 6.1 and 6.2 illustrate the rough similarities between Bridge River's Housepit 24 Feature 1 and Keatley Creek's Housepit 7 Feature 88-P31. It is possibly to see the reason why the bones of the dog's left hind foot are recovered from the same unit as the skull; the curled position of the Keatley



Figure 6.1: Photo of Feature 1 dog cranium *in situ*

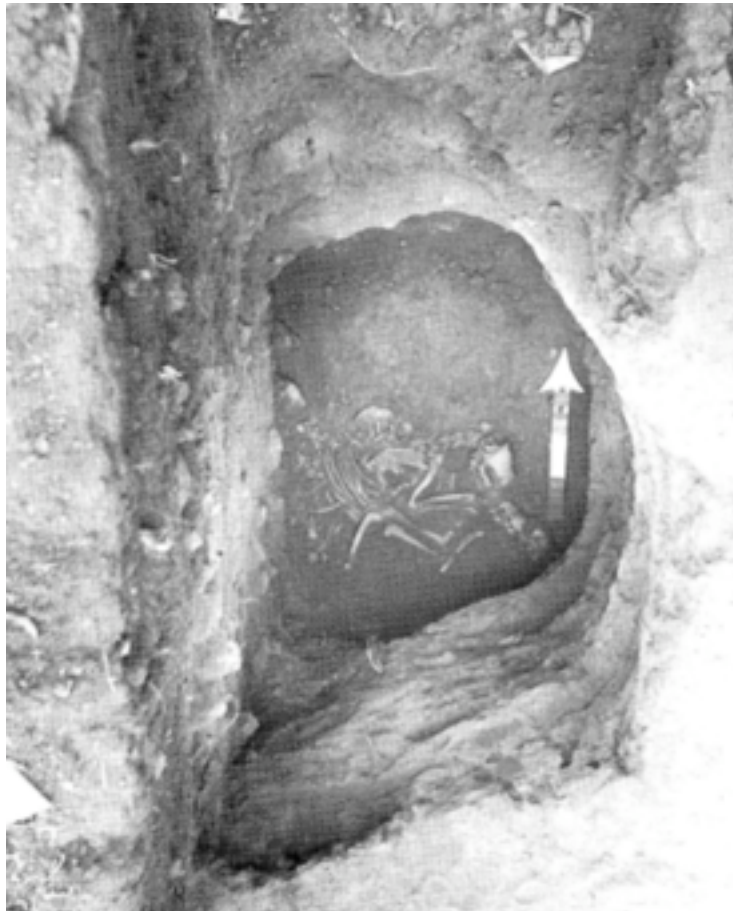


Figure 6.2: Dog burial from Keatley Creek's Housepit 7

Creek dog *in situ* shows a hind foot reaching toward the same plane as the dog’s skull. The missing maxilla and mandible of this dog are inconsistent with a true formal burial as is the case at Keatley Creek. Unfortunately, time constraints did not permit full excavation of this pit feature, and the priority of this thesis is the disarticulated remains from Feature 5.

The skeletal remains from Feature 5 include both mandibles; an atlas and axis; two bones of the hyoid, fragments of both humeri ; a proximal radius fragment; three carpals and five metacarpals; one rib and four rib fragments; four sternabrae; both innominates, although fragmented and missing the left ilium; fragments of both femurs; fragments of both tibias; the right fibula; one left calcaneus, three tarsals, five metatarsals, two sesamoids, sixteen phalanges; fifteen vertebrae fragments; five caudal vertebrae; as well as the numerous unidentifiable fragments. Osteological analysis of these remains estimate the dog represented is a female under the age of three years, and would stand at an estimated shoulder height of 47.64 centimeters. Most likely, this dog would resemble the archaeo-forensic reconstruction of the Makah village dog from worked by Crockford and Pye (1997; see Figure 3.2).

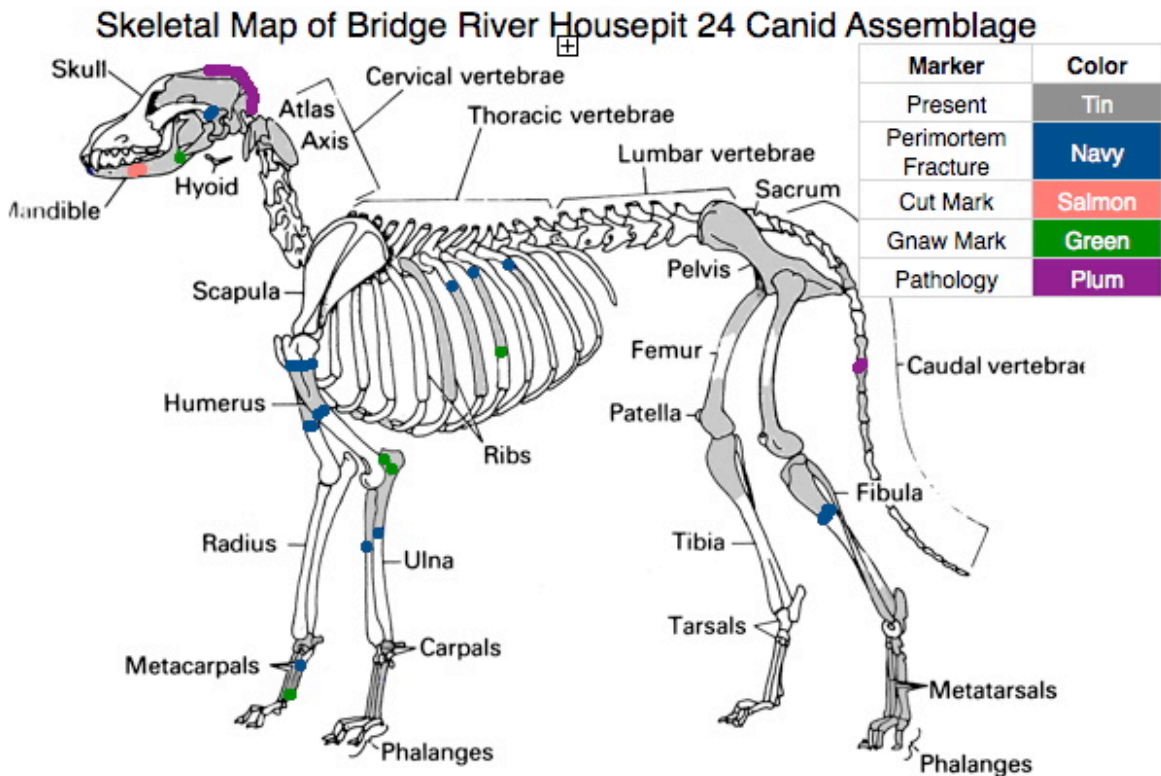
Table 6.1 summarizes the osteological analysis of the two dogs from Housepit 24.

**Table 6.1: Osteological Analyses Summary of Housepit 24 Dogs**

Dog	Age	Sex	NISP	Notable Characteristics
Feature 1	< 1.5 years	male	11	cranium lacking maxilla; larger left calcaneus
Feature 5	> 3 years	female	168	trauma; pathology; smaller left calcaneus

Review of Trauma Present

There are seven signs of trauma evident on the canine skeletal remains from Feature 5 resulting from a single event of processing for cultural consumption. Figure 6.3 illustrates the recovered skeletal elements and maps the evident trauma. A caudal vertebra exhibiting a healed fracture, actually fusing with the adjacent vertebra is notable , but unrelated to the cause of death and therefore not included in this list.



Evidence of trauma includes:

1. perimortem spiral fracture of both humeri (Figure 6.4)
2. perimortem fracture of the fourth right metacarpal (Figure 6.5)
3. perimortem fracturing of right mandibular coronoid process (Figure 6.6)
4. cut-marks on the medial aspect of left mandible (Figure 6.7)
5. perimortem fracture and carnivore gnawing on the proximal ulna fragment
6. perimortem fracture of pubic symphysis (Figure 6.8)
7. carnivore gnawing on the ribs (Figure 6.9)

Observations made by Monroe Killy (1946) at a Sioux Dog Feast at Cheyenne River Agency, South Dakota in 1941 provide details of execution methods:

“The usual method of execution for dogs for a feast is to grasp both fore paws and twist them around the neck, thereby choking it. Sometimes the dog is hanged by the neck. This being a large animal and the chief in a hurry, the dog was killed by a charge from the chief’s shotgun aimed at the head.”

The humeri recovered from the Feature 5 cache pit show evidence of perimortem spiral fractures consistent with such an act of forceful twisting, the ulna fragment may have resulted as part of this act, and the fracture of the second right metacarpal possibly occurred due to the strong grip utilized in the forceful twisting the dog's front legs up and around it's neck.



Figure 6.4: Photo of *Canis familiaris* medial aspect of right humerus fragment



Figure 6.5: Photo of *Canis familiaris* right metacarpals



Figure 6.6: Photo of lateral aspect of the right side of the *Canis familiaris* mandible



Figure 6.7: Photo of cut marks on medial aspect of left side of the mandible



Figure 6.8: Photo of *Canis familiaris* rib fragment exhibiting carnivore gnawing



Figure 6.9: Photo of *Canis familiaris* fractured pubic symphysis



Remaining injuries are consistent with ethnographic details of processing dogs for feasting found in Snyder's (1991) research on dogs as a managed food resource among the North American Plains tribes. Cut marks on the medial surface of the left half of the mandible are indicative of removing the pluck, comprised of the tongue, trachea, esophagus, heart, lungs, and liver. The locations of these cut marks on the medial surface of the left half of the mandible could also be associated with the skinning process (Fernández-Jalvo *et al* 1999). The dog skin would most certainly be utilized, possibly in trade within the village and through the Middle Fraser (Teit 1900, 1906). Fracturing of the mandible's right side coronoid process was likely cause following death during disarticulation.

The articulations of the right hip, certain paws, and the atlas and axis found *in situ*, as well as the presence of small sesamoids and two bones of the hyoid apparatus could represent manifestations of processing methods whereby the dog's remains were placed in the cache pit with connective tissue remaining. The articulation of the right acetabulofemoral joint and fracturing of the pubic symphysis are suggestive of the remainder of the hind quarter section produced during the processing method by which the dog is quartered and boiled.

The carnivore gnawing found on multiple elements could indicate the presence of other dogs at the time of processing. It is important to note that these elements were found in the Feature 5 cache pit and were obviously collected and buried with other remains from the processed dog after being gnawed.

As reviewed in Chapter 3, the use of dogs as a food resource is ethnographically recorded throughout the North America Plains, the Northwest Coast, and the Interior Plateau. Teit's (1906) ethnography of the Lillooet states "the Lillooet ate dog flesh extensively, and many families raised dogs for their flesh and skins." The neighboring Thompson and Shuswap did eat dogs during famine, and tribes on the Northwest Coast participated in dog feasts. Crellin (1994) proposes "the practice of consuming nonessential dogs may have originated simply as an adaption to the occasional failure of an important

seasonal food resource,” salmon. The cyclical nature of salmon runs, in terms of peaks and shortages, would call for a need to balance those times of famine with other food resources in areas like Bridge River where sources of protein are scarce. Many of the large ungulates are not found in the immediate territory around the village, and could explain why this group kept dogs for their “flesh and skins.”

As a managed food resource, our Bridge River village dogs, which are closely related to the East Asian dog (see Yang *et al* 2010) highlighted in Snyder’s (1991) study, provide 19.5 more grams of fat and 148 more calories per edible meat weight than deer. Table 6.2 provides the values for the food resources pertinent to this study in the Canadian Plateau: East Asian dog, stray dog, coyote, beaver, deer, and salmon. Salmon is included as the common protein food resources at Bridge River, where harvesting of salmon was seasonal, and storage crucial. Stores of salmon would be depleted through the winter, and the possibility of spoilage was probable. The East Asian dog provides 19.5 more grams of fat and 148 more calories than deer. Figure 6.10 and 6.11 compare fat, protein, and calorie levels of these. As illustrated in Figure 6.11, the high caloric value of dog meat is maintained throughout the winter and spring, making it a good famine food resource. Domestic dogs are able to retain greater amounts of fat due to their ability to scavenge in populated villages, while deer and other hunted species deplete their stored fat throughout the winter and early spring (Snyder 1991).

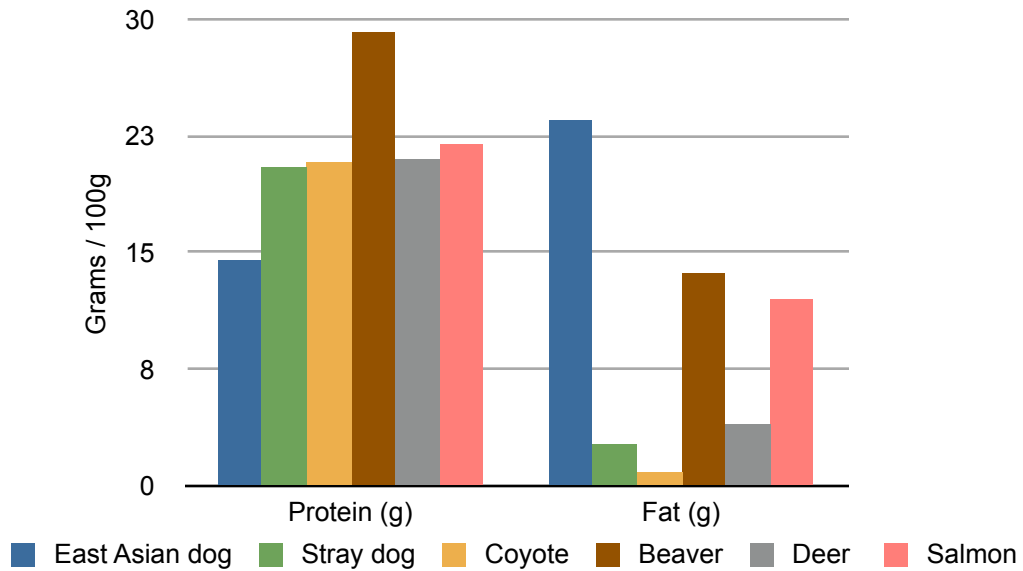
As a managed resource, a pattern among domestic dogs should appear in the Lillooet territory’s archaeological record. Utilizing a life table matrix to see the age’s at death of dogs found in region elucidates a clear pattern of dog deaths before three years of age. This data is representative of the dogs found within excavated housepits, and are related to the dog’s use as a cultural resource; which is why the figure shows higher frequencies of individuals between age interval 0 and 3 years. These are at age intervals before and reaching sexually maturity. Most likely, using dogs as a food resource serves a dual purpose to feed people as well as maintain the dog population (Crockford 1997).

**Table 6.2: Proximate composition of modern samples and selection Native American food resources**

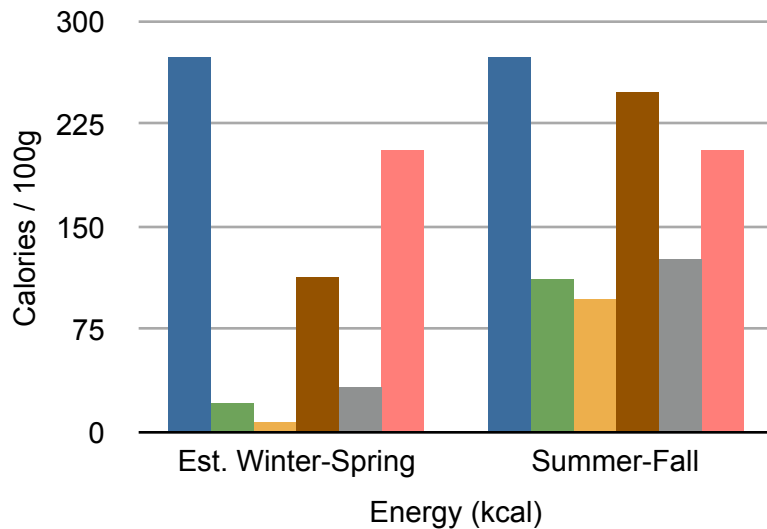
Taxon	Moisture (%)	Ash (%)	Protein (g)	Fat (g)	Energy (kcal)
East Asian dog ( <i>Canis familiaris</i> )	76.4	1.2	14.5	23.5	274.0
Stray dog ( <i>Canis familiaris</i> )	74.6	1.1	20.5	2.7	111.8
Coyote ( <i>Canis latrans</i> )	76.4	1.1	20.8	0.9	96.9
Beaver ( <i>Castor canadensis</i> )	56.2	0.9	29.2	13.7	248.0
Deer ( <i>Odocoileus</i> sp.)	74.0	1.0	21.0	4.0	126.0

From Snyder (1991:372)

**Figure 6.10: Fat and Protein Levels Comparison**



**Figure 6.11: Estimated Caloric Levels Comparison**



The Mid-Fraser Canyon Domestic Dog Life Table

A life table matrix is generally used for recognizing paleodemographic patterns among ancient populations, generally from bioarcheological excavations of village sites (Lovejoy *et al* 1977). Although controversial due to the necessity for sweeping assumptions for calculations, the Mid-Fraser Domestic Dog Life Table represents a human controlled population, not natural, and essential and substantive to this argument for a management of dogs as a resource within the region. The validity of this tool is comparative to more accepted sampling of paleodemographic patterns following a catastrophic event, which more accurately portrays the living populations demographics at the time of the event. Numbers are based on estimated ages at death represented by the dog remains recovered from the six sites detailed in Table 6.3. Life tables are generally built using data from a single village site, but the representation of the canine population is extremely limited, and a broader approach is needed. The main purpose in utilizing this tool is to survey broader cultural patterns of the use of dogs on the Plateau, most notably population control techniques of age groups. The sample size (N=30) is small, limiting capabilities of this assessment in rendering stronger conclusions about roles of dogs in the Mid-Fraser. All of these calculations are made with the assumption that (1) the skeletal sample is representative of the living population, (2) the population is stable with the birth rate and the death rate equal, (3) the birth rate and death rate do not change over time treating several generations as contemporary, (4) there is a stable age

**Table 6.3: Life Table for Mid-Fraser Canyon Domestic Dogs**

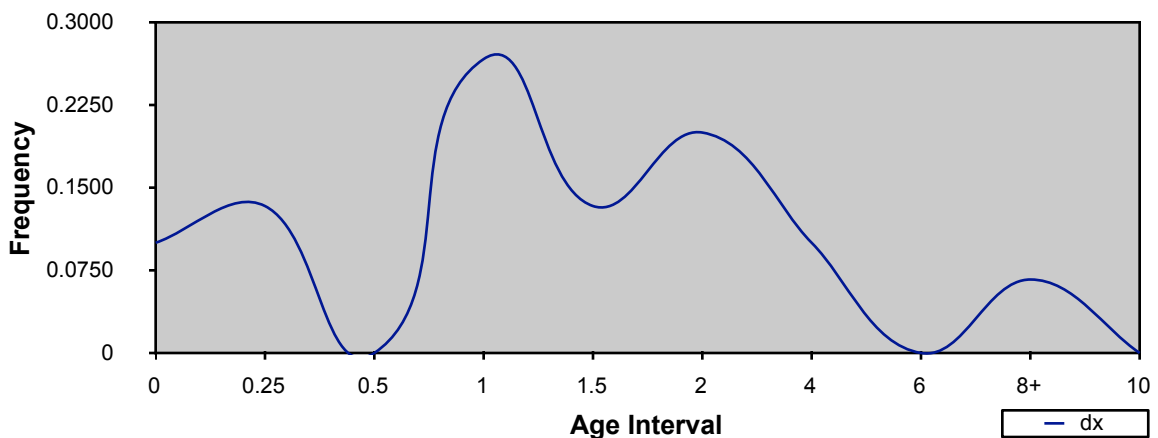
x	Dx	dx	lx	qx	Lx	Tx	ex	cx
0	3	0.1000	1.0000	0.1000	0.2375	2.3292	2.3292	0.2375
0.25	4	0.1333	0.9000	0.1481	0.2083	2.0917	2.3241	0.2315
0.5	0	0.0000	0.7667	0.0000	0.3833	1.8833	2.4565	0.5000
1	8	0.2667	0.7667	0.3478	0.3167	1.5000	1.9565	0.4130
1.5	4	0.1333	0.5000	0.2667	0.2167	1.1833	2.3667	0.4333
2	6	0.2000	0.3667	0.5455	0.5333	0.9667	2.6364	1.4545
4	3	0.1000	0.1667	0.6000	0.2333	0.4333	2.6000	1.4000
6	0	0.0000	0.0667	0.0000	0.1333	0.2000	3.0000	2.0000
8+	2	0.0667	0.0667	1.0000	0.0667	0.0667	1.0000	1.0000
10	0	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	0.0000
	30				2.3292			7.6699

distribution at any given time, and (5) the ages are known and not estimated. These figures are used as a simple analytical tool, and these assumptions are critical to the generation of paleodemographics even though the methodology clearly contains bias in age estimation, which is difficult to estimated beyond age eight years in ancient dog remains.

The life table provides percentage of deaths in the population ( $dx$ ), survivorship ( $lx$ ), age specific probability at death ( $qx$ ), total years lived ( $Lx$ ), total years to be lived ( $Tx$ ), life expectancy ( $ex$ ), and the proportion of the population alive in the age intervals ( $cx$ ). Please note these years are “people” years equal to 365 days per year, and not “dog” years that roughly equate to 7 years for each 1 people year. The crude death rate (CDR) can be calculated using the life expectancy, which in turn can be used to estimate the living population size.

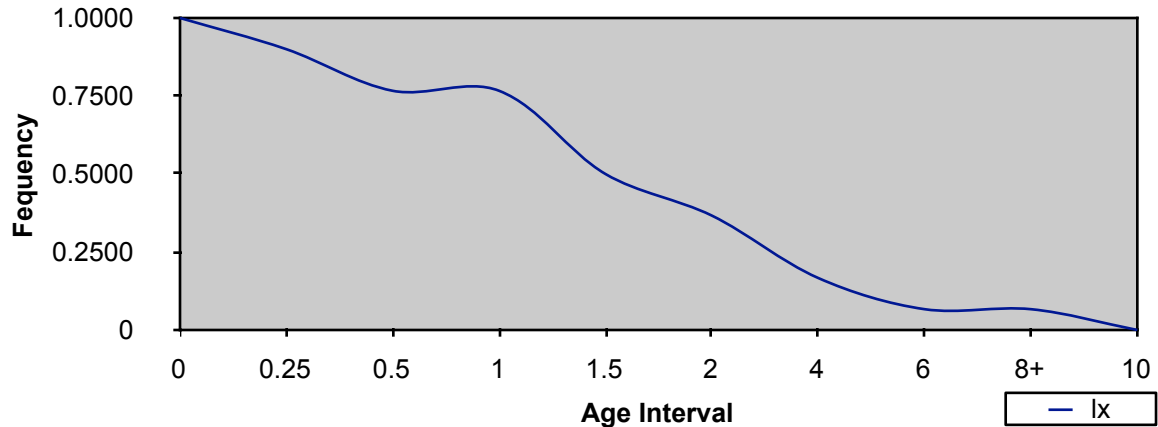
The Death Curve, or percentage of deaths (Figure 6.12) represents the percentages of death at each age interval ( $d_x$ ). Figure 6.12 displays the largest percentage of the sample within the 0.5 to 1.5 year range, with the peak at 1 year. The percentages drop around age 1.5 and again after age 2 years. This data suggests that there is an increased risk of death for dogs between 8 months and 2.5 years; if they survive to age 2 years. The frequencies of these age intervals are lower than other age ranges because they indicate a decrease of available individuals reaching these ages, not a lack of individuals dying at these ages. The mean age at death (MAD) is equivalent to  $e_0$ , and more accurately

**Figure 6.12: Death Curve - Percentage of Deaths ( $d_x$ )**



reflects the birth rate within a population, where as MAD goes up, birth rate goes down. The Mid-Fraser dogs MAD equals 2.62 years suggesting a relatively high birth rate.

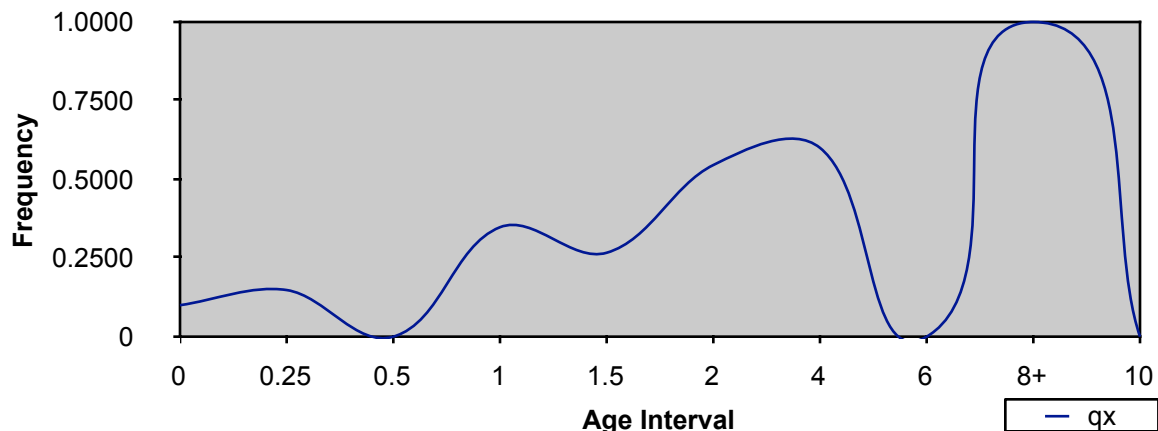
**Figure 6.13: Survivorship ( $l_x$ )**



The survivorship ( $l_x$ ) for the population illustrates the 100% survivability at birth, because every individual must be born that is represented in the sample, and the survivability decreases toward 0% at age 10, because every dog dies and does not survive past that estimated age. Figure 6.13 indicates higher mortality rates following age interval 1 year, before which it plateaus; the slope of the survivorship curve levels out at 10 years because there are no survivors beyond this estimated age interval.

Similar to the survivorship information are the calculations of age specific probability of death ( $q_x$ ) at each age interval. Figure 6.14 show that the

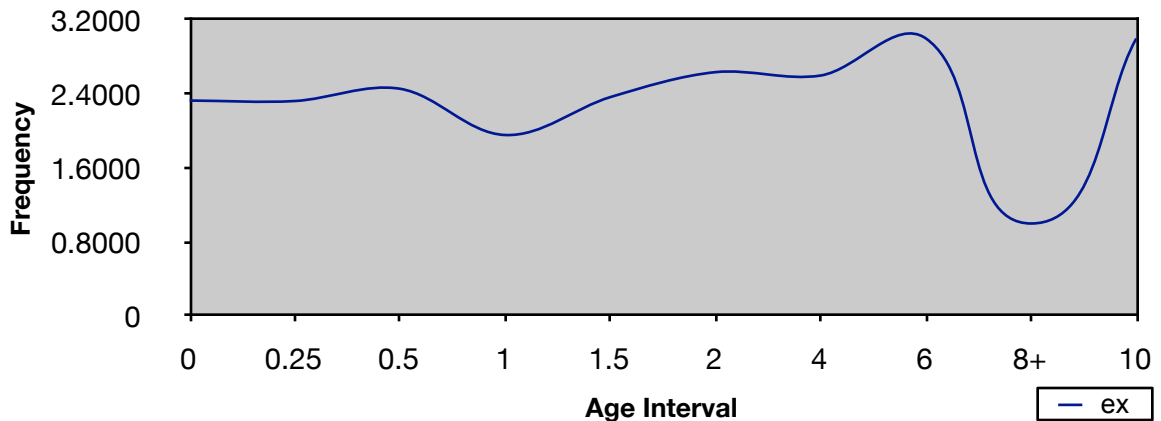
**Figure 6.14: Probability of Death ( $q_x$ )**



probability of death significantly increase between ages 1, 2, and 8 years, with a plateau between ages 2 and 6 years, then the jump to 100% chance of death at age 8 due to old age.

The life expectancy ( $e_x$ ) graph, Figure 6.15 indicates that for dogs that make it past one year, their life expectancy increases, then sharply drops following age six years. This pattern could reflect the ethnographic evidence that dogs were well cared for members of the family, either contributing prized hunting dogs or pack dogs, like the older articulated individual from Keatley Creek (Crellin 1994; Hayden 1997a; Teit 1906).

**Figure 6.15: Life Expectancy ( $e_x$ )**



The graphs of the life table matrix support a managed life cycle for dogs in the Middle Fraser, showing clear patterns of culling between the ages of zero and two years. This pattern contributes to the idea that dogs were a managed resource in the Lillooet region, and distinct cultural patterns of use were in play. Crockford (1997) posits similar results for village dogs among the Makah communities, where patterns in the archaeological record show a skewed ration of older males outnumbering older females in the assemblages suggesting female dogs were usually culled to maintain low populations.

### Theoretical Implications

Subsistence strategies of complex hunter-gatherers developed as a means of dealing with fluctuating food supplies, and new social strategies of risk

reduction grew out of the existent egalitarian structures of support networks based on alliance formations and mutual assistance (Hayden 2009; Wiessner 2002). Feasts provide the platform for sharing food, and are the instrument by which food resources are converted into socioeconomic currencies. As prestige economies evolved with material wealth based status inequality, it would manifest as part of the feasting apparatus. The very nature of feasting is “bivocal” where by groups are *solidified* by social boundaries of inclusion and exclusion and *stratified* by access to the resources exchanged. Feasting on delicacies developed as an important aspect of emergent inequality, and dogs would exist as a managed and control prestige item in this scenario. Alternatively, dogs were perhaps a sacred or special food resource exclusively reserved for privileged consumption (Clarke 2001). Archaeological evidence of canid coprolites recovered from Housepit 24 contain actual salmon vertebrae, and isotopic analysis reveals dogs ate salmon exclusively, which is a considerable cost. It is only logical that due to the high cost of ownership, social parameters would be in place to reserve dogs as a specialized food resource. With evidence of coprolites, it appears dogs were residing within the housepit. Speculatively, dogs were kept in the house to monitor and administer an exclusive salmon diet as preparation for feasting, just as any animal is fattened up for consumption.

The evidence of dog ownership, dog remains and dog coprolites, only appears in wealthy housepits at both Bridge River and Keatley Creek. It is possible that dogs represent the high cost wealth item that some elites are willing to sacrifice in competitive behavior, and that less wealthy families could only afford dogs that earned their keep as hunting companions or transporters. Different calibers of domestic dogs must have existed (Hayden and Schulting 1997), where some more useful as a high fat meal than as competition for salmon.

Although the consumption of dogs may have originated as necessity during famine, prior to the establishment of material wealth based status systems. The development of specialized feasting foods and delicacies could have stemmed from purposeful aggrandizing behavior (Hayden 1994; Wiessner



2001). Wiessner (2001; 124) writes that as populations grew and competition accelerated for the Enga of Papua New Guinea, the existing trade goods, game animals, and land could not meet the needs for sufficient exchange. Ambitious Big Men recognized that pigs were the only form of wealth whose production could be readily intensified to meet new demands, but at that time the pig's value was not high enough to encourage intensification on its own.

The feasting apparatus and the development of prestige economies evolved recursively in the transegalitarian social structure. This paper is not so bold as to define the development of feasting and posit that it engendered material wealth based status inequality. Nonetheless, the logical and likely process grew out of the egalitarian systems, which include mechanisms of food sharing and alliance building. The use of feasting as a socioeconomic tool serves to advance and maintain material wealth based status inequality. The social structures of egalitarian lifeways expanded and evolved in dealing with population growth, and the emergent status inequality was a successful trait perpetuated through the feasting apparatus.

## CHAPTER SEVEN CONCLUSION

Studying the roles of domestic dogs in the social practices of complex hunter-gatherers adds to the larger investigation of emergent material wealth based status inequality on the Plateau by defining the use of dogs in terms of material wealth, and delving into the social mechanisms active in their consumption as a cultural resource. The recent evidence supporting a late emergence of social complexity and the development of material wealth based status systems without obvious indicators of inherited status at the Bridge River village offer a different perspective of the formation of institutionalized inequality found in the ethnographic record (Hayden 1997b; Prentiss *et al* 2008; Prentiss 2011; Prentiss *et al* 2012; Teit 1906). The newly established Housepit 24, built during the Bridge River 3 period spanning circa 1300 BP to 1100 BP and briefly occupied prior to village abandonment, contains the greatest accumulation of material wealth, which contradicts hypothesis of wealth accumulation within more established housepits (Hayden 1996; Prentiss and Foor 2010; Prentiss *et al* 2011, 2012).

The dog remains and coprolites recovered from the cache pits and floor stratigraphy of the wealthy Housepit 24 provide a distinct avenue for investigating material wealth. The role of domestic dogs at Bridge River is not unique to the region, but this research provides a more detailed investigation of the canine component deficient in previous analysis on the Mid-Fraser Canyon.

There is discernible evidence of the use of these dogs culturally as a food resource, ethnographically recorded throughout the North America Plains, the Northwest Coast, and the Interior Plateau (Crockford 1997; Snyder 1991; Teit 1909). Clear signs of trauma suggest a single event of processing for cultural consumption: perimortem spiral fracturing of both humeri; perimortem fracturing of the right mandibular coronoid process; cut marks on the medial aspect of the left mandible; perimortem fracturing and carnivore gnawing on the proximal ulna fragment; and carnivore gnawing on the ribs. The fractures of the humeri and

ulna are suggestive of an execution method where the dog's front legs are twisted around its own neck, choking it (Killy 1941). The other injuries are consistent with ethnographic details of processing dogs for food and feasting (Snyder's 1991). Articulations of joints such as the neck, hips, and feet indicate the dog's remains were placed in the cache pit with connective tissue present, and maybe representative of the sectioned portions of a dog utilized as a food resource.

In addition to the explicit signs of trauma on the dog from Feature 5, a broader pattern across the six Mid-Fraser Canyon sites emerges when looking at the data in a life table matrix. Graphs of the matrix illustrate a potentially managed life cycle for Middle Fraser dogs, with a clear pattern of culling between the ages of zero and two years, closely resembles patterns from the neighboring Makah (Crockford 1997).

Complex hunter-gatherers developed subsistence strategies to deal with fluctuating food supplies through existent social structures of egalitarian alliance formations and mutual assistance (Hayden 2009; Wiessner 2002). Feasts are the embodiment of these egalitarian social structures of alliances and reciprocal assistance. They are an instrument for converting food resources into socioeconomic and political currencies, and the feasting apparatus is a means to establish, maintain, and manipulate social relations through the distribution of these resources. Ethnographic evidence from Teit (1906) expressly states dogs were kept for their "flesh and skins." As a managed food resource, our Bridge River village dogs, which are closely related to the East Asian dog highlighted in Snyder's (1991) study, provide 19.5 more grams of fat and 148 more calories than deer, and their ability and instinct to scavenge in populated villages helps to maintain these calories.

Dogs as a managed resource represent a commodity exchanged within the political economy as a further risk-reduction method, considered "meat on the hoof". The cost of maintaining dogs is significant, with an estimated cost of one kilogram of salmon a day. Archaeological and ethnographic evidence supports dogs being feed a diet of salmon, including coprolites containing salmon

vertebrae found in Housepit 24 and utilized in the DNA analysis. At such a high cost, it is logical dogs would become a luxury of the rich, accessible only by the wealthiest houses, as evidenced by their presence in Housepit 24, becoming embodied cultural capital and lending to their use as a delicacy in the feasting apparatus of an evolving political economy..

This evidence presented delineates a clear relationship between the skeletal elements from Feature 5 and ethnographic evidence, supporting the hypothesis that domestic dogs at Bridge River are a managed food resource during the Bridge River 3 Period. This research also proposes that domestic dogs at Bridge River represent a managed food resource potentially developed through use in the feasting apparatus of an evolving political economy, providing evidence of social practices in play during the transition to institutionalized inequality.

As food for thought, Wiessner (2001; 124) explains that ambitious Big Men among the Enga of Papua New Guinea perceived the potential to revolutionize pigs into a form of material wealth when existing trade goods, game animals, and land could not meet the needs for sufficient exchange. Is it possible that certain aggrandizers of the Mid Fraser Canyon recognized the potential of dogs as a delicacy in the same fashion? This is a possible route for further exploration of the social theory on feasting in Northwestern North America.

Beyond the social theory of aggrandizing elites, there is a strong need to revisit domestic dog assemblages from the entire Mid-Fraser Canyon, and scrutinize specimens in more detail. Such research would add depth and credence to use patterns of domestic dogs in the region. In an age where accessibility to information is at our fingertips through the Internet, it is simple to add basic weights and measurements of studied specimens, this belief steams from Crockford's (1997) plead with future researchers to make information more accessible. Osteometric studies of the Mid-Fraser Canyon dogs have the potential to reveal distinctions between dogs that make up the canine assemblages across the Plateau. Hayden and Schulting (1997) suggest there are two or more breeds of dog in region, the village dog and the hunting dog.

## CHAPTER 7: CONCLUSION

Research as simple as weights and measurements, could reveal more information about domestic dogs from Keatley Creek and the Plateau, and substantiate such a hypothesis of two dog breeds. Furthermore, understanding distinctions between dogs and their use patterns lends to the understanding of the human animal bond in the Mid Fraser, opening avenues to better comprehend social structures active in the region, as well as adding depth to the developing subject of the bond between human and animal.

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## APPENDIX A

Table A.1: *Canis Familiaris* Elements from Housepit 24 Area 3 Feature 5

Element	Description	Qty	Measure (mm)	Weight (g)	Provenience					
					Acc #	Sq	Strat	Lev	Feat	Lay
accessory carpal		1	13.9	0.5	08-632	30	II	8	5	2
astralogus		1	23.04	1.8	08-632	30	II	8	5	2
atlas		1	69.58	8.9	09-408	1	II	4	5	2
left calcaneus		1	40.23	3.7	08-632	30	II	8	5	2
caudal vertebra		2	17.04; 14.99	2.7	08-632	30	II	8	5	2
caudal vertebra		3		2.1	08-578	21	II	1	5	2
caudal vertebra		1	18.7	0.9	08-628	30	II	8	5	2
central tarsal		1	15.67	0.8	08-632	30	II	8	5	2
cervical vertebra		1	17.06	1.5	09-408	1	II	4	5	2
cervical vertebra		1	29.55	2.7	09-408	1	II	4	5	2
cervical vertebra	fragment	2	15.63	0.2	09-408	1	II	4	5	2
distal metatarsal	fragment	2		1.5	08-628	30	II	8	5	2
distal phalanx		1	10.9	0.15	08-577	30	II	8	5	1
distal phalanx		1	16.74	0.3	08-578	21	II	1	5	2
distal phalanx		1	12.11	0.1	08-632	30	II	8	5	2
distal phalanx		1	15.5	0.1	08-632	30	II	8	5	2
right femur	distal fragment	1	27.28	17.2	08-632	30	II	8	5	2
left femur	proximal fragment	1	53.85		08-628	30	II	8	5	2
right femur	proximal fragment	1	33.3	7	08-632	30	II	8	5	2
left fibula	fragmented	2		0.7	08-632	30	II	8	5	2
right fifth metacarpal		1	49.2	2	08-577	30	II	8	5	1
left first metacarpal		1	50.26	2.6	08-578	21	II	1	5	2
first phalanx		1	21.16	0.8	08-578	21	II	1	5	2
first phalanx		1	20.2	0.45	08-578	21	II	1	5	2
first phalanx		1	24.28	0.4	08-628	30	II	8	5	2
first phalanx		2			08-632	30	II	8	5	2
right fourth metacarpal		1	56.4	2.2	08-577	30	II	8	5	1
fourth tarsal		1	8.08	0.1	08-632	30	II	8	5	2
left humerus fragment		1	83.43	11	09-408	1	II	4	5	2
right humerus fragment		1	77.1	10.7	08-578	21	II	1	5	2
hyoid		1	22.77	0.1	08-577	30	II	8	5	1
hyoid		1	24.84	0.1	08-577	30	II	8	5	1
left mandible		1	122	35.8	08-577	30	II	8	5	1
right mandible		1	130.8	38.4	08-579	21	II	1	5	1
metatarsal	proximal fragment	1	22.09	0.9	08-624	21	II	1	5	3
metatarsal	fragmented	8		2.7	08-632	30	II	8	5	2
left os coxa	fragmented	1		16.5	08-578	21	II	1	5	2
right os coxa		1	84.68	19.8	08-632	30	II	8	5	2
radius	proximal fragment	1	15.89	1.2	08-578	21	II	1	5	2
rib	fragment	1	114.08	3.7	08-577	30	II	8	5	1
rib	fragment	1	92.65	1.8	08-577	30	II	8	5	1
rib	fragment	1	53.06	1.6	08-579	21	II	1	5	1
rib	fragment	1	53.55	1.7	08-579	21	II	1	5	1

APPENDIX A

Element	Description	Qty	Measure (mm)	Weight (g)	Provenience					
					Acc #	Sq	Strat	Lev	Feat	Lay
rib	distal fragment	1	45.25	0.95	08-630	30	II	8	5	1
rib	distal fragments	2	60+			21	II	1	5	2
right second metacarpal		4	39.27	1.3	08-577	30	II	8	5	1
second metatarsal	distal fragment	2		0.8	08-632	30	II	8	5	2
second phalanx		1	12.33	0.4	08-578	21	II	1	5	2
second phalanx		2	11.68; 9.24	0.4	08-628	30	II	8	5	2
second phalanx		3	24.74	1.7	08-632	30	II	8	5	2
sesamoid		1	8.86	0.1	08-628	30	II	8	5	2
sesamoid		1	8.17	0.2	08-628	30	II	8	5	2
sternabra		1	15.83	0.4	08-577	30	II	8	5	1
sternabra		1	17.78	0.5	08-578	21	II	1	5	2
right third metacarpal		1	57.2	2.4	08-577	30	II	8	5	1
third tarsal		1	14.7	1	08-632	30	II	8	5	2
left tibia	distal fragment	1	54.43	6.4	08-632	30	II	8	5	2
left tibia	proximal fragment	1	32.94	1.9	08-628	30	II	8	5	2
right tibia	diaphysis fragment	1	88.74	7.5	08-632	30	II	8	5	2
right tibia	proximal fragment	1	72.24	10.01	08-632	30	II	8	5	2
left tibia	fragments	61		11.9	08-632	30	II	8	5	2
unknown	fragment	8	0	2.05	09-408	1	II	4	5	2
unknown vertebra	fragmented	1	27.06	0.6	08-630	30	II	8	5	1
upper premolar		1	9.28	0.2	08-623	30	II	8	5	1
vertebra	fragment	1	12.53	0.4	08-630	30	II	8	5	1
vertebra	fragment	1	26.89	0.8	08-630	30	II	8	5	1
vertebra	fragmented	8	20.4	2.35	09-382	1	II	4	5	1
distal phalanx		1	12.76	0.6	08-407	5	II	4		0
fourth carpal		1	9.06	0.3	08-407	5	II	4		0
rib	fragment	1	17.4	0.5	09-459	2	II	6		
second carpal		1	13.9	0.9	08-407	5	II	4		0
sternabra		1	15.37	0.4	08-407	5	II	4		0
sternabra		1	14.7	0.6	08-541	30	II	8		0
sternal fragment		1	0	0	09-541	30	II	8		
right ulna fragment	proximal fragment	1	92.82	8.2	08-543	30	II	8		
ulna	fragment	1	17.08	0.3	08-543	30	II	8		
vertebra	fragment	1	18.94	1.3	08-541	30	II	8		
unknown	fragment	1	19.68	0.9	08-407	5	IIA	4		



APPENDIX A

Table A.2: *Canis Familiaris* Elements from Housepit 24 Area 3 Feature 1

Element	Description	Qty	Measure (mm)	Weight (g)	Provenience					
					Acc #	Sq	Strat	Lev	Feat	Lay
cranium	missing rostrum	1	107.5	77.8	08-400	5	II	1	1	5
fourth tarsal		1	16.61	1.7	08-401	5	II	1	1	5
tarsal		1	12.38	0.3	08-401	5	II	1	1	5
metacarpal		1	13.91	0.5	08-406	5	II	1	1-2	1
carpal		1	14	0.5	08-405	5	II	1	1-3	1
left calcaneus		1	42.27	6.3	08-443	5	II	1	1-3B	2
distal phalanx		1	12.76	0.6	08-407	5	II	4		0
fourth carpal		1	9.06	0.3	08-407	5	II	4		0
second carpal		1	13.9	0.9	08-407	5	II	4		0
sternabra		1	15.37	0.4	08-407	5	II	4		0
unknown	fragment	1	19.68	0.9	08-407	5	IIA	4		

## APPENDIX B

Table B.1: *Canis Familiaris* Cranial Measurements

Measurement	Length (mm)	Points	Notes
<b>Total Length</b>		Akronkranion - Prosthion	
<b>Condylbasal length</b>		aboral border fo the occipital condyles - prosthion	
<b>Basal Length</b>		basion - prosthion	
<b>basicranial axis</b>	48.2	basion - synsphenion (interspheniod suture)	
<b>basifacial axis</b>		synsphenion - prosthion	
<b>neurocranium length</b>		basion - nasion	
<b>upper neurocranium length</b>	97.2	akronkranion - frontal midpoint	
<b>viscerocranium length</b>		nasion - prosthion	
<b>facial length</b>		frontal midpoint - prosthion	
<b>greatest length of the nasals</b>		nasion - rhinion	
<b>length in braincase</b>		foramen to basion (Wagner 1930, 13)	
<b>"Snout" Length</b>		oral boarder of orbits (median) - prosthion	
<b>median palatal length</b>		staphylion - prosthion	
<b>palatal length</b>		medion point of intersection fo the line joining the deepest indentation of the Choane - Prosthion	
<b>length of the horizontal part of the palatine</b>		staphylion - palatnoorale	
<b>length of the horizontal part of the palative cooresponding to M 13a</b>			
<b>length of the cheektooth row</b>		alveoli on the buccal side	
<b>aboral boarder of the alveolus of M3</b>		oral boarder of the alveolus of C	
<b>length of the molar row</b>		alveoli on the buccal side	
<b>length of premolar row</b>			
<b>length of the carnassial</b>		measured at the cingulum	
<b>greatest breadth of the canassial</b>			
<b>length of the carnassial alveolus</b>			
<b>length and breadth of the M1</b>		measured at the cingulum	
<b>length and breadth of the M2</b>		measured at the cingulum	
<b>Greatest diameter fothe auditory bulla (Wagner 1930, 21)</b>	21.7	from the most aboral point of the ublla on the sutre with the paraoccipital process up to the external carotid foramen	
<b>greatest mastiod breadth greatest breadth of the occipital triangle</b>	66.7	otion - otion	possible damage to right otion
<b>breadth dorsal to the external auditory meatus</b>	52.8		possible damage to right auditory meatus
<b>greatest breadth of the occipital condyles</b>	39.7		
<b>greatest breadth of the bases of the paraoccipital processes</b>	51.9		

APPENDIX B

Measurement	Length (mm)	Points	Notes
greatest breadth of the foramen magnum	20.2		
height of the foramen magnum	15.1	basion - opisthion	
greatest neurocranium breadth greatest breadth of the braincase	62.4	euryon - euryon	
zygomatic breadth	109	zygion -zygion	≈54.5*2 or .5=54.5
least breadth of skull least breadth aboral of the supraorbital process	40.7	breadth at the postorbital constriction (Duerst 1926:238 frontostenion - frontostenion	
frontal breadth	55	ectorbitale - ectorbitale	≈27.5*2
least breadth between the orbits		entorbitale - entorbitale	
greatest palatal breadth		measured across the oter borders of the alveoli	
least palatal breadth		measured behind the canines	
breadth at the canine alveoli			
greatest inner height of the orbit			
skull height	6.7	(Wagner 1930:19) The 2 pointers of the slide gauges are places basally on the basis of the skull (on the basioccipital) and dorsally on the highest elevation of the sagittal crest	
skull height without sagittal crest	6.21	(Wagner 1930:19 ff) the slide gauge is placed beside the sagittal crest on highest point of braincase	
height of the occipital triangle	4.33	akrokranion - basion	
height (length) of the canine - left		measured in a straight line from point to point (removed from jaw)	
height (length) of the canine - right		measured in a straight line from point to point (removed from jaw)	
neurocranium capacity		with ethmoid preservedforamina of the braincase are stipped up with wadding; when it is completely free fo dirt, fill with millet seeds and shaken to remove air pockets. Finally the seeds are tipped into measuing beaker for their volume	

## APPENDIX C

Table C.1: Left Mandible Measurements of *Canis Familiaris*

Measurement	Length	Points	Notes
total length	122	length from condyle process - infradentale	damage to left infradental
length	124.7	the angular process - infradentale	damage to left infradental
length from the indentation	118.1	between the condyle process and the angular process - infradentale	damage to left infradental
length	110.4	the condyle process - aboral border of the canine alveolus	
length from the indentation between the condyle process and the angular process - aboral border of the canine alveolus	106.6		
length	113.6	the angular process - aboral border of the canine alveolus	
length	70.7	the aboral border of the alveolus of M 3 - aboral border of the canine alveolus	
length of the cheektooth row M3 - P1		measure along alveoli	no pl
length of the cheektooth row M3 - P2	63.4	measure along alveoli	
length of the molar row	32.7	measure along alveoli	
length of the premolar row, P1 - P4		measure along alveoli	no p1
length of the premolar row, P2- P4	30.3	measure along alveoli	
length and breadth of th carnassial	20.2	measure at the cingulum - best measured from dorsal	
length of the carnassial alveolus	20.5		
length and breadth of M2	8	measure at the cingulum	
length and breadth of M3	4.5	measure at the cingulum	
greatest thickness of the body of jaw (below M1)	21.3		
height of the vertical ramus	55.3	basal point of the angular process - coronion	damage to angular process - could affect measurement
height of the mandible behind M1	22.7	measure on the lingual side and at right angles to the basal border	?
height of the mandible between P2 and P3	18.3	measure on the lingual side and at right angles to the basal border	
height (length) of the canine	35.8	measure in a straight line from point to point (removed from jaw)	
calculation of the basal length		(Brickman 1929) measurement 2 multiplies by 1.21	damage to left infradental
calculation of the basal length		(Brickman 1929) measurement 4 multiplies by 1.37	
calculation of the basal length		(Brickman 1929) measurement 5 multiplies by 1.46	
the mean of M22, 23, 24			
Calculation of the basal length (Dahr 1937)	no P1	measurement 8 multiplied by 2.9, minus 44 mm	

Table C.2: Right Mandible Measurements of *Canis Familiaris*

Measurement	Length	Points	Notes
total length	130.8	length from condyle process - infradentale	damage to left infradental
length	133.8	the angular process - infradentale	damage to left infradental
length from the indentation	127	between the condyle process and the angular process - infradentale	damage to left infradental
length	113.1	the condyle process - aboral border of the canine alveolus	
length from the indentation between the condyle process and the angular process - aboral border of the canine alveolus	110		
length	116.9	the angular process - aboral border of the canine alveolus	
length	73.7	the aboral border of the alveolus of M 3 - aboral border of the canine alveolus	
length of the cheektooth row M3 - P1		measure along alveoli	no pl
length of the cheektooth row M3 - P2	63.5	measure along alveoli	
length of the molar row	33.7	measure along alveoli	
length of the premolar row, P1 - P4		measure along alveoli	no p1
length of the premolar row, P2- P4	31.5	measure along alveoli	
length and breadth of th carnassial	21.4	measure at the cingulum - best measured from dorsal	
length of the carnassial alveolus	20.7		
length and breadth of M2	8.2	measure at the cingulum	
length and breadth of M3	missing	measure at the cingulum	
greatest thickness of the body of jaw (below M1)	22		
height of the vertical ramus	57.5	basal point of the angular process - coronion	damage to angular process - could affect measurement
height of the mandible behind M1	21.8	measure on the lingual side and at right angles to the basal border	?
height of the mandible between P2 and P3	18.5	measure on the lingual side and at right angles to the basal border	
height (length) of the canine	36	measure in a straight line from point to point (removed from jaw)	
calculation of the basal length	161.898	(Brickman 1929) measurement 2 multiplies by 1.21	damage to left infradental
calculation of the basal length	154.947	(Brickman 1929) measurement 4 multiplies by 1.37	
calculation of the basal length	160.6	(Brickman 1929) measurement 5 multiplies by 1.46	
the mean of M22, 23, 24	159.148		
Calculation of the basal length (Dahr 1937)	no P1	measurement 8 multiplied by 2.9, minus 44 mm	

APPENDIX D

Table D.1 : Mid-Fraser Domestic Dog Assemblage

Site	HP	Site Name	Date	N	Floor	Feature	MINI	0-3 mon	3-6 mon	6-12 mon	12-18 mon	18-24 mon	2-3 Yrs	3-5Yrs	5+Yrs
EeRk 4	1	Ball Site		20			1						1		
EeRk 4	6	Ball Site		1			1								
EeRk 4	19	Ball Site		1			1						1		
EeRk 7	1	Gibbs Creek Site		7			3	1	1						
EeRk 40	1	East Site		4			1								
EeRk9	3	Ollie Site		102			3	1	1						
EeRk 4	65	Bridge River		180			4	0				3			
EeRk 4	24	Bridge River	1199 BP	182			2				1		1		
EeRk 7	3	Keathley Creek	1200-200 BP	48			1	1							
EeRk 7	7	Keathley Creek	2160±60 BP	1214			12		2				3	2	2
EeRk 7	109	Keathley Creek		42			1					1			
EeRk 7	110	Keathley Creek		52			1							1	
<b>Totals</b>				<b>1853</b>	<b>152</b>	<b>1383</b>	<b>31</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>2</b>
<b>Percent</b>				<b>8.20%</b>	<b>74.64%</b>		<b>9.68%</b>	<b>12.90%</b>	<b>0.00%</b>	<b>25.81%</b>	<b>12.90%</b>	<b>19.35%</b>	<b>9.68%</b>	<b>6.45%</b>	