

More than Food:
An exploration of the social significance of
faunal remains at *st'ámes* (DkRs 6)

by

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Abstract

There are complex relationships between humans and animals that influence their day-to-day interactions. While commonly described by traditional knowledge and ethnographic records, these social dynamics between animals and humans are difficult to access in the archaeological record. This thesis explores how such relations influence the distribution of the faunal assemblage at *st'ám̓es* (DkRs 6) on the Salish Sea by drawing upon multiple streams of evidence including zooarchaeological analysis, stable isotopes, ancient DNA analysis, Squamish Nation oral history and traditions, and ethnohistoric data. The variations in the assemblage suggest that while *st'ám̓es* fauna is generally consistent with regional trends, local factors influence the taxa present. The abundance of domestic dog remains in the *st'ám̓es* deposits stand out compared to sites of similar age in the region and a sample of four of these remains underwent stable isotope and aDNA analysis to further investigate their role at *st'ám̓es*. These remains are found to be more likely to represent hunting dogs than woolly dogs, and stable isotope analysis suggests their diets were dominated by anadromous marine protein sources. Squamish Nation oral history and traditions exemplify the place of animals such as dogs in the community as entities linked with the landscape and history, shaping their modern significance.

Keywords: Zooarchaeology; Northwest Coast, Squamish Nation; Salish Sea; Dogs; Social Zooarchaeology

Dedication

In memory of Kathleen Edmunds

1962 - 2012

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List of Acronyms

aDNA	Ancient DNA
BP	Before Present (present is 1950)
c.	Circa
CDF	Coastal Douglas Fir
CWH	Coastal Western Hemlock
DNA	Deoxyribonucleic Acid
MNI	Minimum number of Individuals
NISP	Number of Individual Specimens Present
NWC	Northwest Coast
ya	Years ago

Chapter 1.

Introduction

“After the Great Flood, a bald eagle appeared and gave a salmon to the sole survivor of the Cheakamus people. Thus, the Squamish people felt close to bald eagles and never harmed them” (Louis Miranda in Bouchard and Kennedy 1976a:76)

Although represented throughout ethnographic records and in traditional knowledge of Indigenous peoples around the world, the social significance of animals in human society is rarely addressed in zooarchaeology. Historically, zooarchaeological studies focused on the tangible aspects of human use of animal resources in the past. The role of subsistence and storage of animal products in human societies has been a staple of zooarchaeological research ever since archaeologists began to study faunal assemblages, beginning with the fabled zooarchaeological “laundry list” of species exploited at a given site (Lyman 2014, Sykes 2014). Over the decades this focus expanded to include the study of human hunting practices and optimal foraging (e.g. Lyman 2003, Ugan 2005), domestication, reflections of status or environmental availability, movement, trade, seasonality, and changes within each of these elements (e.g., Butler and Campbell 2004, Cannon and Yang 2006, Coupland et al. 1993).

However, there is growing awareness in zooarchaeology of other ways that the study of faunal remains can contribute to the understanding of human lives in the past, moving beyond the essential role of animals in human diets into the social role of animals in human lives (e.g., Armstrong Oma 2010, Hill 2011, Overton and Hamilakis 2013, Russell 2011, Sykes 2014a). Anthropological explorations of the complexity of human-animal relationships (e.g., Ingold 2000) in agricultural and hunter-gatherer groups provide context for this discussion. In a western worldview humans are separate from the environment, part of a cultural sphere that classifies animals as ‘other,’ and thus personhood is limited to humans alone (Russell 2011, Sykes 2014). For many Northern hunter-gatherer groups the dichotomy between culture/environment does not exist in the same way, and thus personhood is open to both human and non-human animals (Ingold 2000:49). This understanding of non-human animals influences the way in which

humans interact with them in all aspects of daily life. If the complex nature of social dynamics shapes the ways that humans make use of and relate to animals, it is important to consider the influence that such relationships may have had in the formation of archaeological assemblages. This thesis examines the evidence of human-animal relationships at the site of *st'ám̓es* (DkRs 6) in the Salish Sea region of the Pacific Northwest Coast.

1.1. Research Context

The Northwest Coast of North America stretches from southern Alaska down through British Columbia, into Washington and Oregon. It is an environment of variability and abundance, ranging from the peaks of Coastal-Cascade mountain ranges that parallel the coastline (Barnett 1955:11) to low coastal plains and island chains of Haida Gwaii and the San Juan Islands. Archaeologically and anthropologically it is a well studied region, giving rise to the definition of the Developed Northwest Coast Pattern (Matson 2003) that has been the focus of significant research. The indigenous peoples who occupy this region are highly diverse, living in a region of seasonal and local variability in abundance that influences subsistence strategies (Suttles 1978) and the other ways that people interact with their environments.

The Salish Sea is a sub-region of the Northwest Coast, home to the diverse culture groups of the Central Coast Salish. In the Salish Sea region alone there are five known language groups, among which are Squamish, Nooksack, and Clallam, as well as Halkomelem, and Northern Straits, which themselves are groupings of autonomous nations that include several distinct dialects (Barnett 1955, Suttles 1990, Hill-Tout 1978). Far from being the untouched wilderness that European explorers believed they found when they first arrived, traditions of resource management over many generations have shaped the environment seen today (Lepofsky and Caldwell 2013, Grier 2014, Deur and Turner 2005, Oliver 2007). Shellfish are one of the foremost examples of this, as the management of clam beds through the construction of terraces to increase productivity is well documented (e.g., Groesbeck et al. 2014, Lepofsky and Caldwell 2013). Plant resources were also actively managed via burning to clear areas and encourage growth, transplant, and tending (Deur and Turner 2005). Ultimately, the physical, cultural, and archaeological context of the Salish Sea are important foundations for understanding the social significance of animals at *st'ám̓es*.

On the Pacific Northwest Coast, salmon is a vital resource and its place in human society has been explored in detail. Between oral histories, the accounts of early explorers, and ethnographies, the importance of salmon in the diets and lives of peoples throughout this region post-contact is well established (White 2006, Drucker 1951). The importance of salmon has been suggested as a source of the cultural complexity that resulted in the classification of Northwest Coast peoples as “Complex Hunter-Gatherers” and made the region a focus of research for archaeologists and anthropologists throughout the twentieth century. Salmon is linked to rituals such as the First Salmon Ceremony that continue to be significant to descendent communities today (Barnett 1955, Amoss 1987, Reimer 2012, Reimer et al 2016) and social management strategies (Campbell and Butler 2010, Lepofsky and Caldwell 2013). Its abundance in archaeological assemblages contributed to the profusion of salmon-related discourse in the literature (e.g. Matson 1992). For many years, the significance of salmon in Northwest Coast communities dominated zooarchaeological research to the extent that some researchers have accused the discipline of “salmonopeia,” focusing on salmon to the exclusion of other influential resources (Monks 1987); however, this is changing with the recognition of the role played by other species (e.g. Angelbeck and Cameron 2014, Butler and Campbell 2004, Cannon and Yang 2006, Ewonus 2006, Grier 2006, McKechnie 2014, Moss 2011, Pegg 1999, Trost 2005), particularly the importance of herring (McKechnie et al. 2013, Speller et al. 2012) and shellfish (Moss 1993)

Over the past decade, the scope of zooarchaeological research on the Northwest Coast has been shifting to include more complex understandings of the interactions between humans and landscape in the past, of which animals are one aspect (e.g., Ewonus 2006, Grier 2014, Moss 2011, Zimmerman 2014), including the exploration of role of relationships with non-human beings in resource management strategies. It has been suggested that these relationships encourage people not to over-exploit animal resources, ensuring that populations are maintained through daily practices and rituals such as the ethnographically recorded First Salmon Ceremony (Lepofsky and Caldwell 2013, Reimer et al 2016). However, the interplay of the social dynamics of human-animal relationships, daily subsistence routines and the landscape has yet to be explored in detail. To that end, this study explores how the faunal assemblages at archaeological sites may be reflective of social significance of animals in the past, focusing on the faunal assemblage from the site of *st'ármes* at the head of Howe Sound. By drawing on faunal data, ethnographic research and traditional knowledge from Squamish

Nation, I examine how evidence of fauna present at *st'ám̓es* differs from sites of similar age on the Salish Sea, and whether this could be reflective of local social significance.

1.2. Research Objectives

Within the scope of broadening zooarchaeological research on the Pacific Northwest Coast, my objective is to study the social dynamics of peoples' use of and relationships with animals, with focus on how these might be represented in the archaeological record at *st'ám̓es* (Table 1-1). As social dynamics are primarily invisible, existing mainly in the minds of those who enact them, they rarely preserve in the archaeological record. Entangled with worldview, there are few material reflections of social significance seen in ritual and burial practices. Thus, it is necessary to turn to complementary data sources such as Squamish Nation oral history and ethnography to explore the potential social significance of faunal remains in the *st'ám̓es* assemblage.

Research objective: How is the social significance of animals in human lives represented in the faunal record at *st'ám̓es*?

Sub-Question (Objective)	Predictions/Data Required	Method
1. Are fauna differently represented between midden and housefloor deposits at <i>st'ám̓es</i> ?	Midden will show different density of fauna and representation of species than housefloor deposits because of different disposal practices, which may be reflective of use.	Comparison of deposits: <ul style="list-style-type: none"> • Richness/Evenness • Weathering • Burn level • Part representation • Element representation • Cultural modifications
2. How does the <i>st'ám̓es</i> faunal assemblage compare to other archaeofaunal assemblages in the Salish Sea region?	While many factors (e.g. environment, time period) contribute to the representation of species in an assemblage, regional analysis of use and distribution offers insight into how a site fits or does not fit regional patterns.	Comparison of <i>st'ám̓es</i> assemblage with Salish sea sites: <ul style="list-style-type: none"> • Richness and evenness • Species represented
3. Do differences in faunal treatment at <i>st'ám̓es</i> reflect broader social factors?	Differences in faunal materials at <i>st'ám̓es</i> compared to regional patterns may contribute to understanding of social factors with reference to ethnographic data and oral traditions.	<ul style="list-style-type: none"> • Ethnographic records • Spatial distribution of faunal assemblage • Analysis of cultural modifications of fauna • aDNA and C13/N15 analysis of select <i>Canis sp.</i> remains

Table 1-1. Research objectives and goals of the exploration of the *st'ám̓es* faunal assemblage

Much of the archaeology of the south-central Northwest Coast has been concentrated in the Gulf Islands and Fraser River Valley area. To date, little archaeology has been done in the Howe Sound region of Squamish Nation territories besides contract research, mostly restricted to the grey literature, with the exception of several research projects (e.g. Macdonald et al 2013, Reimer 2000, 2006, 2012, 2014, Reimer and Ewing 2011, Reimer and Hamilton 2015, Reimer et al 2016, Velliky and Reimer 2013). Thus, the existing data from *st'ám̓es* offers a valuable opportunity to explore the zooarchaeology of this region in more detail. *St'ám̓es* is an ideal site to conduct a study of the social significance of animals in archaeological contexts as it has been a key site in Squamish Nation territories over at least 4000 years (Barnett 1955, Bouchard and Kennedy 1986:307, Reimer 2012:49). The site was traditionally a winter village and gathering place where social relationships were enacted. In combination with ethnographic research done

in cooperation with traditional knowledge holders of Squamish Nation (Bouchard and Kennedy 1976) and documented over the twentieth century (Barnett 1955, Drucker 1951, Suttles 1970, Hill-Tout 1900), this allows one to develop the understanding of the complex relationships between humans and animals at this site and the significance they had in human lives. Moreover, the *st'ámes* faunal assemblage includes a significant proportion of domestic dog remains (Arcas 1998), which offer an opportunity to explore the social significance of animals in the lives of *st'ámes* inhabitants in more detail.

While other animals present at the site played influential roles in subsistence and social lives of people at *st'ámes*, none play quite the same role as domestic dogs. Domestic dogs occupy a unique place among animals by living and working so closely with people (Schwartz 1997), straddling the boundary between human and animal. Dogs in Coast Salish territories provide an opportunity to study social significance as historically two types of dogs lived with human communities: woolly dogs, whose fur was incorporated into blanket weavings, and village dogs (Howay 1918, Schulting 1994, Crockford 1997). Their relationships with people are inherently social, and by exploring the context in which they are found, one may be able to study differences in the social dynamics between people and each type of dog. To explore how archaeological dog remains relate to social patterns at *st'ámes* in particular and on the Salish Sea in general, it is necessary to turn to additional data sources including Squamish Nation oral histories, ethnographies, and the accounts of Western explorers on the Northwest Coast. Moreover, by studying select canid remains more closely through ancient DNA analysis (aDNA) to determine whether they represent wool or village dogs, Carbon-14 dating, and dietary analysis through stable carbon- and nitrogen isotope analysis (e.g. Cannon 1999, Ames et al. 2015), I explore in detail the roles that they may have played at *st'ámes* in the past.

1.3. Theoretical Context

Social zooarchaeology is a growing area of research (Crabtree 1990, Ewonus 2006, 2014, Sykes 2014, Russell 2011, deFrance 2009) and over the past decade, explorations of its potential have emerged around the world. In Europe, it is proposed that a social zooarchaeology is based in the study of human-animal relationships. Thus, it can be approached by studying the contexts of consumption, in addition to practices of how disposal and treatment of remains differ between animals (Marciniak 2005). It is within this framework that I am building my exploration

of the *st'átmes* assemblage. The development of a social zooarchaeology has primarily grown out of interest in identifying ritual activity in the zooarchaeological record (Russell 2011, Sykes 2014) and only in the past few decades has this started to intersect with “social” as an exploration of meanings created through engagement between humans and material culture or places (e.g. Marciniak 2005).

However, far from being a unified theoretical approach, the scope and methodology of social zooarchaeology vary according to the definition of ‘social’. It ranges from interpretations of faunal data focusing on the implications of zooarchaeological specimens for local or regional interaction (e.g., Ewonus 2011, 2014) to efforts to “place social at the center of zooarchaeology” (e.g., Russell 2011), in which it is argued for an approach based in practice theory (e.g., Bourdieu 1977, Giddens 1979, Pauketat 2001, Robb 1999). A social zooarchaeological approach based in practice theory focuses on the ways power relations play out in social life and more specifically the ways that these relations are enacted through animals (Russell 2011:9), through ritual, symbolism, taboos, wealth and companionship, as well as relationships enacted through hunting or domestication. These are utilized in the effort to answer social questions through the use of animal bone data (Ewonus 2014:20).

It has been pointed out that much of existing social zooarchaeological research is anthropocentric (Overton & Hamilakis 2013). In these cases, the agency of animals is not addressed but rather interpreted through their role as nutritional or symbolic resources in human lives (Overton and Hamilakis 2013:111). The consideration of the agency that animals wield in human relationships is an important aspect of their social significance, as archaeologists strive first and foremost to understand humans in the past from the material traces they left behind, but it is also important to consider the engagement of humans and animals. In an “ontology of dwelling” (Ingold 2000:42), the “human condition is that of being immersed from the start, like other creatures, in an active, practical, and perceptual engagement with constituents of the dwelt in world.” Animals are one aspect of this engagement. Not only do animals possess significance as resources, but engagement between humans and animals on the Northwest Coast is inextricably linked to social practices through respectful treatment of nonhuman kin and resource management systems (Butler and Campbell 2010, Lepofsky and Caldwell 2013, Turner and Jones 2000). Humans cannot be separated from the environment and thus, other people, animals, plants, mythical beings, inanimate objects and places are all interwoven with understandings of place and history (Ingold 2000, Reimer 2006). To neglect this aspect of

faunal significance in a social zooarchaeology is to neglect an important element of how people engage with the landscape and the beings in it.

Archaeology is linked to a greater colonial tradition that has a history of denying voice to descendent communities, and erasing them from a landscape that their ancestors have occupied since time immemorial. With the emergence of Indigenous Archaeology over the past few decades, there is a shift towards archaeology done “by, for, and with Indigenous peoples” (Nicholas & Andrews 1997, Lyons & Reimer 2008), one method of decolonizing archaeology and interpretations of the past (McNiven & Russell 2005, Nicholas 2005). It offers a valuable framework for critiquing an archaeology that too often sidelines Indigenous perspectives in their own history. Indigenous archaeology reinforces the importance of traditional knowledge such as oral traditions in research. If I only considered the economic and dietary significance of faunal remains from *st’ám̓es* it would contribute to this culture of erasure by overlooking the deep history and traditions associated with this place. Thus, it is important to consider cultural perspectives and wider sources of data in the interpretation of archaeological sites and artifacts. This opens new perspectives to better understand the significance not only in the lives of past peoples but to communities for whom these places have meaning today.

In addition to being essential elements of subsistence and economy, individual animals may engage with humans in a variety of ways (as predators, prey, companions) in life, or fulfill a variety of purposes in death as food, raw materials, ritual, wealth, status signifiers, or combinations thereof. As groups, they can influence human traditions, settlement patterns, and subsistence practices (e.g., Hill 2012). If one considers “social” to be defined as “living, or disposed to live, in companionship with others rather than in isolation” (Random House Dictionary 2015), then a social zooarchaeology may include all aspects of animal engagement in human lives. While a social zooarchaeology has not yet become an explicit part of faunal studies on the Northwest Coast, consideration of the ways that animals are embedded in worldview, landscape, and social practice is becoming more common (e.g., Butler and Campbell 2010, Lepofsky and Caldwell 2013, Ewonus 2006,). Likewise, the ways that relationships with animals shape the landscape such as through fish weirs and traps, and the social significance thereof, are integral aspects of research (White 2011). Traditions of proper use and respect to the spirits of animals may leave patterns identifiable in the archaeological record (Hanson 1991:16). This concept of engagement is at the core of social significance, and it is this that will form the foundation for exploration of the social significance of the *st’ám̓es* faunal assemblage.

1.4. Environmental Context

The site of *st'ám̓es* (DkRs 6) is in the modern-day town of Squamish, situated at the mouth of the Stawamus River where it enters Howe Sound, in the wider region of the Salish Sea. The Salish Sea is home to many cultural groups occupying a range of environments, most distributed between the Coastal Western Hemlock zone and the drier, warmer Douglas Fir zone that typifies southern Vancouver Island, the Gulf Islands, and the San Juan Islands (Meidinger and Pojar 1991). Throughout the Salish Sea, peoples moved throughout the landscape over the course of the year in accordance with the resources available, from long-term winter villages like *st'ám̓es* to spring and summer sites, to the more ephemeral sites that were created because of activities such as hunting, fishing, berry-gathering, and processing (Deur and Turner 2005). While sharing key resources such as salmon, the variable environmental conditions of each region influence the types of plants and animals available to people and at what times of year they are most abundant. This in turn shapes the ways they perceive and interact with their surroundings.

1.4.1. Howe Sound

Howe Sound is an inlet located on the southern coast of British Columbia on the Salish Sea (Figure 1-1), at the head of which Squamish and Cheakamus rivers flow into the waters of the Pacific. This region is the center of traditional Squamish Nation territory (Bouchard and Kennedy 1986:308, Barnett 1955:31). Since the end of the last ice age 11,000 years ago, the region has undergone significant change and the ancient environment differed from the conditions found in more recent years (Reimer et al. 2016). Deglaciation of Howe Sound began around 14,000 years ago, which resulted in the isostatic rebound of the land following the retreat of the ice and subsequent rise in sea levels (Arcas 1998:186, Clague & James 2002:74, Mackie et al. 2014). The sea levels in this part of the coast did not reach their modern levels until approximately 2250 years ago (Shugar et al. 2014). The Squamish River delta has likewise shifted over this period, and until about 3000 years ago, the head of Howe Sound was located near the modern confluence of the Squamish and Cheakamus Rivers. 1500 years later the delta was located only 1 km below the modern confluence of Squamish and Mamquam rivers, building up gradually over time until the Squamish River changed course to its modern position (Friele 1997).

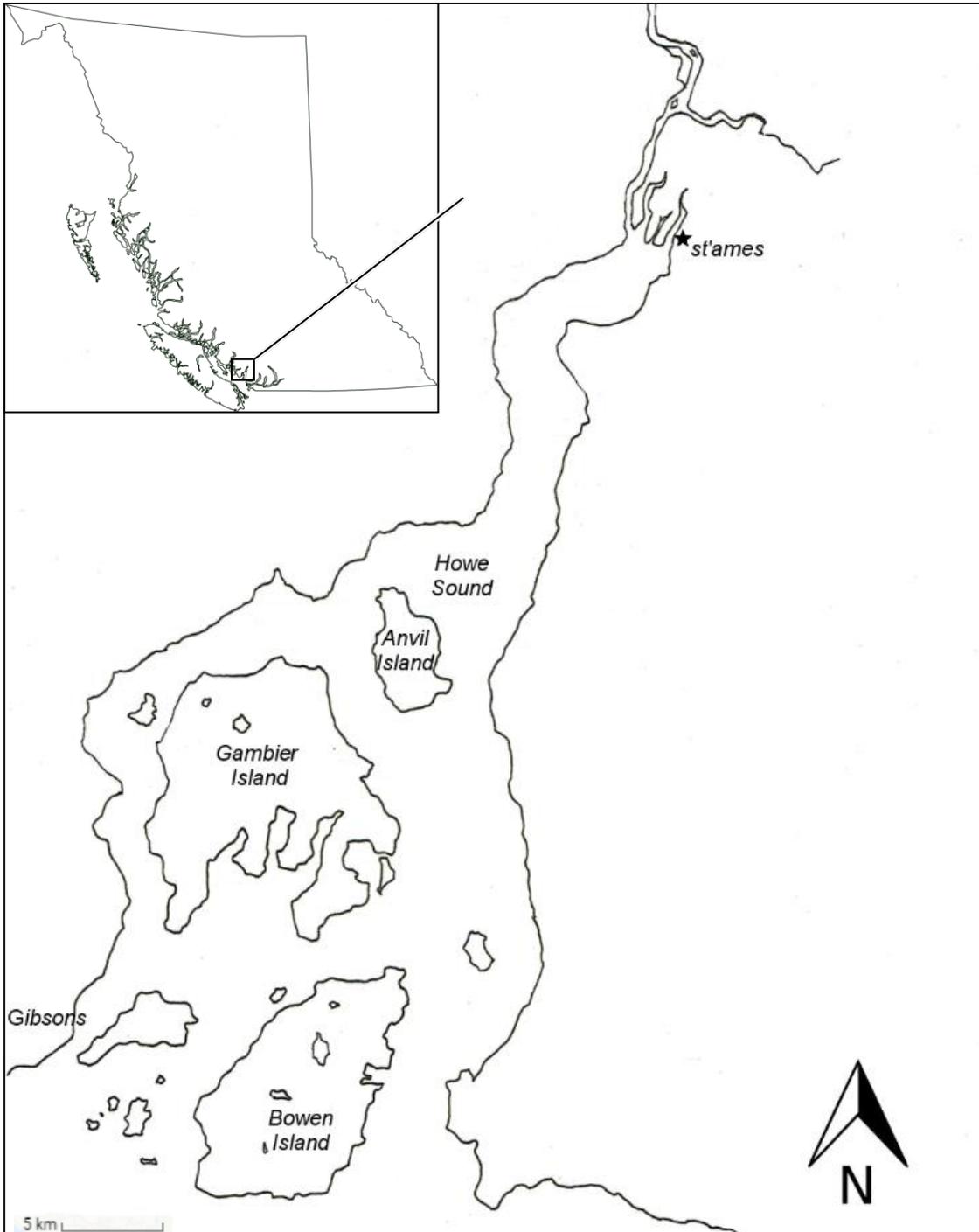


Figure 1-1. British Columbia (inset) and Howe Sound today, showing location of st'ames (DkRs 6) study area, map data © 2016 Google

Today, Howe Sound falls into the Coastal Western Hemlock biogeoclimatic zone. There are a wide range of land and sea resources available throughout this region, with an abundance of salmon-bearing streams, easy off-shore access along the coast, and frequent rainfall that

supports a variety of plant life such as the iconic red cedar. The most common large mammals in this environment are black-tailed deer, black bear, grizzly bear, mountain goats, and grey wolves (Meidinger and Pojar 1991). Sea mammals such as harbour seal, California and Stellar sea lions are common in low near-tidal inlets along the coast. Estuaries provide shelter for overwintering birds while seabirds such as gulls find shelter in rocky islets and shellfish are abundant in the tidal flats. Most streams in the region are salmon-bearing and provide spawning grounds for other anadromous fish such as steelhead trout. Offshore waters provide access to a wide variety of species of fish including herring, eulachon, smelt, halibut, pacific cod and Walleye Pollock (Meidinger and Pojar 1991). Zooarchaeology indicates that the variety of animal species available in House Sound over the past several thousand years were very similar to those present in the region today.

1.5. Cultural Context

1.5.1. Northwest Coast

At the time of contact, the Northwest Coast was home to 11 language families, making it the second-most diverse linguistic area in North America (Ames and Maschner 1999:17). Within these families are regional and local groupings that are further divided into villages and households, which share certain cultural and social characteristics while being distinct entities with their own traditions, subsistence strategies, and social structures. For years the peoples of the Northwest Coast have been held up as the prime anthropological example of complex Hunter-Gatherers, defying long-held Western assumptions about the lifestyles of non-agricultural peoples, described better as hunter-fisher-gatherers than hunter-gatherers (Suttles 1962, Barnett 1955). The abundance of resources that characterize the region were thought to permit the development of complexity, defying deeply embedded stereotypes that informed understandings of cultural evolutionary models. However, more recent research promotes more nuanced views of the relationships of the peoples who called and continue to call the Northwest Coast their home with the landscape. There is increasing acknowledgement that people actively managed both terrestrial and marine environments. (e.g., Deur and Turner 2005, Caldwell 2013, Ewonus 2014, Grier 2014, Moss 2011, Lepofsky and McKechnie 2014) through deliberate choices about when, how, and where to harvest, shaping landscape through habitat manipulation. However, management also manifests indirectly through regulation by social

networks and entanglement with traditions (Campbell and Butler 2010, Lepofsky and Caldwell 2013:9).

The characteristics that make cultures of the Northwest coast so distinctive include social stratification, large semi-permanent villages, specialization, and complex material culture (Ames and Maschner 1999:13). At the time of contact, many groups also practiced concepts of ownership and control of property, monumental forms of woodworking such as house posts, grave markers and totem poles (Holm 1990-602-632), complex ritual (the potlach) and had relatively high population densities (Barnett 1955), all of which are cultural components usually associated with agricultural communities. Thus, over the last century many groups on the Northwest coast have been intensively studied by western anthropologists (e.g. Hill-tout 1897; Boas, Barnett 1955, Suttles 1970, Bouchard and Kennedy 1976). The overarching “Developed Northwest Coast Culture Type,” comprising features that seem to be shared along the coast, have been a staple of archaeological research for years (Matson and Coupland 1995, Carlson 1983, Ames and Maschner 1999). However, there is recognition of the diversity of groups on the Northwest coast, acknowledging that abundance is neither universal nor stable (Suttles 1960), and that across the coast peoples have adapted to and shaped their environments in different ways.

1.5.2. **Central Coast Salish**

The traditional territories that define the Central Coast Salish region are oriented around the Salish Sea and include peoples inhabiting lands from the south-eastern part of Vancouver Island, the San Juan islands, the Gulf Islands, and the lower Fraser River basin. The landscape throughout these regions differ, and consequently the plants and animals available to people in a given place vary in abundance and availability. The usefulness of the ‘Central Coast Salish’ classification has been debated (e.g., Harmon 2007) but certain similarities of culture make it useful for the purposes of regional comparison.

While there is significant diversity within this region, ethnographic and historical records provide examples of common themes in Central Coast Salish organization and practices in the early contact period. Cedar plank houses are among the most distinctive features of traditional Central Coast Salish life. These were primarily of shed-roof (single-pitched) construction and on average were 20 by 60 feet in size, which would house several extended families (Barnett

1955:58). Gable-roofed houses became more prominent later in the post-contact period where, except among Sechelt, Squamish and Musqueam peoples, they were indicators of wealth and social status (Barnett 1955:35). Squamish villages typically contained one or two houses of the shed-roof type, on average 200 to 300 ft long and 20 to 40 ft wide (Hill-Tout 1978). Although these houses were not partitioned for families, this is not true for all Central Coast Salish groups. Mainland Coast Salish groups also used pithouses, unlike other coastal groups in the region (Barnett 1955).

As an economic and social unit, the household was central in the structure of many Central Coast Salish communities, which were then part of kin-based villages (Ames and Maschner 1999:147, Ames et al. 1992, Barnett 1955, Lepofsky et al 2000, Matson 1999, Matson 2003). However, the extent to which the household operated as a unit of organization, production and consumption throughout the Central Coast Salish region has been questioned (Ewonus 2006:15). In Squamish Nation during the ethnographic period, house units were autonomous. Each house was a distinct social and economic entity that did not draw food from a common stock and was not obligated to share although sharing was common and, following periods of good fortune, expected (Bouchard and Kennedy 1986). Throughout the region, kin relations were complex and often the foundation of resource acquisition, ownership, and status, whether based in a family, household, or wider village (Barnett 1955). The extent to which this organization applies to the past is uncertain but is a useful starting point against which to evaluate evidence from archaeological contexts.

1.5.3. **Squamish Nation**

People have lived in the lands around Howe Sound since time immemorial, documented in the place names and stories that shape the cultural landscape and archaeologically visible in the 215 sites documented throughout Squamish Nation territories (Reimer 2012). Howe Sound is a part of Squamish Nation territories, the heart of which is located near the site of *st'á'mes* (DkRs 6). This environment is imbued with significance and a long history, of which *st'á'mes* is one piece. The earliest archaeological components at the site date to about 4000 BP in the lithics workshop and 1500 BP in village contexts, while the most recent components date to the modern period, reflecting the depth of time over which this place has been important. The earliest European contact with the Squamish people dates to Captain George Vancouver's 1792 journey (Hill-Tout 1978) and since that time, ethnographic records (e.g., Hill-Tout 1978, Suttles

1990, Bouchard and Kennedy 1976) have documented oral traditions, language, post-contact settlement patterns and daily life, in addition to the ongoing traditions of Squamish Nation. While the applicability of oral traditions in archaeological research has been debated (e.g. Grier 2007), descendent communities hold important ties to places such as *st'ám̓es*, making it important to take social memory into account (McLaren 2006).

In Squamish culture, the earliest sites are *Sxwexwiyam*, which refers to places, objects, and features associated with mythical beings, from the time when the world was in a state of chaos (Reimer 2012:51). Places, objects of features from the time when the world was being set right by the Transformers are *Xaay Xays* sites (Reimer 2012:51). In these times, animals could still remove their skins and become people but the Transformers were sent to teach people, animals, and plants the proper ways of the world (Reimer 2012:64). Some people were transformed into other beings or resources, such as cedar, beaver, or deer, some to stone, and these beings became the ancestors of Squamish Nation (Reimer 2012:65). *Syets* sites represent everyday activities by people and encompass villages, camps, and traditional use areas, places where cultural knowledge was put into practice (Reimer 2012:52). All three types of sites are present throughout Squamish Nation territories.

The traditional boundaries of Squamish Nation territories range from Point Grey to Roberts Creek on the west, north to the Elaho River headwaters, all of the islands in Howe Sound and the entire Squamish Valley, south to the Port Moody area including the entire Mamquam River and Indian Arm drainage, then west along the south side of Burrard Inlet to Point Grey (Squamish Nation 1992). The village of *st'ám̓es* is located at the northern end of the Sound at the lower end of the Squamish River on both sides of its mouth, traditionally an aggregate village where people from multiple villages came together to access seasonal resources and reaffirm social ties (Reimer 2012). Numerous other villages were situated along the Cheakamus and Squamish Rivers (Barnett 1955), primarily winter locations at the head of Howe Sound and nearby streams, while summer camps that were used for berries, clams, and sturgeon fishing included locations at Jericho Beach, inside False Creek Bay, around Granville Bridge, English Bay, and Port Moody (Barnett 1955:31, Bouchard and Kennedy 1986:1). Historically, the village of *st'ám̓es* at the mouth of the Squamish River was known as an eulachon fishing site where people congregated in the spring and dispersed after eulachon season (Barnett 1955). While generally classified by ethnographers as members of the Central Coast Salish group, Squamish peoples speak a Squamish dialect and have cultural traditions

and material culture that differ from both coastal and interior groups (Barnett 1955, Bouchard and Kennedy 1986, Hill-Tout 1978:28). Squamish place names for the surrounding region provide insight into traditional land and resource use as well as the ways that people engaged with the beings in their environment.

1.6. Archaeological Context

Although the Pacific Northwest coast has been heavily researched over the past century, very little archaeology has been done in the Howe Sound region. Until recently most research, particularly in zooarchaeology, has focused on the Gulf Islands, southeast Vancouver Island and the Fraser Valley region. Relatively few sites have been excavated in comparison to the size of the province and they tend to be concentrated in the same areas (Driver 1993), leading to few wide-ranging regional studies (e.g. Hanson 1991), but the breadth of zooarchaeology in BC is changing. Industrial development of forestry and pipelines throughout the Northwest Coast means that significant amounts of research are restricted to the grey literature of contract archaeology, but valuable work is being done in this area. However, over the past several decades, research projects have begun to explore inlet environments and other less intensively studied locales (e.g. Trost 2005, Pierson 2011). Moreover, archaeology on the Northwest Coast is being used to explore social questions (e.g. Campbell and Butler 2010, Ewonus 2006, Lepofsky et al. 2007, Grier 2014, Moss 2003), integrate traditional knowledge (e.g. Reimer 2006a, 2006b, 2012, Reimer et al. 2016, Tait Elder et al. 2014, White 2011), and develop community archaeological practice.

In Squamish Nation territory, significant archaeological exploration has occurred around Howe Sound over the past two decades, including the project that led to the excavation of *st'ám̓es* (Arcas 1998). The site was explored over four seasons between 1991-1994 by Arcas Consulting Archaeologists Ltd (hereafter 'Arcas') as part of a regional survey. Prior to the Arcas project that surveyed the site as well as several other smaller-scale sites in the region, no archaeological research had been conducted in this part of Howe Sound. The site is an ethnographically documented village and the archaeological deposits include a village (midden and house deposits), deposits dating between approximately 1400 years BP (AD 600) and the recent past, and a lithics workshop, which has radiocarbon dates ranging between 2560 – 310 BC. The archaeological materials recovered over the course of this project were initially

analysed as part of the Arcas report (1998) and continue to be studied in more detail (ie. Bakkelund 2014). In addition to the Arcas survey, several other studies have explored archaeology in this region, in cooperation with and for Squamish Nation (Reimer 2006, Reimer 2007, Reimer 2011, Reimer et al. 2016).

1.7. Organization of Thesis

This thesis is organized into six chapters. The first chapter provides context for the work that follows, beginning with a regional environmental and geographic summary to contextualize the Salish Sea. It then moves into the local conditions at *st'ám̓es* to characterize the site itself both in the present day and recent past, as past inhabitants may have experienced the environment. This is followed by a brief survey of traditional Central Coast Salish culture before moving into Squamish Nation, in whose traditional territory *st'ám̓es* is found. Chapter Two lays out the archaeological context of research at *st'ám̓es*, summarizing the work that has been done at the site in the past to provide a foundation for further analysis. Chapter Three defines the methods used to identify and quantify the faunal assemblage from *st'ám̓es*. This chapter conducts a brief archaeological survey of the Pacific Northwest coast and descriptions of each of the sites included in the regional comparison. Moreover, it highlights the ways in which the regional assemblages were standardized and interpreted before a social analysis could be attempted. It also addresses taphonomic factors that limit interpretation.

Chapter Four presents the faunal results of the *st'ám̓es* assemblage and compares them to five other sites within the Salish Sea. Chapter Five delves into the results of the *Canid* analysis, considering stable isotope and aDNA data for four samples of domestic dogs recovered from burial contexts, to assess the social significance they may have held in human lives at *st'ám̓es*. Chapter Six draws together the results of this analysis to discuss the social significance of animals at *st'ám̓es* as represented by the faunal assemblage, regional patterns, and ethnographic records. It concludes with an exploration of the importance of this kind of zooarchaeology not only to the discipline but also its potential for descendent communities, and offers directions for future research.

Chapter 2. Archaeological Context of St'ámes

The site of *st'ámes* was excavated by Arcas between 1991 and 1994, beginning with a series of surveys throughout the Howe Sound area. This research was undertaken for Squamish Nation to support a land claim that was under preparation at the time (Arcas 1998:2). One of the main goals of this project was to explore changes in land use and settlement over time and as an ethnographically documented village site, *st'ámes* provided an opportunity to explore these goals in detail (Arcas 1998:181). Initial excavations documented the spatial extent and depth of the site. Later excavations focused on obtaining more detailed information about a smaller portion of the site, particularly to identify features associated with traditional plank houses such as post-moulds and living floors (Arcas 1998). The results of these excavations were documented in 1998 as part of a comprehensive report of Arcas' archaeological research in Squamish Nation territory.

2.1. Physical context of St'ámes

St'ámes is situated at the bottom of a low hill in the zone between the hill and old tidal flats at the head of Howe Sound, east of Mamquam blind channel and bordered to the southeast by the Stawamus River. The site is 260 m long by 120 m wide, covering a total of 31000 m² (Arcas 1998:185), and is sheltered from south winds and rough seas by Watts Point, which is 6 km north of the site. The landscape is shaded by the Stawamus Chief for at least part of the day over much of the year, a rocky bluff 0.5 km south of *st'ámes* that overlooks the site. Over the period following deglaciation of the region around 14,000 years ago, conditions at the site would have varied as glaciers retreated and sea levels changed (Reimer 2012, Clague and James 2002). The development of the Squamish River Delta and its gradual shift to a point just north of modern day Stawamus I.R. 24 is one such change that would have influenced the site (Arcas 1998:186). Today the forest cover is variable, featuring a typical CWH mix of red cedar, western hemlock, red alder, and broadleaf maple among native trees, while several non-local species have been introduced by modern houses and gardens. The land has been impacted by house

construction and dredging on what is today Stawamus I.R. 24, disturbing some of the upper cultural layers of the archaeological site.

2.2. Excavation Details

A total of 30 units were excavated over the four years of the *st'ám̓es* project (figure 1). Initial testing began in 1991 following the exploration of a single 1 x 1 m unit to test depth and integrity of deposits, leading to the placement of six more excavation units later that year. In 1993, another 1 x 1 m excavation unit was placed adjacent to the 1991 excavations between two additional residences, before in-depth excavation began in 1994.

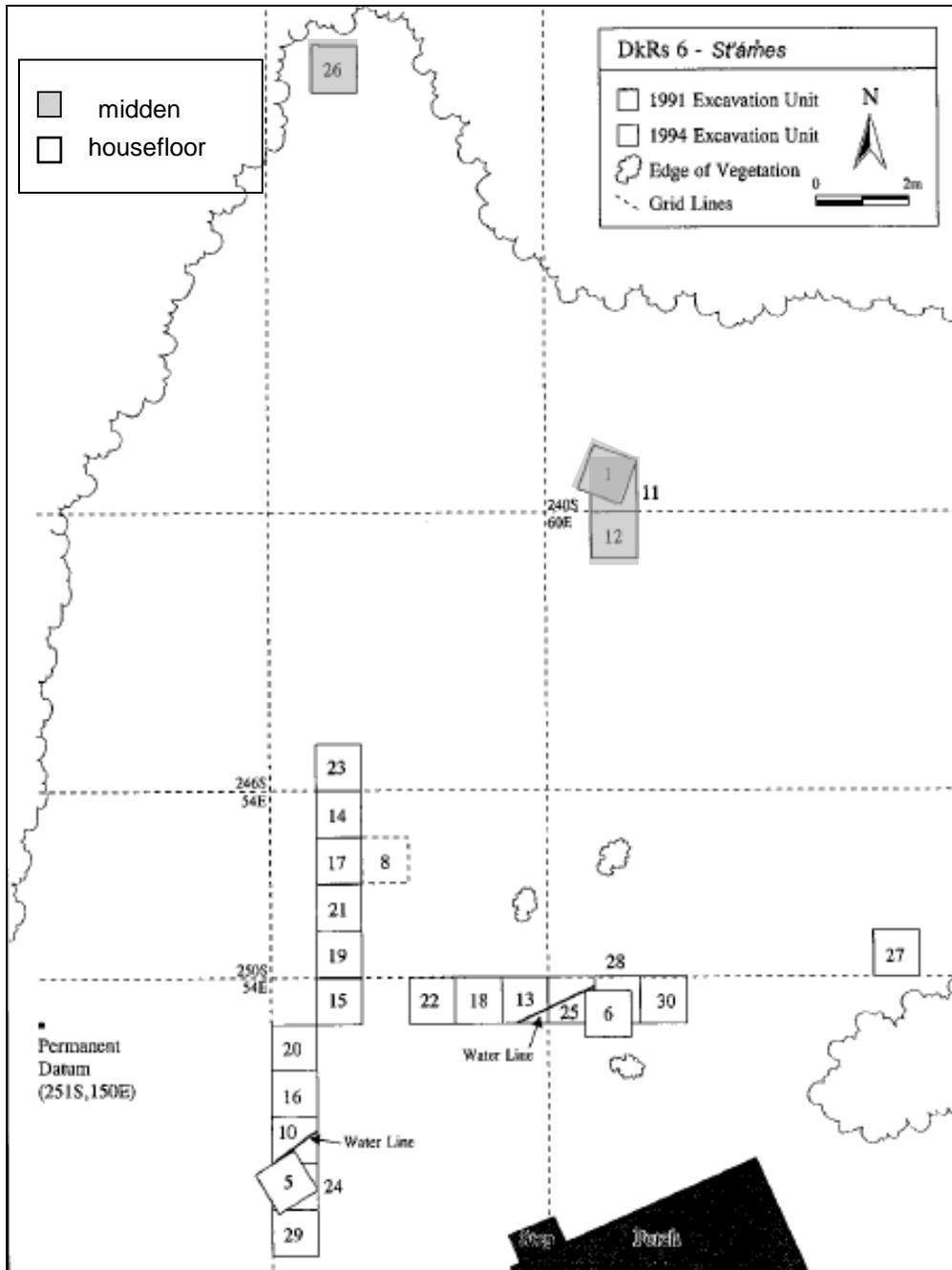


Figure 2-1. Plan of *st'ármes* village excavation units in the yard of Barbara Billy (from Arcas 1998) – EUs 2 and 4 not shown

Over the 1994 field season, a team excavated twenty 1 x 1 m units arranged in three trenches to investigate an area of the site associated with post holes and living floors, which are features of traditional plank houses. All units were excavated in arbitrary 10 cm levels. While for the most part the excavations followed established Arcas protocol, there was some variation in

methods over time. Units dug in 1991 and 1993 (EUs 1 through 9) were excavated until sterile beach soil was reached, while units dug in 1994 (EUs 10 through 30) were excavated to the arbitrary depth of 100 cm below the surface, focusing on upper housefloor levels (Arcas 1998:181). 1991 excavations did not distinguish cultural layers within the arbitrary 10 cm levels, while the 1993 and 1994 excavations separated cultural layers within levels.

Samples were collected according to Arcas protocol (Arcas 1998:38-39). A total of 400 matrix samples were collected throughout the site from individual layers within excavation units, and of these 100 were weighed and water screened to be sorted for further analysis. Faunal materials were recovered by water screening of all fill excavated from each excavation unit through ¼" (6mm) mesh. In addition, 1- or 2- litre matrix samples were collected from each stratigraphic unit of the site. These were then water-screened through 1/8" (3mm) mesh before being separated, bagged, and labeled. Because of this, a significant volume of vertebrate faunal remains was recovered from housefloor and midden deposits for analysis. For radiocarbon dating, a total of sixteen samples were collected throughout the site from cultural layers and features. Of these, six were drawn from the housefloor deposits, five from the midden, and three from the lithics workshop. In addition, two samples were submitted to date geological events in the region.

2.3. Results of Arcas Excavation

Excavations at *st'ám̓es* identified two phases of occupation at the site, divided between a lithics workshop and a sedentary or semi-sedentary village, which consists of midden and housefloor deposits. While midden and housefloor deposits date between 1500 and 240 BP, suggesting that they were associated, the lithics workshop is significantly older, with uncalibrated dates between 4060 BP and 2210 BP. The lithics workshop deposits were found only in EU 4 and were characterized by artifact-rich sandy gravel. This assemblage was characterized by a high abundance of chipped stone artifacts with few ground stone or bone artifacts, and no faunal remains, separated from the village midden by a small wetland (Arcas 1998). As a result of its separation from the rest of the site both geographically and temporally, Arcas researchers concluded that it was not directly associated with the later village deposits. The presence of these two phases of use at *st'ám̓es* demonstrates a continuity of occupation over more than 4000 years.

2.3.1. Excavation and stratigraphy *st'ámes*

Of the units excavated in the *st'ámes* village, five were associated with the midden (EUs 1, 2, 11, 12, 26) and twenty-three units were situated in the area containing house floor deposits (EU 3, 5, 6, 8-10, 13-25, 27-30). Within the house floor area, most units were arranged in three trenches excavated over the 1994 season to explore traditional plank house features. EU 7 contained only fill, while disturbed cultural deposits were found in two excavation units located within the house (EUs 3 and 9), and therefore received limited analysis. In the housefloor area, units were characterized by cultural deposits of up to 160cm deep with large amounts of ash, charcoal, and fire-reddened soil. In contrast, the midden deposits reached 170cm deep and were characterized by thin layers of silty sand, with varying amounts of charcoal, shellfish, fire-altered rock (FAR), ash, faunal remains, and artifacts. In both areas, all units were found to be subject to some modern disturbance, with a standard of 30 cm below surface in housefloor deposits, and up to 40 cm below surface in the midden. However, two small pit features in EU 1 were found to contain industrial artifacts at 70 cm below surface (Arcas 1998:191). While disturbance of surface levels was consistent across the site, the majority of deeper cultural deposits were intact.

2.3.2. Radiocarbon dates from *st'ámes* midden and housefloor

Radiocarbon dates were obtained from charcoal samples during the original excavations from both midden and housefloor deposits (Table 2-1 and 2). These samples show a continuity of occupation at *st'ámes* from 1400 cal BP to the post-contact period in village contexts. These dates were calibrated using the IntCal13: Northern Hemisphere curve from OxCal (Reimer et al. 2013).

Table 2-1. Radiocarbon dates from the st'ámes housefloor deposits calibrated using OxCal

Sample #	Laboratory #	Provenience	Standard Date	Calibrated Date (2 sigma)
16-3	Beta-103929	EU 16	240 ± 90 BP	483 - 241 and 233 - 60 calBP
18-7	Beta-80495	EU 18	530 ± 70 BP	665 - 470 cal BP
SQ 2	Beta-47927	EU 5	580 ± 50 BP	656 - 525 cal BP
17-4	Beta-80494	EU 17	740 ± 50 BP	764 - 639 cal BP
9-6	Beta-103928	EU 9	760 ± 70 BP	800 - 629 cal BP
SQ 3	Beta-47928	EU 5	1110 ± 70 BP	1185 - 913 cal BP

Table 2-2. Radiocarbon dates from the st'ámes midden deposits calibrated using OxCal

Sample #	Laboratory #	Provenience	Standard Date	Calibrated Date (2 sigma)
RC 1	Beta-44549	EU 1	410 ± 50 BP	530 - 421 and 407 - 316 cal BP
26-4	Beta-103930	EU 26	450 ± 70 BP	559 - 314 cal BP
SQ 4	Beta-47929	EU 2	890 ± 80 BP	935 - 678 cal BP
RC 2	Beta-44596	EU 1	1240 ± 60 BP	1290 - 1053 cal BP
2-9	Beta-103927	EU 2	1360 ± 90 BP	1416 - 1063 cal BP

Dates from the midden reflect accumulation of deposits beginning roughly 300 years earlier than the earliest dates obtained from the housefloor. This may be indicative of a phase of occupation that pre-dated the establishment of the household. However, it is more likely that the correspondingly early housefloor levels have not been dated, or have not yet been excavated. Ultimately, the dates from *st'ám̓es* are indicative of long term consistent use of the site (figure 2-2).

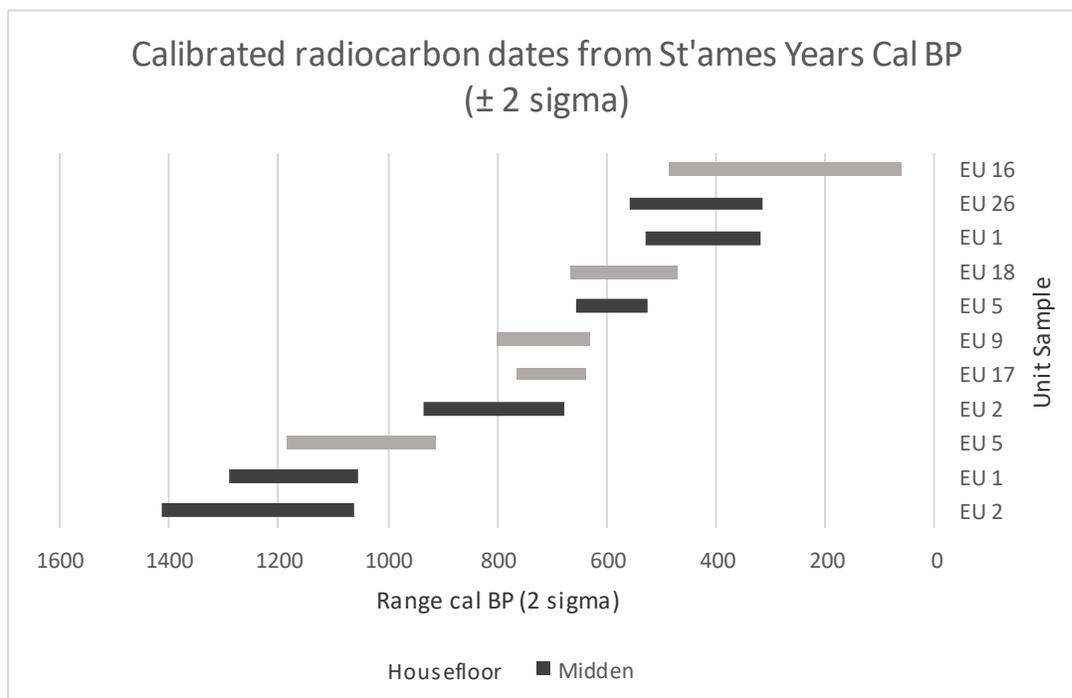


Figure 2-2. Calibrated Radiocarbon dates (2 sigma age estimation range) from *st'ám̓es* midden and housefloor units showing continuous occupation at the site from 1416 cal BP

2.3.3. Cultural Features at *st'ám̓es*

Over the course of the Arcas excavation, 220 cultural features were identified in the site housefloor deposits alone. Most of these were pole/stake moulds and post moulds, but there were also several features associated with fires (e.g. hearths and concentrations of FAR), and pit features (Arcas 998:194). This also includes two intrusive modern features suspected to be fence posts and three “unknown” cultural features that may be hearths. Within Trench 1A and 1B (Figure 2-3), 105 features were identified, including 10 pit features and 5 possible pits, some

of which could be post moulds. In Trench 2, most features were identified as pole/stake moulds, apart from a pit near the bottom of EU 27 that may have been associated with dog remains.

Midden deposits contained fewer cultural features than those associated with the housefloor. Only 5 features were identified in EU 1, two of which were conjoined pits in which at least two dogs were found. These are suspected to be deliberate burials. A feature in EU 12 contained at least three more dogs, which was interpreted as another possible example of ritual behaviour on the part of the inhabitants of the site (Arcas 1998:195). EU 2 contained five identified features (Figure 2-4), two of which were potentially modern pits, two of which were pole/stake moulds, and one post mould. Of all midden units, the largest number of cultural features were found in EU 26, which contained 6. These included one large pit, which contained the remains of at least two dogs.

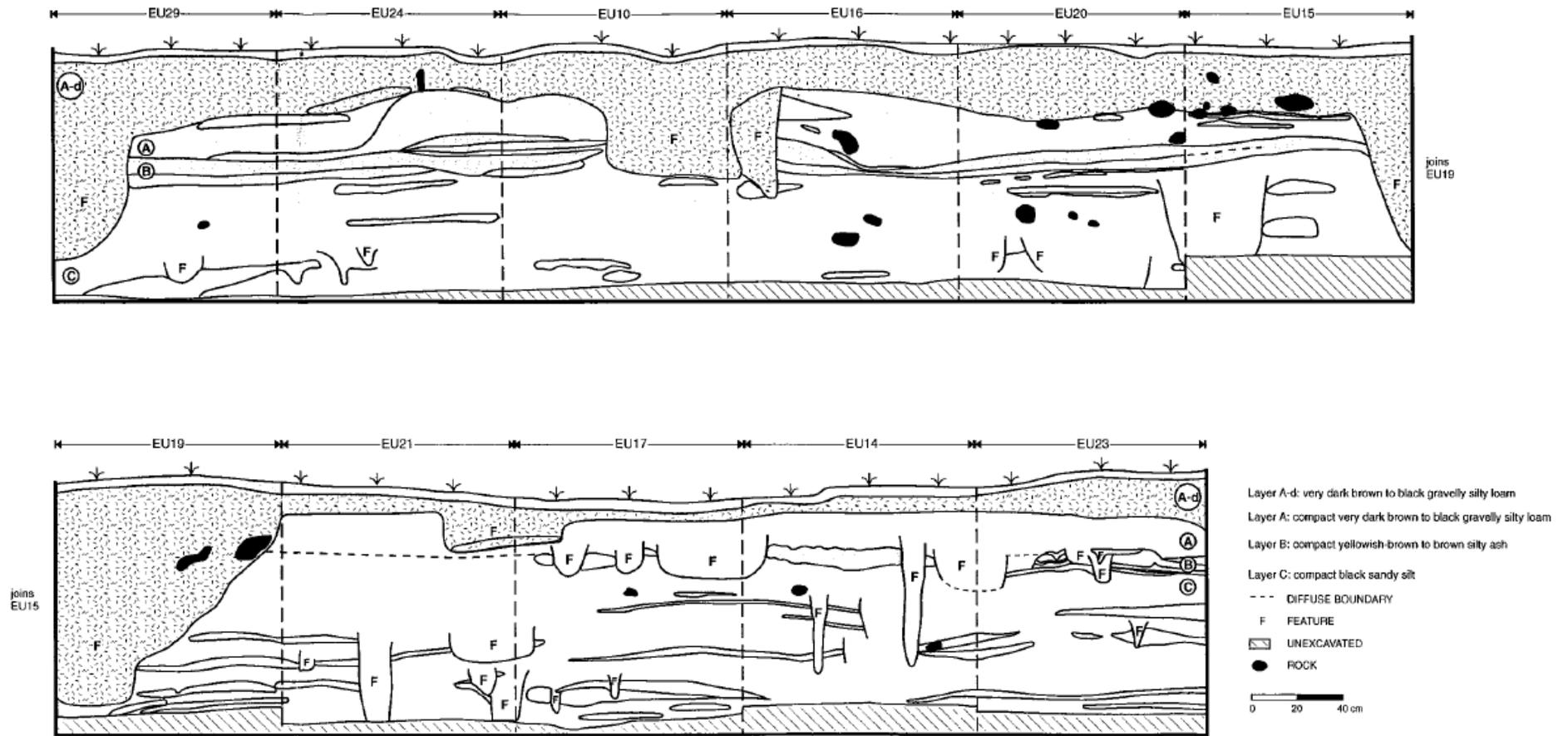


Figure 2-3. Stratigraphic profile of housefloor deposits in Trench 1a and 1b from st'ames (DkRs 6) excavation report (Arcas 1998)

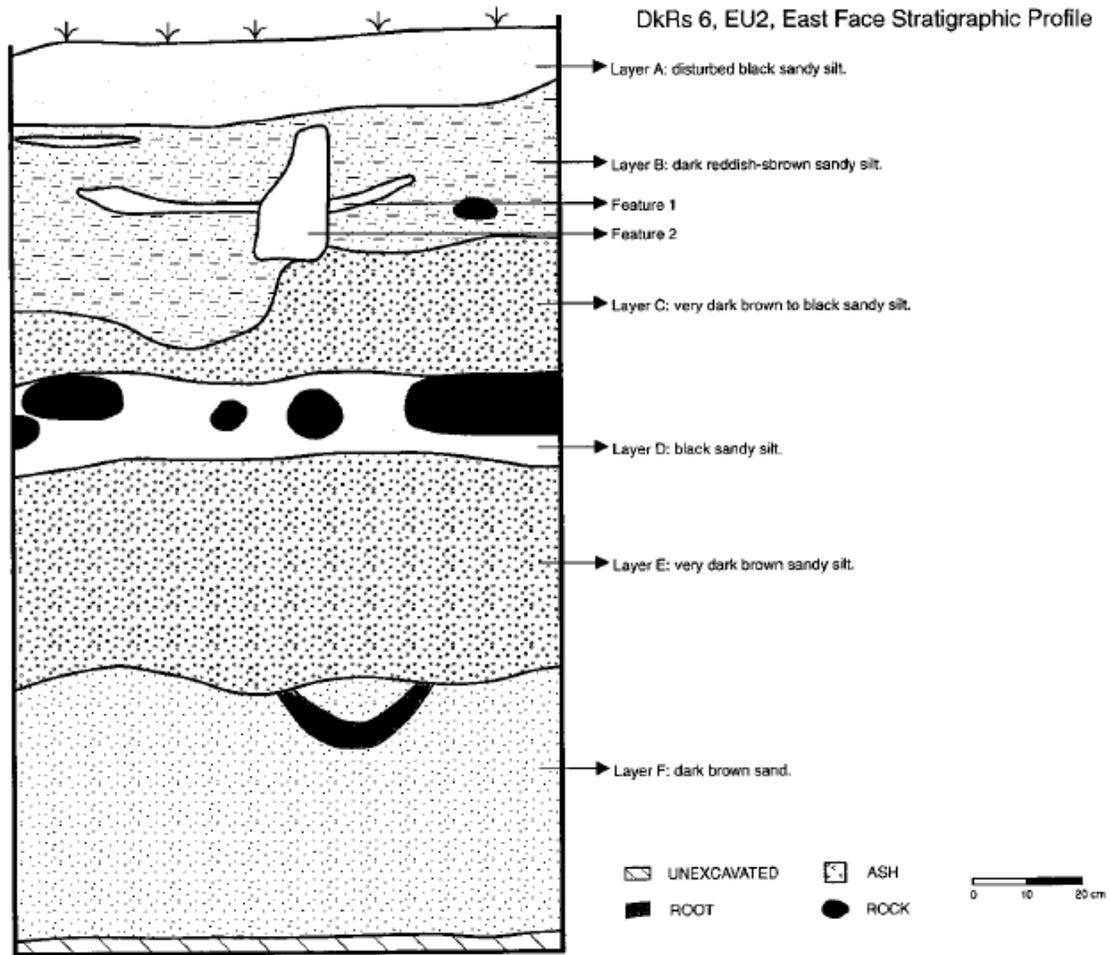


Figure 2-4. Stratigraphic profile of midden deposits in EU 2 from st'ames (DkRs 6) excavation report (Arcas 1998)

2.4. *St'ám̓es* Results from the Arcas Report

The *st'ám̓es* excavations yielded more than 14,000 vertebrate remains (bone, tooth, and antler fragments) and over 9,000 artifacts (stone, bone, and wood) from midden and housefloor deposits, which were analysed in Arcas laboratories for the Squamish Nation report. Fish, land mammals, and birds make up most of the faunal assemblage, while marine mammals and shellfish were found to be less common. The focus on marine resources (particularly anadromous fish) is consistent with expectations for a Salish Sea site of this age. However, the lack of shellfish and large sea mammals are uncommon for a Squamish village site, and may be explained by the scarcity of edible shellfish available in the otherwise rich environment at the head of Howe Sound (Arcas 1998:248). Ultimately, this initial analysis found that the assemblage reflects the diverse wildlife available near the site, and across a range of seasons of habitation that suggest a sedentary or semi-sedentary community.

A total of 16,627 artifacts were identified at *st'ám̓es*, distributed across all three areas of the site. These are primarily waste product from the production of chipped stone bifaces and show a focused manufacture of tools beginning around 4000 years BP. Although the highest density of which were recovered from the lithics workshop, a significant proportion of lithics were recovered from housefloor deposits. Overall, 7,738 artifacts came from housefloor deposits. Most were chipped stone, with only 50 tools identified as ground stone, bone or antler and only 9 of these being bone or antler. However, if one considers the significant volume of detritus formed by chipped stone tools, ground stone dominates the formed tools at the site. A wide variety of activities are represented by artifacts within housefloor contexts, including tool-making, hunting, woodworking, fishing, and manufacture of ground bone, stone, and antler tools (Arcas 1998:225). Artifacts recovered from housefloor contexts likely represent activities that occurred at this location.

In the midden, a total of 1,350 artifacts were identified, 9 of which were made of bone. Unlike the housefloor artifacts, these do not represent activities that occurred in-situ but elsewhere around the site, before reaching their ultimate disposal in the midden. As a result, most are broken or production rejects (Arcas 1998:226). Ground stone and

bone tools are present from the lowest levels of the site and increase in number over time, but like the housefloor the assemblage is dominated by chipped stone. Significant bone tools from the midden include two awls, two wedges/chisels, and a large dagger made from a whale rib. Due to its fragile nature and association with a galena nodule and several fragments of ochre, it is hypothesized that it represents a shaman's kit or ceremonial regalia (Arcas 1998:234).

Overall, the artifacts and faunal remains from *st'ám̓es* show a wide array of activities consistent with a sedentary or semi-sedentary village on the Salish Sea. While there are some differences in the activities represented between midden and housefloor deposits, overall one sees similar tool styles, raw material patterns, production methods, and radiocarbon dates. Moreover, the taxa identified in midden and housefloor deposits are broadly consistent, supporting the interpretation that the two areas are related (Arcas 1998: 251). Ultimately, the deposits reflect a series of traditional plank houses built at the site beginning around 1175 years BP while midden deposits show consistent use of the area up to 230 years earlier.

Chapter 3. Methods

In this chapter, I define how the faunal materials from the *st'ám̓es* assemblage were identified and analysed. I also establish how regional faunal assemblages were selected and standardized for purposes of comparison to the *st'ám̓es* collection.

3.1. Identification and Sampling

Prior to analysis in the Simon Fraser University zooarchaeology lab, a species list was constructed of taxa present in the region (based on Ministry of Sustainable Resource Management 2002) during the period in question to identify species, such as coyote, that are unlikely to appear in the assemblage (Ministry of Environment, Fish and Wildlife Branch 1980:2). A total of 14110 vertebrate specimens were recovered from 29 units in *st'ám̓es* midden and housefloor deposits, while no faunal materials were recovered from the lithics workshop located in EU 4. Due to the comparatively small assemblage, it was decided that to obtain the best possible representation of the midden and housefloor assemblages, all faunal materials from *st'ám̓es* should be analysed.

Once a baseline of species was constructed, faunal materials from level bags within each unit were sorted by taxonomic class, classified as bird, mammal or fish specimens. Those mammal remains that were identifiable to class and element but did not possess features permitting a more specific level of classification were recorded based on size (table 3-1). In the few cases where the class of a sample could not be determined, these were recorded as 'undetermined.' Only specimens that were identifiable to a specific element were further identified to a taxonomic category.

Table 3-1. Mammal categories used for faunal analysis of the *st'ámes* zooarchaeological assemblage, drawn from Arcas 1998(183)

Small Mammal	Smaller than <i>Canis sp.</i>
Medium mammal	Between <i>Canis sp.</i> (inclusive) and <i>Odocoileus</i> in size
Medium-large mammal	Between <i>Odocoileus</i> and <i>Cervus elaphus</i> in size
Large mammal	Larger than <i>Odocoileus sp.</i>

3.1.1. Identification Method

Identification of the *st'ámes* faunal assemblage was conducted in the Simon Fraser University zooarchaeology lab by visual comparison to the SFU faunal reference collection, and supplemented with faunal reference manuals (Cannon 1987, Miles 1990, Olsen 1973). Identification was based on size and morphological similarities between specimens (Reitz and Wing 2008). Specimens were only identified to a specific taxon when all other possibilities could be excluded through direct comparison to the reference collection (after Driver 1992). As a result, more general taxonomic categories such as Family or Order were used where specific identifications on the basis of size and morphology could not be assigned.

Where not identifiable to a formal taxonomic category, mammal specimens were documented as “small mammal” (smaller than *Canis sp.*), “medium mammal” (between *Canis sp.* and *Odocoileus* in size), and “large mammal” (larger than *Odocoileus*). Non-diagnostic mammal remains that were transitional between *Odocoileus* size range and larger were classified as “medium-large mammals.” Non-diagnostic avian elements were categorized as “small bird” (smaller than *Anas sp.*), “medium bird” (size range of *Anas sp.* inclusive) or “large bird” (larger than *Anas sp.*) Invertebrates were only identified to a level more specific than order where there were hinge fragments or entire shells present,

and were directly compared to specimens from the SFU faunal collection. However, as the *st'ám̓es* invertebrate assemblage is small and highly fragmented, this was a secondary priority.

For each mammal specimen identified, the element, side and part of the bone were recorded (after Driver 1985). The presence and location of burning were also noted, while the degree of weathering for each element was recorded with a number between 0 and 5 based on Behrensmeyer's scale (1978). Each specimen was then weighed and the NISP recorded, except for invertebrate remains, which were pooled and weighed by level rather than counted individually. Driver's skeletal part index (1985) was adjusted to classify fragmentation bird and fish bones in the assemblage. For all classes, any other modifications such as cut marks, carnivore gnaw marks, or notable breakages were noted separately. Further discussion of these observations follows.

3.1.2. Quantification

Each specimen in the *st'ám̓es* sample was counted and recorded. However, teeth were not counted individually where they were still attached or associated with an identifiable mandible. Number of Individual Specimens Present (NISP) was used as the primary means of quantification despite its well-documented limitations (e.g., Grayson 1984, Driver 1992). The most notable flaws of using NISP counts to represent a sample include inflation of the sample size because of a high degree of fragmentation (Klein and Cruz-Urbe 1984), over-representation of taxa with higher numbers of elements (Grayson 1979, Watson 1979), or over-representation of those that have higher recovery rates (Watson 1972). Nonetheless, as NISP counts are the primary data recorded for faunal assemblages at sites across the Northwest Coast, it is a useful tool to permit regional comparison of zooarchaeological data. NISP was therefore selected as the best method of basic quantification of the *st'ám̓es* fauna. Due to the potential for over-representation of certain taxa and inflation of sample size that are consequences of NISP counts, any statistical analysis conducted with these values may be unreliable and any apparent statistical significance is interpreted cautiously. To limit false identification

of statistical significance, statistical analysis based on regional data was largely limited to comparisons using basic descriptive statistics.

To facilitate inter- as well as intra-site comparison of species abundance, the relative abundance was calculated by dividing the NISP of each species by the total of each class present at the site. The Shannon Species Diversity Index was calculated for both midden and housefloor deposits to determine the heterogeneity of assemblages in these areas, and was then used to calculate the Shannon Index of Evenness. The Minimum number of Individuals (MNI) was calculated only in specific cases, namely that of specimens identified as *Canis* sp. or *Canis familiaris*, to obtain an estimate of the minimum number of individuals associated with midden and household deposits. It is calculated by pairing left and right elements based on NISP to determine the fewest possible individuals that could be represented in the assemblage (Grayson 1984). As MNI is derived from NISP values, the limitations associated with this method of quantification apply and it is unlikely to precisely represent the actual number of animals deposited at the site (Driver 1993).

3.2. Regional Comparison

To study how *st'ám̓es* compares to other sites in the Salish Sea, faunal data from four additional sites were examined (figure 3-1). While it would have been possible to examine the *st'ám̓es* sample in relation to sites from the Arcas survey of Howe Sound (1998), the faunal samples from these sites were not of comparable size to the *st'ám̓es* assemblage, primarily consisting of single units or test pits, and were identified as short term or temporary use sites (Arcas 1998). Rather, samples from several village sites were drawn upon to establish a baseline of the types of faunal assemblages found throughout the region. Port Hammond, British Camp, Dionisio Point and Cove Cliff were chosen because they allow a broader understanding of species present in archaeological assemblages on the Salish Sea, and how they may differ as a result of environmental, taphonomic, and social factors.

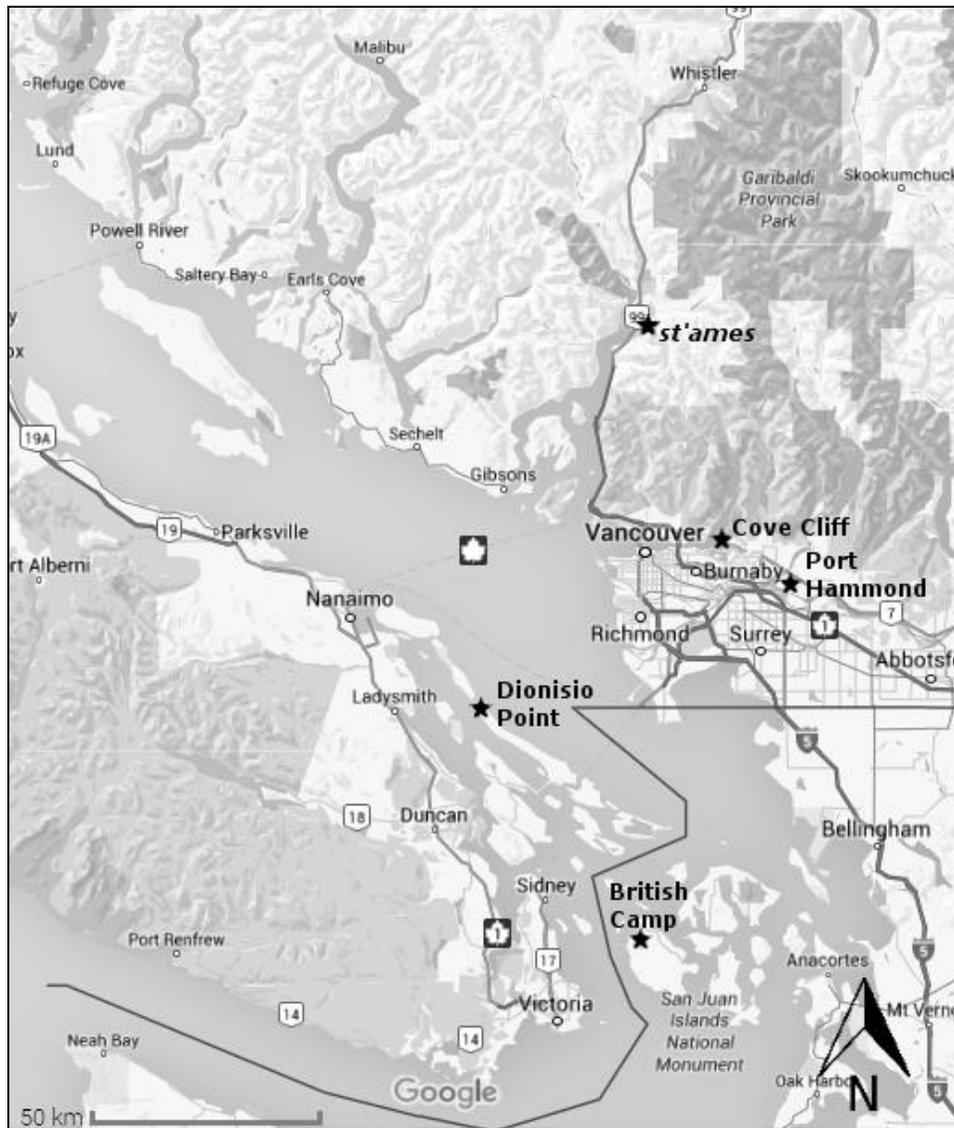


Figure 3-1. Regional map of select Salish Sea sites © Google 2016

Although the sizes of the faunal assemblages at Port Hammond, British Camp, Dionisio Point and Cove Cliff vary, they all originate from sites with a midden component. All four Salish Sea sites are either ethnographically recorded villages or show archaeological evidence of having been long-term habitation sites, despite differences of season of occupation, comparable to *st'ames*. Each assemblage is hypothesized to include a winter or spring habitation component, which minimizes differences in the sample based on differing seasonality resulting in different availability of species. The sites are in a

range of environmental or geographical contexts in the sheltered bays and inlets of the Salish Sea (table 3-2).

Table 3-2. Summary of the environmental and biogeoclimatic contexts of five Salish Sea sites

Site	Location	Context	Shore type	Climate Zone
<i>St'ámes</i>	Howe Sound	Marine Inlet	Rocky intertidal	CWH
Cove Cliff	Indian Arm	Marine Inlet	Cobble shore + sandy intertidal, mudflats	CWH
British Camp	San Juan Island	Marine Island	Rocky intertidal	CDF
Dionisio Point	Galiano Island	Marine Island	Sandy spit + rocky intertidal	CDF
Port Hammond	Fraser Lowland	Riverine	River Estuary	CWH

Each site has evidence of habitation over a similar period, containing Late Phase (1200 BP - 250 BP) deposits (Figure 3-2). This geographical range allows access to a similar variety of resources while providing a survey of possible differences over the Salish Sea region, with a sample that is spread throughout the region.

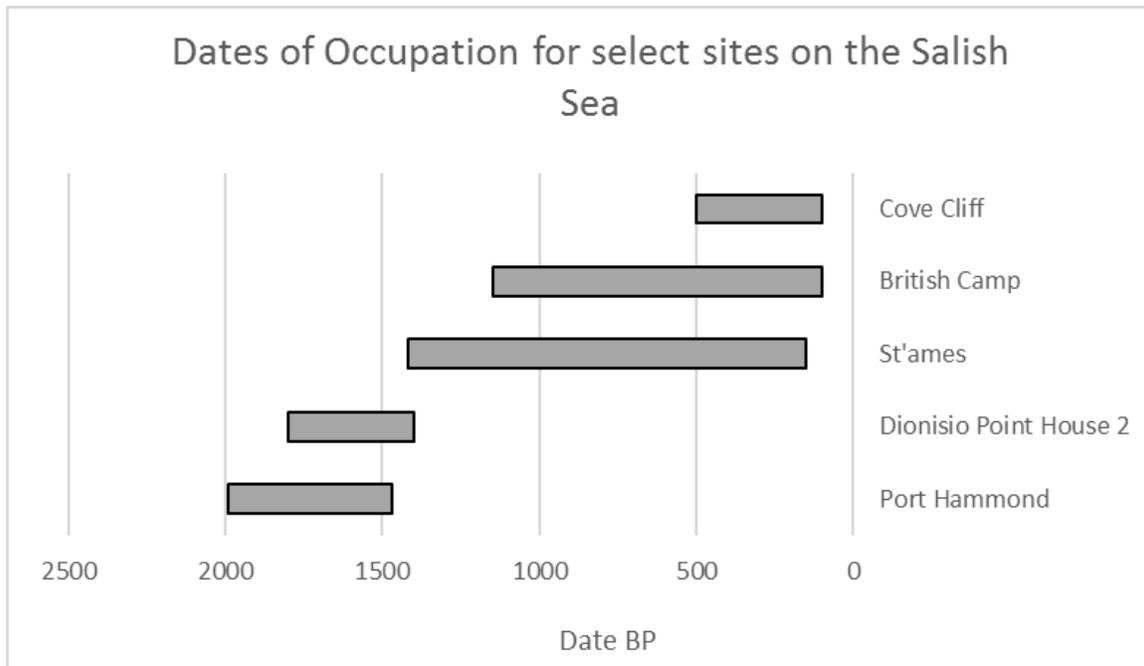


Figure 3-2. Dates from a select regional sample of sites, based on published data (Arcas 1998, Antiquus 2001, Pegg 1999, Ewonus 2006, Trost 2005)

Cove Cliff was selected because it, like *st'ámes*, was occupied beginning around 1300 BP until regular site occupation ceased around 200 BP. It is located on a sheltered inlet, with a shell midden and features that are thought to represent a small structure (Trost 2005). The extensive British Camp midden was deposited between 1500 to 200 BP, over a similar time range to the *st'ámes* midden, and provides an example of a larger assemblage from a bay in the Gulf Islands. While Dionisio Point is also situated in the Gulf Islands and thus occupies a different environmental zone than *st'ámes*, the House 2 assemblage from DgRv-3 was chosen for study because it provides an example of fauna associated explicitly with housefloor deposits (Ewonus 2006, Grier et al 2012) as well as a midden. Its use begins slightly earlier than other sites considered in this study with dates of the deposits centering around 1500 BP. In contrast, Port Hammond provides an example of a riverine site, located on the lower Fraser River (Antiquus 2001). Based on artifacts, dates at Port Hammond range between 2000 to 1500 BP, the oldest site in the study, but like Dionisio Point, overlaps with the earlier Late Phase that is represented at all five sites.

3.2.1. Archaeological context of select Salish Sea Sites

Cove Cliff (DhRr 18), Burrard Inlet

Cove Cliff, also known as Say-umiton, is in the Burrard Inlet-Indian Arm locality of British Columbia, which is traditionally Halkomelem-speaking Coast Salish territory. The site's boundaries are found in what is now Strathcona Park and adjacent house lots. Like Howe Sound, little archaeology has been done in this inlet region until this site was excavated in 2000 as part of a joint project of Simon Fraser University and Tsleil-Waututh nation (Trost 2005). It is a large shell midden with several human burials that suggest association with a larger village at some point in its history (Trost 2005:17). While oral historical records indicate that it was used as a short-term shell-fishing camp (Trost 2005:17), cultural deposits stretch 200m along the shore and 100m inland, with a midden as deep as 1.2m in places, indicating that at some point in Cove Cliff's history it provided longer term habitation.

During the 2000 excavation, a series of overlapping surfaces were uncovered, including a 12m by 6m area thought to be the remains of a small structure. Materials of both the interior and exterior deposits of the proposed structure were extensively sampled with the goal of identifying activity areas. Excavation was done in arbitrary 10 cm levels, grouped within larger stratigraphic levels (Trost 2005:25). Faunal materials were collected by hand, by screening sediments, and by flotation of matrix samples, all of which were screened using ¼" mesh (6mm) and identified in the lab. Although the possibility of winter occupation was not excluded based on current evidence, archaeobotanical analysis and a survey of seasonal growth rings of bivalve shells indicate that the site was likely used mid-summer to early fall (Trost 2005, Lepofsky and Karpiak 2001:61:62). Direct radiocarbon dates were not obtained, however the material culture recovered from Cove Cliff is typical of a Late Phase site, including toggling harpoon heads, antler wedges, grinding slab, groundstone point, and a small side-notched projectile point identified during lithics analysis. This means that site use likely occurred began around 1300 BP and because of logging and urban development in the region, it appears that regular use of the land stopped by the late 1800s (Trost 2005:24).

British Camp, San Juan Island

British Camp is an ancient shell midden located on the Western side of San Juan Island, Washington. The midden is over 4 m deep in places, covering more than 300 m along the shoreline of what is now called Garrison Bay. In the more recent past, it is likely that First Nations communities of the area around British Camp would have spoken a dialect of the Northern Straits Salish language (Thompson and Kinkade 1990:32), and based on traditional territories may have been affiliated with Saanich, Songish, or Lummi historic groups (Pegg 1999:14). Lummi oral traditions identify the site as one of their winter villages (Suttles 1974:36). Between 1859 and 1872 the island was occupied by a British garrison during a dispute with the United States over the islands that gave the site its name, and as a result the earlier shell midden was significantly disturbed. The climate today is drier and warmer than adjacent mainland sites, which influences the range of resources available.

British Camp has a long history of archaeological investigation beginning in the 1950s followed by a study of the historical occupation during the 1970s. Between 1983 and 1989 the pre-contact component of the site was excavated as part of a University of Washington field school led by Julie Stein, which focused on a 6 x 8 m area excavation on the shore of Garrison Bay, called "Operation A" (Pegg 1999). Since the end of the project, numerous studies have been conducted on the shell midden (Stein 1992, Stein et al 1992, Ford 1992, Pegg 1999). Over the project's duration, 72 m³ of midden were excavated and sediments were water-screened through nested screens of 1" to 1/8" (25 to 3mm) mesh. Radiocarbon dating of the excavated area suggest that the majority of the midden was deposited between 1500 to 200 BP (AD 500 to the early 1800s), with calibrated radiocarbon dates ranging between 1730 and 64 ya (Pegg 1999:16) that show site use in both the Marpole Phase (400 BC to AD 1250) and the San Juan Phase (AD 1250 to early 1800s). Faunal materials recovered from the larger screens (15 and 13 mm) were sorted in the field while the smaller screens (6 and 3mm) were sorted in the lab. Archaeofauna recovered in the field was bagged separately from other midden materials and weighed before further analysis.

Dionisio Point, Galiano Island

Dionisio Point is a village site situated at the northern end of Galiano Island, one of the Southern Gulf Islands south east of Vancouver Island in the Strait of Georgia (Ewonus 2006, Grier 2003, Grier 2006, Grier et al. 2012) and ethnographically falls within Central Coast Salish territory. It lies in the rain shadow of Vancouver Island, which makes it drier than the nearby mainland and the resulting local forest cover is dominated by Douglas Fir, while the climate is characterized by minimal precipitation and moderate temperatures. The site itself is located on the eastern side of a small bay, and includes five large house deposits set behind the eastern-most of two beaches within the bay. The landscape is defined by a small point to the east, and a small gravel beach to the west onto which part of the site extends (Ewonus 2006:11). It is not known whether or not the houses were occupied contemporaneously and for this reason, the House 2 assemblage was the focus of my comparison.

The site was initially surveyed in the 1970s, and following this House 2 was selected for a more intensive study (Grier 2006). Further excavations focusing on this area began in 1998, creating eleven parallel trenches of 2x2 m units throughout House 2 to link all key areas and provide an extensive sample of the interior and exterior deposits. A total of 77m² of the 200m² of house deposits were excavated to non-cultural sediments (Ewonus 2006). Sediments from House 2 were screened through 1/8" (3mm) wire mesh for recovery of small artifacts and fauna. This excavation revealed that the site may have been the focus of seasonal activities beginning in the spring, as the faunal assemblage is dominated by fish with an emphasis on herring (Ewonus 2006: 23). Other interpretations (Grier 2006, Grier and Lukowski 2012) suggest that Dionisio Point may have been a winter village based on aDNA analysis of salmon remains. Detailed faunal analysis was based on four levels from house 2 (A, B, C, and D) with a focus on layers B and C (Ewonus 2006:29) as site use decreased during layer A. Radiocarbon dates suggest a period of possible house use between AD 80-680 for House 2, with all dates centering around 1500 BP (cal AD 500), although it is unknown whether the occupation was intermittent or continuous.

Port Hammond (DhRp 17)

The site of Port Hammond is a shell midden situated on the northern bank of the Fraser River in the part of the Fraser Lowlands now known as Pitt Meadows, 10 km upstream of confluence of the Pitt River (Rousseau et al. 2003). It falls within the traditional territory of the Katzie First Nation, a Central Coast Salish group speaking a mainland Halkomelem dialect. Today Port Hammond is located on a well-defined river terrace with southern exposure and long views both up and down the river. The site was recorded early in the history of British Columbia archaeology, documented as far back as publications in 1895 by Charles Hill-Tout. Further research was conducted between 1897-1907, before the site underwent the extensive industrial development that characterizes it today.

The most recent excavations were conducted in 2000 by Antiquus (Antiquus 2001) as part of a management project for International Forest Products Hammond Cedar Mill, which has built on much of the site and thus impacted the midden deposits significantly. Moreover, road construction and residential activities have affected site integrity meaning that intact deposits are only found below this impacted zone. Cultural deposits encountered in the course of monitoring were excavated in trenches by 10-15cm levels with a backhoe, then systematically sorted by hand and trowel. For artifacts that were found in situ, the exact locations were recorded, while backdirt was water-screened using ¼" (6mm) mesh on Katzie reserve by community members to recover artifacts that were not identified onsite (Rousseau et al 2003:90). Faunal remains were collected during monitoring and identified to the most specific category possible by use of direct comparison reference collections, as well as osteological manuals and species list (Antiquus 2001:48). Further analysis of artifacts suggests that site dates to the Marpole phase (400 BC to AD 1250) and radiocarbon dates of cultural deposits support this, with dates ranging between 1500-2000 BP (cal AD 0-500). Analysis of faunal remains from Port Hammond show a dominance of herring (spawning in late winter to early spring) and eulachon (spawning March to May) which suggests that the site was most likely occupied primarily during spring.

3.2.2. Quantification and Standardization of Regional Sites

Reported NISP values from sites on the Salish Sea were analysed to study abundance of species. In order to compare the *st'ámes* assemblage with these other sites it was necessary to standardize faunal data and the relative abundance of taxa at each site was calculated from these NISP values, based on publications (Pegg 1999, Antiquus 2001, Trost 2005, Ewonus 2006). Inferential statistical analysis of these values was not attempted, as differences in methods of identification lead to variable results between sites, which makes relative abundance (%NISP) the most useful method of comparison.

In several cases, categories were combined from more specific genus or species identifications into broader family identifications to be consistent with *st'ámes* data and species counts were adjusted accordingly. This was necessary particularly in the case of birds where more specific identifications such as Merganser or Mallard were collapsed into the broader category of 'ducks' (*Anas* sp.). Similarly, fish that were not identified at *st'ámes* but fit into broader categories used at the site were combined. No categories of mammal taxa were combined as they were less abundant than fish at most of the sites considered in this study and differences observed were important in analysis. Likewise, few fish taxa were combined as most differences between the assemblages could be based on environmental factors or social factors, as opposed to specificity of identification. Where only scientific names were used, the categories were standardized to common names to make presentation of results consistent between sites.

3.3. Radiocarbon Dating and Stable Isotope Analysis at *st'ámes*

Following identification of elements at *st'ámes*, a sample of eight *Canis familiaris* bones were removed from the assemblage for more detailed analysis, to contribute to the growing field of research exploring the domestication and relationships of dogs with humans on the NWC (e.g., Ames et al. 2015, Barta 2006, Cannon 1999, Crockford 1997, Zimmerman 2014). Two bones were taken each from EU 12 Level 9 (midden),

and EU 23 Level 10 (housefloor), while four bones were selected from two quadrants of EU 1 Level 13 (midden), which had the highest concentration of canid remains. The samples from each of these contexts were associated with pit features that suggest they may have been deliberate interments. One bone from each of these areas was selected for ancient DNA (aDNA) analysis by Dongya Yang and Thomas Royle of Simon Fraser University aDNA labs, for a total aDNA sample of four. This included three samples from the midden and one from the housefloor, with the goal of comparing dogs located in burial contexts from both midden and housefloor deposits to see whether it is possible to identify them as wool or village dogs. These samples were decontaminated using methods described by Yang et al. (2008) before DNA was extracted from the samples using modified silica-spin column methods (Yang et al. 1998, 2008) for the remains to be haplotyped, by amplifying a fragment of the mitochondrial control region using two overlapping primers. A phylogenetic analysis was then conducted to identify the evolutionary relationship of the *st'ámes* dogs to other canids on the NWC (Royle 2016).

The other four bones from these contexts were submitted for radiocarbon dating as well as stable carbon- and nitrogen isotope analysis by Beta Analytic laboratories to see whether there are any notable differences in diet or age of remains. If ethnographic sources and oral histories related to the keeping of wool dogs are correct, one expects to see distinctions between woolly dogs, which were kept separately from the general dog population by women and highly valued (Schwartz 1997, Barnett 1955, Solazzo et al. 2011), and hunting (village) dogs, highly valued for their abilities in hunting deer (Bouchard and Kennedy 1976a:11, Howay 1918).

3.4. Analysis

To study the resource use at *st'ámes*, species counts, weights, and relative abundance were considered. At the most basic level, quantification of faunal remains at archaeological sites is useful for the study of subsistence practices via the richness and evenness of species present. This in turn offers information about how people lived at the site and interacted with their environment: the animals hunted or fished, resource specialization, and how much particular species contributed to diet. Moreover, faunal

data can indicate what environments people exploited, the season of a site's use, and at times past availability of certain resources (e.g. Hanson 1991, McKechnie 2014, 2007, McKechnie et al 2013, Moss and Cannon 2011). All of these factors are important for understanding how people interacted with their environments in the past, in addition to the ways they provide for themselves.

At *st'ámes*, a full site summary was conducted to determine which species are most common overall and the implications thereof. Richness and evenness were studied to determine the roles played by the most significant fish, birds and mammals in subsistence. This foundation makes it possible to conduct an inter-site comparison to determine how the *st'ámes* faunal assemblage relates to other sites in the region of similar age, and whether the data reflects overarching patterns of Central Coast Salish resource use that may allow insight into social significance of species at *st'ámes*.

3.4.1. Analysis of house vs. midden deposits

Spatial analysis of faunal remains from in midden and household contexts at *st'ámes* was conducted to assess patterns of use. In addition to highlighting distribution, processing, and discard of fauna, this also has the potential to highlight social dynamics of resource use, as the household is traditionally the center of ritual activity (Barnett 1955). It is a place where resources are processed and actively consumed. Moreover, the household is a center of identity, associated with daily practices that can redefine or create frameworks of status and power that influence social relationships (Lepofsky et al. 2009:597). When considered considering regional trends and ethnographic records, this may reflect differing levels of social significance accorded to different animals. To do so, several factors are compared: richness and evenness of taxa, level of weathering, degree of fragmentation, burn levels, parts, and elements represented at each locale. The specific applications of each of these factors to analysis of social significance are discussed below.

Richness and evenness

The richness of fauna in an assemblage is defined as the number of mutually exclusive taxa in a sample (Kintigh 1984, McCartney and Glass 1990) and is a useful indicator of what species were being used at a site. Evenness, on the other hand, is defined as the relative abundance of taxa at a site. I first calculated the heterogeneity of the assemblage using Shannon's H ($H = -\sum P_i(\log P_i)$) where P_i is the proportion of a taxon in the assemblage (Shannon and Weaver 1949). Shannon's H calculates the diversity of an assemblage and typically ranges between values of 0.01 to 1.10 in faunal assemblages, with greater heterogeneity reflected in higher values (Lyman 2008:192).

I then used this value to calculate the Shannon Index of Evenness ($e = H/\log S$) where H is the Shannon Diversity value and S is the taxonomic richness. This Index reflects the evenness at the site, in which values fall between 0 to 1, where a value of 1 would indicate complete evenness of distribution of taxa at the site (Lyman 2008, Lepofsky and Lertzmann 2005, Mitchell et al. 2016). The measure of diversity considers both richness and an estimate of evenness of taxa, which is useful for intra-site analysis by allowing one to conduct a spatial comparison of whether the taxa present in midden and housefloor contexts differed and to what degree. For this purpose, the richness of the *st'ármes* midden and housefloor assemblages were plotted against a Monte Carlo simulation from the pooled site assemblage to estimate the expected richness of the site.

Weathering

Weathering of faunal remains occurs because of exposure to the elements that influence the preservation and condition of bone, foremost among these being wind and water, in addition to other taphonomic factors such as soil pH. Based on Behrensmeyer (1978), the degree of weathering on each faunal specimen was documented on a scale from 0 to 5 (see Table 3-3). The proportions of each category present in midden and housefloor contexts are used to compare potentially differing treatment of remains at each locale by their condition.

Table 3-3. Weathering Stages of archaeological bone (Behrensmeier 1978)

Stage 0	No evidence of weathering: fresh, unaltered bone; may still be greasy.
Stage 1	Bone surface shows fine cracks, often parallel to fiber structure.
Stage 2	Some flaking of outermost bone layers with angular crack edges.
Stage 3	Surface of bone shows rough cracks with fibrous patches of texture, and rounded crack edges
Stage 4	Coarsely fibrous surface with deep cracks that penetrate into inner bone, splintered edges that may break off if bone moved.
Stage 5	Bone is very fragile with many splinters and very deep cracks, original shape difficult to determine.

Intensity of Burning

As the colour of burned bone often correlates to temperature, type and duration of heating (Orton 2012), vertebrate specimens from *st'ámes* were analysed to determine whether they were burned. Where specimens were found to be burned, both colour and location were recorded. Burned bone was classified as black, grey, brown, or white. Bones that did not show any clear traces of burning were recorded as unburned. Blackened bone indicates burning for a moderate length of time at relatively low temperatures while grey and white (calcined) bone indicates progressively longer duration of burning or hotter temperatures (Nicholson 1993, Stiner et al. 1994). It is

important to note that apparently unburned bone is not necessarily reflective of lack of cooking, nor does the presence of burning indicate certain cooking (Bennett 1999). Other depositional processes may be responsible (Orton 2012). Proportions of each level of burning were contrasted spatially and further compared between species and elements to analyse potential patterns of treatment in midden and household assemblages.

Fragmentation

Fragmentation indicates how much of an element is present. This was documented based on Driver's coding system for the mammalian skeleton (1985), with numbers from 1 to 8 corresponding to the part of the element that is present. According to this scale, one represents a whole element while 8 represents a shaft fragment (Driver 1985). Different element categories apply this coding system to different parts based on bone type (e.g. vertebrae vs. longbones vs. crania) and thus it is difficult to standardize these values across elements, a factor that has been considered in analysis. The scale has been modified by the addition of '10' to reflect unidentifiable fragments in addition to the adjustment of standard part indices to reflect fragmentation of fish and bird bones. The degree of fragmentation in an assemblage may be reflective of processing as well as post-depositional processes, and as such the average level of fragmentation is compared between midden and household assemblages.

Elements

Each specimen was identified to a skeletal element and sided after comparison to SFU reference collections. Where the specific element could not be determined, general element designations such as 'vertebrae fragment' or 'tooth fragment' were used. In some cases, the specimens were too fragmented to be identified beyond class, and these were recorded as 'unknown.' These elemental identifications contributed to an understanding of human usage of animal resources at the site through comparison of regional patterns of part frequencies with the observed frequency at st'ámes. As taphonomic factors have a significant influence on the preservation of certain elements

in the record, the frequency of skeletal parts present in an assemblage may not be directly indicative of peoples' uses of certain elements at the site.

Other modifications

Where present, cultural modifications such as cutmarks or saw marks were noted for each specimen in addition to post-depositional alterations such as carnivore or rodent gnawing. Cutmarks were not analysed to determine whether the marks were made by metal or stone tools, nor was whether these modifications were for food processing or artifact manufacture. While complete bone tools recovered from the site are not considered as part of the faunal assemblage, they are assessed considering significance. Cultural modifications provide an opportunity to directly view post-death treatment of faunal remains and whether a specimen was used in subsistence practices or for other purposes. However, absence of cut marks does not mean absence of use or processing for subsistence, a fact that is considered in analysis.

3.4.2. Regional Analysis

To analyse how the use of fauna at *st'ámes* compares to other sites in the region, I considered the richness and evenness of faunal remains present, degree of specialization, and skeletal part or element representation at each locale where data was available.

Richness – The foremost index considered when comparing the *st'ámes* assemblage to the samples from other Salish Sea sites is richness, or number of individual taxa present at each, by constructing species accumulation curves for each site. Considering regional patterns of presence and absence of species, abundance, and site use allows one to analyse how *st'ámes*' faunal assemblage reflects (or does not reflect) these patterns. As well as social factors, such as preferences (e.g. Ewonus 2006), differences may reflect variations in site use, seasonality, accessible resources and environmental context. Factors that may be unique to the social significance of animals at *st'ámes* are highlighted against a regional backdrop.

Evenness – Considering differences in how taxa were distributed across these Salish Sea sites, evenness was evaluated for each. This reflects the degree to which an assemblage is dominated by particular species, and is correspondingly demonstrative of specialization (Lepofsky and Lyons 2003:1361). Such specialization is an indicator of to what extent people focused on procurement of certain taxa, whether they obtained many of few essential species or lower numbers of a wider variety, which allows insight into the significance of animals in each location. Site specialization was determined for the overall assemblage of each site by calculating the heterogeneity of each site using Shannon's H (Shannon and Weaver 1949), which was then used to calculate the Shannon Index of Evenness as described above. In a population where all classes are distributed with perfect evenness, the Shannon Index of evenness would be equal to 1, and would reflect a site with no notable specialization, while a value closer to 0 reflects focus on fewer abundant taxa (Lyman 2008).

Element Representation – As many of the site reports do not feature spatial distinction in their presentation of numbers of taxa or their abundance, other measures are necessary to assess how the faunal assemblage at *st'ám̓es* relates to the regional sample. Levels of burning, elements present, cultural modifications such as cut marks, and non-cultural modifications such as carnivore gnawing provide evidence of how species were used and in some cases post-procurement treatment. Wider patterns throughout sites on the Salish sea are also contrasted with the *st'ám̓es* assemblage to determine whether similar trends are reflected, such as the overabundance of wing bones in bird assemblages when compared to leg bones, a pattern that has been documented across the Northwest Coast (Bovy 2012, Schalk 1993). Since studies have shown this is unlikely to be due to differential preservation of wing elements compared to leg elements, other factors may be at play (Bovy 2012), and these may have implications for species use. Other patterns of element representation that have been noted include an abundance of artiodactyl foot bones that may be due to processing in the field (Trost 2005, Charlton 1974, Hanson 1991).

These factors contribute to understanding to what extent the fauna present at *st'ám̓es* reflect regional patterns of species use and the social dynamics that they represent.

Chapter 4.

Results

A total of 14110 vertebrate specimens were collected and analysed from all units at *st'ám̓es* with the exception of EU 4, the lithics workshop, in which no faunal materials were present. The total weight of the vertebrate assemblage was 5963.46 g. Of this assemblage, 42.3% was identifiable to order or greater, while 56.7% of the assemblage were identified to class (Mammal, Fish or Bird). The remaining 1% of the assemblage was classified as unidentifiable remains, which could belong to either birds or mammals. Overall, while the faunal assemblage from *st'ám̓es* is not as large as some Salish Sea Sites, the number of specimens identified is high enough to permit comparison with sites of similar age and environment on the Salish Sea.

4.1. Taphonomic factors influencing interpretation

As taphonomy influences cultural deposits, it is necessary to evaluate the extent to which the *st'ám̓es* assemblage has been affected by taphonomic processes before one can draw conclusions about spatial distribution and cultural modification of remains (Orton 2012). As a number of factors such as modern house construction and the construction of roads and underground services have impacted the archaeological site of *st'ám̓es*, the deposits excavated between 1991-1994 were found to have varying levels of disturbance (Arcas 1998). Some parts of the site were covered by dredging from the Mamquam Blind Channel during the first half of the twentieth century, and in some places redeposited dredge sediments are up to 200cm deep. In addition, parts of the site were covered by sawdust during the early 1960s as part of a plan to increase the land elevation at the modern site to decrease flooding.

During excavations, two units from within the house were noted to contain significantly disturbed cultural deposits (EUs 3 and 9), however variable levels of disturbance were found to be present throughout Trench 1a (EUs 5, 10, 16, 20, 24, 29) and Trench 1b (EUs 14, 15, 17, 19, 21, 23). Recent disturbances ranged between 15 cm to 100cm deep but on average were limited to the upper 30 cm of housefloor deposits. Cultural deposits in Trench 2 were impacted by modern waterline, and thus any cultural deposits below this level were not excavated. Midden deposits in EUs 1, 2, 11, 12 and 26 showed similar levels of modern disturbance as those of the house, up to depths of 40cm below surface. While most pit features in the midden did not show evidence of modern intrusion, two pit features in EU 1 contained industrial artifacts at 70 cm below surface. EU 2 also contained two pits that may have been of modern origin but did not have artifacts associated. Most of the cultural features identified were not associated with fauna, with the exception of several pits in the midden associated with canid elements thought to represent intentional interment. Modern faunal specimens such as domestic cattle, or specimens showing cut marks from modern saws or metal tools, were located primarily within the first two levels (between 0-30cm below surface) in midden and housefloor deposits. Few post-contact species were identified among elements from below 70 cm below surface outside of disturbances otherwise noted by the excavators.

In addition to human disturbances, animals may also influence the distribution of remains. No rodent burrows and few rodent remains identified in the faunal assemblage reflect limited disturbance from these agents. However, the presence of dogs at *st'ámes* is confirmed by the abundance of canid remains in deposits. Carnivores may have a significant influence on the distribution of faunal remains at a site and carnivore gnaw marks are present on several specimens throughout the assemblage, including some canid remains.

4.2. Assumptions

Unless disturbances were apparent in a unit, it was assumed that materials were found near their place of deposition by past human or animal activities. Therefore, it is assumed that whether a specimen is found in midden or housefloor contexts is more

likely a reflection of cultural activities than natural. However, for deposits up to 30 cm below surface, greater levels of disturbance are shown and thus *Canis sp.* or large artiodactyl remains are not identified to species level. Due to internal mixing of layers in some cases, cultural layers were interpreted with caution and not taken to represent chronological periods except where radiocarbon dates support this interpretation. As changes through time are not a goal in this study, arbitrary levels are used as reference. These are based on excavation technique rather than cultural distinctions, but do not reflect whether artifacts or faunal specimens may have occurred together in the past as they may incorporate multiple layers. Moreover, some consistency is assumed in social practices, particularly with regards to the significance of animals at *st'ám̓es*, between ethnohistoric accounts and pre-contact communities. The difficulties of this approach are well documented (e.g., Grier 2006).

Based on the species list assembled prior to identification and knowledge of species in Howe Sound during the relevant time period, certain factors influence the identification of species during lab analysis. In the case of *Canis sp.*, oral histories, skeletal data, and historical data indicate that coyotes were not present in the Salish Sea region until the late nineteenth and early twentieth century when their range expanded (Ministry of Environment, Fish and Wildlife Branch 1980:2). Consequently, small canids in the lower levels of the faunal assemblage are unlikely to be coyote remains, and are thus assumed to be domestic dog. As other modern taxa such as cattle are present in upper levels, however, this does not eliminate the possibility of their presence.

4.3. Identification and quantification of the faunal assemblage

Despite the long and continuous history of habitation at *st'ám̓es*, initial examination of the faunal assemblage reveals that the site stratigraphy is not conducive to chronological analysis. The assemblage is too small to permit detailed comparison across layers, with the exception of documented features, as layers were classified differently between 1991 and 1994 excavations, and arbitrary levels reflect little of cultural deposition. Rather, deposits were classified as belonging to housefloor or

belonging to the midden, both of which reveal patterns in resource use and social significance by the former occupants of *st'ármes*.

Of the 14110 vertebrate specimens analysed across the whole site, 5367 of them were identified as mammal, 612 were identified as avian, and 8063 were identified as fish (see tables 4-1 through 4-3). A small sample, 68 bone fragments in total, were unidentifiable to class. Of those identified overall, 804 (18.5%) mammal remains were of identifiable element, in comparison to 101 (16.5%) bird remains and 5118 (63.5%) fish, which were then compared to specimens from the SFU comparative faunal collection in order to identify taxa. The low level of identification of the *st'ármes* bird and mammal assemblages is due to a high degree of fragmentation of remains compared to the fish assemblage, which is dominated by vertebrae.

Table 4-1. Mammal taxa present in midden and housefloor deposits at st'ámes by NISP

Taxon	Common Name	Midden	Housefloor	Total
Rodentia				
<i>Castor canadensis</i>	Beaver	4	2	6
<i>Rattus rattus</i>	Rat	0	1	1
Carnivora				
<i>Canis familiaris</i>	Domestic Dog	486	27	513
<i>Canis lupus</i>	Wolf	0	1	1
<i>Canis sp.</i>	Dog, coyote, or wolf	70	70	140
<i>Martes sp.</i>	Marten	2	0	2
<i>Mustela sp.</i>	Mink	0	3	3
<i>Ursus americanus</i>	Black Bear	2	1	3
Medium carnivore	Dog-sized carnivore	0	1	1
Pinnipedia				
<i>Phoca vitulina</i>	Harbour seal	2	0	2
Phocidae	Seal	2	2	4
Cetacea				
<i>Delphinidae</i>	Dolphin or porpoise	0	3	3
Artiodactyla				
<i>Bos taurus</i>	Domestic cow	2	2	4
<i>Oreamnus americanus</i>	Mountain goat	0	1	1
<i>Odocoileus</i>	Deer	31	64	95
Artiodactyl	Even-toed ungulate	6	13	19
Medium artiodactyl	Deer-sized	0	2	2
Large artiodactyl	Larger than deer	0	3	3
Miscellaneous				
Sea mammal		2	2	4
Small mammal	Smaller than dog	1	0	1
Medium mammal	Dog to deer-sized	28	42	70
Large mammal	Larger than deer	39	28	67
Totals		677	268	945

Table 4-2. Fish taxa present in midden and housefloor deposits at *st'ámés* by NISP

Taxon	Common Name	Midden	Housefloor	Total
Squaliformes				
<i>Squalus acanthus</i>	Spiny Dogfish	45	30	75
Chimaeriformes				
<i>Hydrolagus spp.</i>	Ratfish	0	1	1
Clupeiformes				
<i>Clupea pallasii</i>	Pacific Herring	473	615	1088
Osmeriformes				
<i>Theleichthys pacificus</i>	Eulachon	0	72	72
Salmoniformes				
<i>Oncorhynchus</i>	Pacific Salmon	1547	1277	2824
Gadiformes				
<i>Gadus macrocephalus</i>	Pacific cod	93	409	502
<i>Theragra chalcogramma</i>	Alaska Pollock	56	209	265
Batrachoidiformes				
	Plainfin			
<i>Porichthys notatus</i>	Midshipman	7	55	62
Perciformes				
Embiotocidae	Surfperches	0	16	16
Scorpaeniformes				
Cottidae	Sculpins	5	5	10
Sebastes	Rockfish	6	6	12
Hexagrammos	Greenling	5	23	28
Pleuronectiformes				
Pleuronectidae	Flounders	59	104	163
Totals		2296	2822	5118

Table 4-3. Avian taxa present in midden and housefloor deposits at *st'ám̓es* by NISP

Taxon	Common Name	Midden	Housefloor	Total
Podicipediformes				
Podicipedidae	Grebes	0	1	1
Anseriformes				
<i>Anas sp.</i>	Ducks	21	54	75
Anatidae (geese)	Geese	0	1	1
Falconiformes				
<i>Haliaeetus leucocephalus</i>	Bald Eagle	1	5	6
Falconidae	Falcon or hawk	2	0	2
Galliformes				
<i>Bonasa spp.</i>	Grouse	0	4	4
Charadriiformes				
Laridae	Gulls and terns	0	6	6
<i>Larus spp.</i>	Gull	1	5	6
Miscellaneous				
Small Bird	Smaller than duck	0	2	2
Medium Bird	Duck-sized	1	5	6
Large Bird	Larger than duck	0	4	4
Total		26	87	113

Very few invertebrate remains were identified in the sample (which is unusual in comparison to most Pacific Northwest Coast midden sites), encountered only in pockets throughout the site and heavily fragmented, which renders identification difficult. Because of this low representation, invertebrate specimens were weighed rather than counted. A total of 200.23g of shell were recovered from *st'ám̓es*. These were identified with reference to the SFU comparative faunal collection, dominated by Littleneck Clam, urchin, and mussel shell. Overall, the *st'ám̓es* assemblage is dominated by salmon (45.73%), herring (17.62%), cods (12.42%), and dogs (10.58%). Secondary taxa identified in the *st'ám̓es* assemblage include flatfish (2.64%), deer (1.54%), ducks (1.21%) and dogfish (1.21%).

Richness, Evenness and Density

Measures of richness, evenness, and density allow one to analyse the species present at a site and their relative abundance. Across the entire site there are 7 bird taxa represented in contrast to 13 fish taxa and 13 mammalian taxa, for a total of 33 unique taxa at *st'ámes*. Overall, the richness of the site is moderate. However, the number of taxa identified in the midden and housefloor assemblages diverge from the expected richness of the assemblage based on Kintigh's diversity model (figure 4-1). These suggest that the housefloor assemblage is richer than that of the midden, although both fall within the range of a 95% confidence interval.

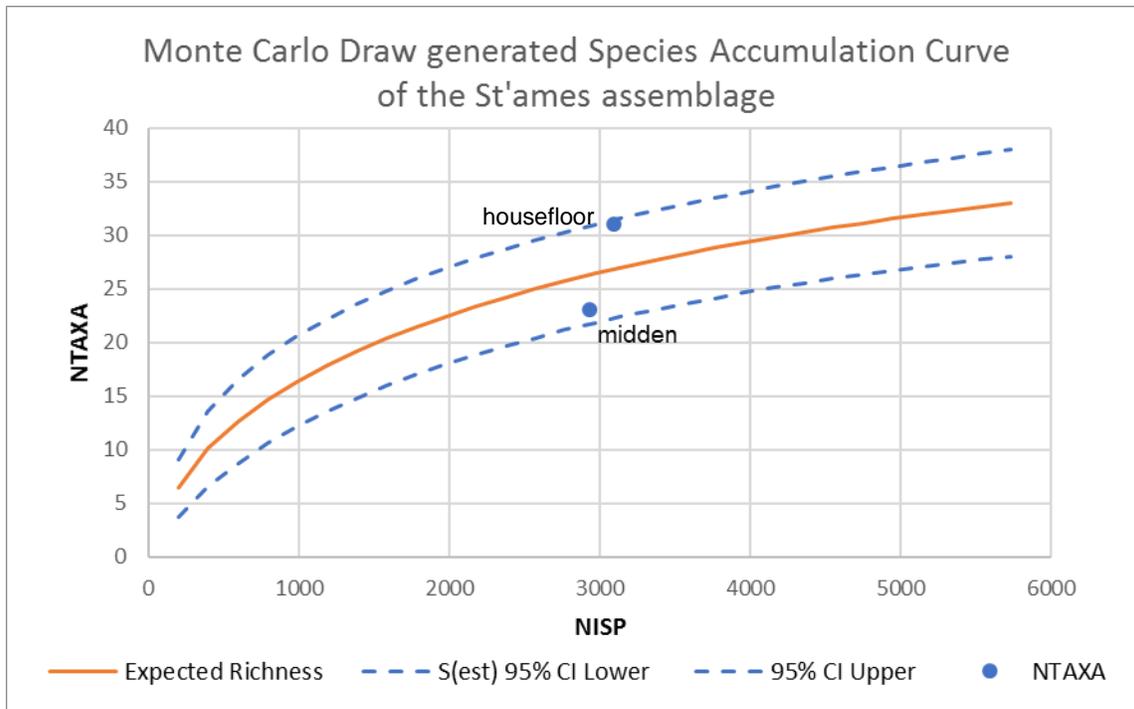


Figure 4-1. St'ámes site Monte Carlo simulation showing expected richness (with 95% confidence intervals) produced in EstimateS (Colwell et al. 2012)

This figure demonstrates the divergence of midden and housefloor assemblages from expected diversity by resampling from a pool of the overall site assemblage to estimate the expected richness. In general, housefloor deposits have a greater concentration of rare taxa that influence the observed richness of the deposits, but Figure 4-1

demonstrates that the richness of the two assemblages does not differ at a significant level.

Likewise, evenness across the site is comparable as the Shannon Index values (0.47 and 0.56 respectively) are similar in midden and housefloor contexts (table 4-4), suggesting a moderately even distribution of taxa in both areas.

Table 4-4. Shannon's H and Shannon Index of Evenness values for *st'ám̓es* midden and housefloor deposits

	Shannon's H	Shannon Index of Evenness
Midden	0.64	0.47
Housefloor	0.83	0.56

At *st'ám̓es*, the housefloor assemblage shows overall greater heterogeneity than that of the midden, which is then used to calculate the Shannon Index of Evenness. If a value of 1 would indicate a population in which all taxa were distributed equally (Lyman 2008, Lepofsky and Lertzman 2005), the evenness values from *st'ám̓es* midden and housefloor deposits fall between the extremes. This suggests the *st'ám̓es* faunal assemblage from both areas is dominated by several highly abundant species with trace amounts of more diverse species, reflecting moderately specialized subsistence practices. Overall, fish (herring, salmon, cods), canids, and deer make up the largest proportions of the site assemblage. However, the lower evenness of the midden deposits observed is likely skewed by the abundance of salmon, herring, and domestic dog, with lower overall diversity than housefloor units.

When one considers the distribution of taxa between midden and housefloor deposits, several patterns emerge. In the twenty-four units that contain housefloor deposits, 31 distinct taxa are represented amongst all classes. In the five midden units, a total of 23 distinct taxa are present. Including taxa identified only to class, housefloor deposits contain 9471 specimens through all units in comparison to 5534 specimens from the midden units, reflecting a much higher level of density in midden deposits. However, the distribution of these classes vary between midden and housefloor assemblages (figure

4-2). Moreover, a higher proportion of specimens from midden deposits are identifiable to taxa compared to the housefloor deposits.

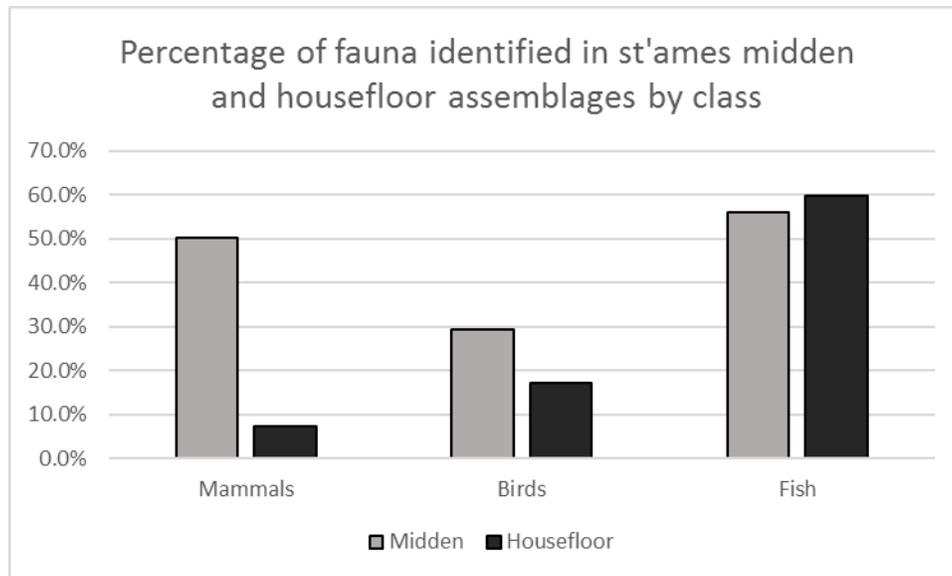


Figure 4-2. The percentage of each class identified in midden and housefloor deposits at st'ames

Breakdown by class further demonstrates how richness and evenness of taxa between areas varies depending on the taxa's significance to people, whether as food, economic, or ritual, and the ways these intersect. While the proportions of fish and birds identified in midden and housefloor contexts are consistent, the mammal assemblage in housefloor deposits shows a much higher level of fragmentation. Correspondingly, the NISP of mammals identified in housefloor deposits is higher than midden at 4226 fragments, compared to just 1352 fragments of mammal bone identified in midden deposits—93.6% of housefloor mammals were not identified as a distinct element, which is consistent with trampling and processing of remains that one would expect to see of an assemblage on a living floor (Arcas 1998:206). Despite this, one sees a more even distribution and more diversity in the assemblage of housefloor mammals, dominated by deer and wapiti, while midden deposits, though smaller, include 11 distinct taxa (table 4-5). Apart from an unusual abundance of Canid remains identified in midden deposits, distribution of taxa between areas of the site is consistent, few species standing out to suggest a significant difference in the presence of a particular taxa.

Table 4-5. Mammal taxa from midden and housefloor deposits included in richness calculations at st'á'nes, by NISP and %NISP

Taxon	Midden	%Midden	Housefloor	%Housefloor
Dog	556	91.3	97	50.5
Black-tailed deer	31	5.1	64	33.3
Deer, elk, or mountain goat	6	1.0	13	6.8
Beaver	4	0.7	2	1.0
Domestic cow	2	0.3	2	1.0
Sea mammal	2	0.3	5	2.6
Seal	4	0.7	2	1.0
Black bear	2	0.3	1	0.5
Marten	2	0.3	0	0.0
Mink	0	0.0	3	1.6
Mountain goat	0	0.0	1	0.5
Rat	0	0.0	1	0.5
Wolf	0	0.0	1	0.5
Total	609	100.0	192	100.0

The midden mammal assemblage is dominated by the same taxa as housefloor (namely dog, large artiodactyls, and deer), with the notable difference of Canid remains contributing over 90% of the identified mammals. This is due to the presence of several nearly complete skeletons, several of which were found in pits that may suggest intentional burial. This discrepancy between areas suggests a level of social significance attributed to dogs that is worthy of further exploration. Moreover, although fewer housefloor specimens were identifiable due to a high degree of fragmentation, several rare taxa are found in housefloor deposits that are not present in the midden, including porpoise (n=3), mink (n=1), and mountain goat (n=1). Wolf is also identified in housefloor deposits, represented by a single metapodial that was considered unlikely to belong to domestic dog or coyote based on size and morphology. Notably, a whale rib dagger is present in midden deposits in association with a galena nodule and fragments of ochre. While several other worked bone tools were also found in this context, the whale rib stands out as the only preserved sample of its species at the site.

In contrast, fish remains are more uniformly distributed between midden and housefloor assemblages (table 4-6), besides the higher density of fish in midden units,

which is expected if processing of fish occurred primarily outdoors as was documented in the ethnographic period (Bouchard and Kennedy 1976b, Barnett 1955, Suttles 1970).

Table 4-6. Fish taxa from midden and housefloor deposits included in richness calculations at s'tames, by NISP and %NISP

Taxon	Midden	%	House	%
Salmon	1547	67.4	1277	45.3
Herring	473	20.6	615	21.8
Cod	93	4.1	409	14.5
Flatfish	59	2.6	104	3.7
Alaska Pollock	56	2.4	209	7.4
Spiny dogfish	45	2.0	30	1.1
Plainfin midshipman	7	0.3	55	1.9
Rockfish	6	0.3	6	0.2
Greenling	5	0.2	23	0.8
Sculpin	5	0.2	5	0.2
Eulachon	0	0.0	72	2.6
Ratfish	0	0.0	1	0.0
Surfperch	0	0.0	16	0.6
Total	2296	100.0	2822	100.0

The housefloor shows similar patterns to those of midden deposits. 59.9% of the fish assemblage is identified in this context, representing 14 distinct taxa in contrast to 10 taxa identified in the midden. However, rather than reflecting different significance of types of fish it is possible that the greater number of taxa identified from housefloor deposits reflects sampling strategy, as almost five times as many housefloor units were excavated as midden. Following a species accumulation curve one would expect to see more unique taxa identified as sample size increases (Lyman & Ames 2004, Lepofsky & Lertzmann 2005). Had more midden units been excavated, more species may have been identified and the distinction between numbers of fish taxa identified in each area would decrease. Salmon and herring are the most abundant fish species in both areas of the site and indeed of all taxa identified at the site, indicating that they likely were of central importance to the inhabitants of *st'ám̓es*, historically abundant in area around Howe Sound. The distinctive vertebrae of the Spiny Dogfish account for a moderate

proportion of the fish assemblage in both areas of the site despite a low subsistence value (Bouchard and Kennedy 1976b:1). The most notable difference in the fish assemblage between areas is a concentration of cod in housefloor deposits that midden deposits lack.

While the proportions of avian remains identified between midden and housefloor deposits are comparable, there is a significantly higher representation of bird bones in housefloor deposits (see table 4-7).

Table 4-7. Avian taxa from midden and housefloor deposits included in richness calculations at s'tames, by NISP and %NISP

Taxon	Midden	%	Housefloor	%
Duck	21	84	54	71.1
Falcon or hawk	2	8	0	0.0
Gull, tern or jaeger	1	4	11	14.5
Bald eagle	1	4	5	6.6
Grouse	0	0	4	5.3
Goose	0	0	1	1.3
Grebe	0	0	1	1.3
TOTAL	25	100	76	100.0

Including unidentified fragments, housefloor deposits contain 535 bird remains, 17.1% of which are identified to taxa. Like the mammal assemblage, bird remains show a greater level of fragmentation in housefloor deposits than midden deposits, which contain a total of 89 bird remains, 29.3% of which are identifiable taxa. Ducks were the most abundant birds identified at *s'tames* in both areas and throughout layers, which reflects a consistent importance in the lives of the people who occupied the site. The majority of these were identified as mallard. In contrast the housefloor shows a higher concentration of gull, terns, or jaegers (n=9) and eagle (n=5), compared to the midden. In contrast, Midden deposits show a much more even distribution of taxa and lower level of diversity, with only 4 distinct taxa in comparison to 7 taxa identified in housefloor deposits and significantly higher NISP of bird remains. Overall, Eagles were the third most common bird taxa identified at *s'tames*, following ducks and gulls.

4.3.1. Part Distribution

For the most part, midden and housefloor deposits at *st'ámes* show a similar distribution of parts by class. Due to the different composition of fish bones and the availability of comparative research discussing fragmentation processes, analysis primarily centers on the mammal assemblages (e.g., Driver 1985). While the midden assemblage is smaller than that of the housefloor, it includes a higher proportion of identifiable parts—either whole or mostly complete elements (21.66% whole) in contrast to housefloor deposits in which 12.7% of elements are whole (see table 4-8).

Table 4-8. NISP and %NISP of parts present in midden and housefloor assemblages at *st'ámes*, part designation based on Driver 1985.

Part	NISP Midden	% Midden	NISP Housefloor	% Housefloor
Whole	1202	21.66	1220	12.7
Proximal + ½ shaft	283	5.10	400	4.2
Proximal and less than ½ shaft	1285	23.15	1409	14.7
Proximal unfused epiphysis, no diaphysis	93	1.68	39	0.4
Distal + ½ shaft	54	0.97	27	0.3
Distal and less than ½ shaft	9	0.16	21	0.2
Distal unfused epiphysis, no diaphysis	33	0.59	8	0.1
Shaft	208	3.75	524	5.5
Fragment	2383	42.94	5938	61.9
Total	5550	100.00	9586	100.0

Of the entire housefloor assemblage, 61.9% of remains are too fragmented to identify. This is consistent with trampling (Arcas 1998:206), being thrown into the fire, or manufacture of bone artifacts (Hodgett & Rahemtulla 2001), which would account for this greater level of fragmentation by breaking bones into small pieces. Moreover, smaller bone fragments are more likely to persist on living floors after larger fragments have

been removed and the floor swept clean. In both areas of the site, identifiable deer remains show a higher proportion of whole specimens than other mammals (32.2% of midden deer remains and 25% of housefloor), with the exception of domestic dogs. Considering patterns within species present at *st'ármes*, it becomes clear that *Canis sp.* and *Canis familiaris* remains in both contexts had a greater number of whole elements, where whole elements account for 58.8% of total *Canis* remains in midden deposits and 50.5% of *Canis* remains from housefloor units. Moreover, a high proportion of elements identified as *Canis* represent more than half of the bone, either shaft or portions thereof. This is primarily due to the presence of several nearly-complete specimens and potential interments, which will be discussed in more detail in Chapter 4. The condition of canid remains at *st'ármes* has the potential to contribute to understanding of the social significance of domestic dogs at the site.

4.3.2. Element Distribution

For most species at *st'ármes*, there are too few samples to identify patterns of element distribution with any degree of confidence. Overall, there are fewer elements identified from housefloor contexts than in the midden, which is related to the increased fragmentation in housefloor deposits. As taphonomic factors have a strong influence over which elements preserve in the archaeological record, it is necessary to be cautious when assigning cultural significance to the presence of certain elements (Orton 2012).

However, *Canis sp.* remains are abundant enough at *st'ármes* that several trends emerge when considering the distribution of elements, which are more evenly distributed in the midden due to the presence of several nearly intact specimens. Of the most abundant elements, primarily vertebrae, teeth, and metapodials, they are all fairly robust and likely to preserve well, in addition to being more numerous in the skeleton, while long-bones, which are also comparatively well represented, are more limited. In housefloor deposits, despite a significantly smaller *Canis* assemblage, one sees a similarly high proportion of teeth, phalanges and vertebrae but also a significant number of partially whole mandibles (accounting for the abundance of teeth), representing 8.5% (n=6) of the housefloor Canid remains. While Canid element distribution is consistent

between midden and housefloor deposits, the more even distribution of Canid elements in midden units and association with pit features in suggests social significance of dogs at the site. This raises the possibility of different treatment of dog remains between areas that could be consistent with oral histories concerning the value of wool dogs compared to village dogs (Schwartz 1997).

The second most abundant mammal is deer, which shows little difference in distribution of elements between midden and housefloor deposits. In both areas of the site foot elements dominate the assemblage, with an abundance of phalanges, metapodials, carpals and tarsals, together making up 51.6% (n=16) of identified deer in the midden and 68.65% (n=44) of identified deer from the housefloor. The predominance of foot elements is a pattern seen at other sites in the Salish Sea region (e.g. Trost 2005, Williams 1974:30), and may be related to taphonomic factors. Alternatively, it may be indicative of processing practices, such as butchery of carcass in the field and transport back to the site (Bouchard and Kennedy 1976a:33), all of which are known traditional practices that could account for this patterning. From a social perspective, deer hooves have been used as adornment for dancers and ritual rattles (Bouchard and Kennedy 1976a:36-37), emphasizing the intersection of social and economic in relationships with animals.

In terms of mammal species whose primary value ethnographically was not food-based, several important taxa are present in low numbers. Beaver is represented by several incisors in the assemblage (n=4), while bear is represented by a metacarpal in the housefloor deposits and a mandible in the midden. A single mountain goat element was identified in housefloor deposits, the wool of which is known to have been used in Salish Blankets. Moreover, there are several Mink elements present in the housefloor assemblage, including paired left and right mandibles and a loose tooth (MNI=1), whose pelts are known to have been used in shamanic ritual (Bouchard and Kennedy 1976a:21-22, Barnett 1955). Although these species were often valued as food, they also possessed economic and ritual significance.

Among fish, as among other fauna in zooarchaeological contexts, element distribution can offer perspective on subsistence and processing practices. Looking at

the distribution of elements among the most common fish taxa at *st'ám̓es* it is evident that there are differences in patterning between midden and housefloor assemblages. While the most abundant taxa are the same in both midden and housefloor deposits, midden units show a different concentration of elements that hint at differing disposal practices between areas of the site. Vertebrae are the most abundant elements for all taxa represented at the site but housefloor deposits show a higher concentration of cranial elements overall. Flatfish and herring remains from the housefloor show a comparatively even distribution of cranial and vertebral remains, suggesting that they were deposited in the assemblage with heads attached. Alaska pollock likewise shows a high instance of cranial bones (see figure 4-3), while in the midden there is a higher concentration of vertebrae relative to other elements (see figure 4-4).

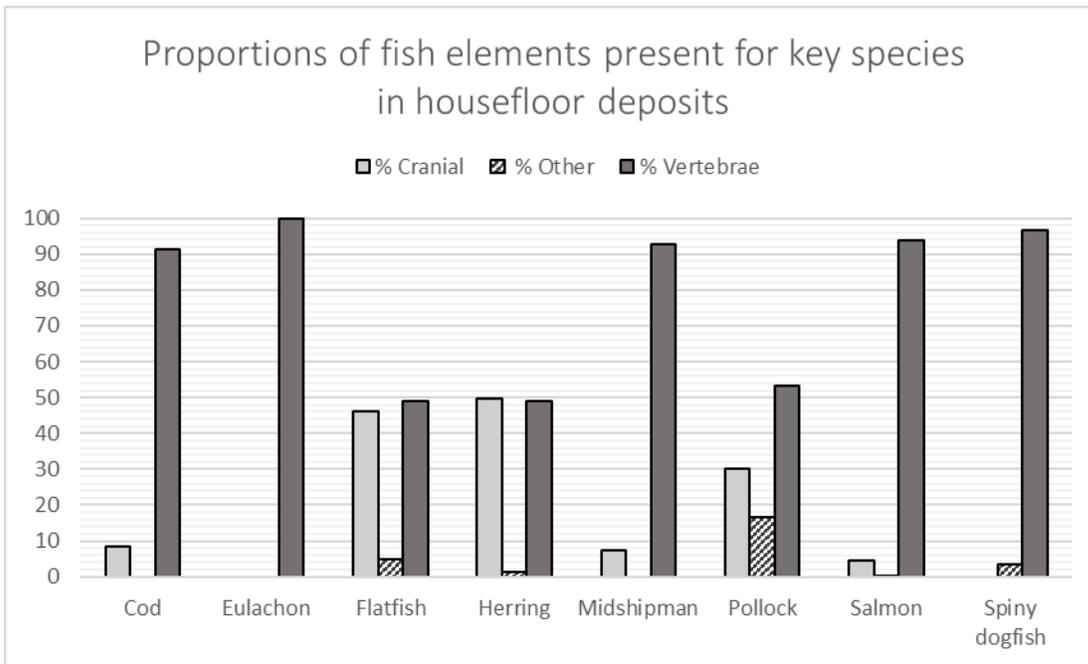


Figure 4-3. Clustered bar graph of the relative proportion of elements of most common fish in housefloor deposits at st'âmes

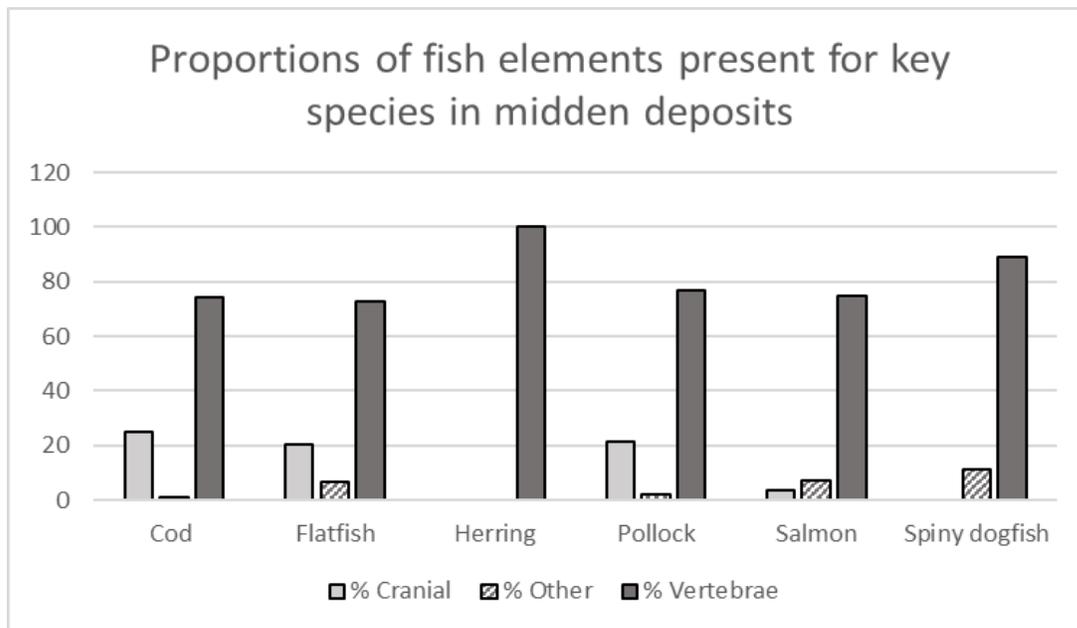


Figure 4-4. Clustered Bar Graph of the relative proportion of elements of the most common fish identified in midden deposits at st'âmes

In both areas, salmon remains show low representation of cranial elements, which may indicate storage practices and processing of remains, which traditionally involved the removal of fish heads in many areas of the Northwest Coast (Ames & Maschner 1999, Barnett 1955). While this may also reflect lower levels of preservation of more fragile cranial bones, the higher instance of preservation of cranial bones for other species of fish across the site makes it more likely that the proportion of salmon cranial bones in the assemblage is significant. If salmon at *st'ám̓es* were processed for storage in this manner it would be consistent with known post-contact period practices (Bouchard and Kennedy 1976b:88), in comparison to other fish that may have been consumed fresh. However, no salmon remains at *st'ám̓es* were identified in relation to pit features. The abundance of Spiny Dogfish in both locations, while less common than salmon or herring, is interesting as Squamish Nation traditions indicate that it is traditionally taboo as a food source (Arcas 1998:205, Bouchard and Kennedy 1976b:2,) and thus were unlikely present in the midden as food. The absence of dogfish cranial elements can be attributed to their poor preservation, as dogfish are cartilaginous fish, making vertebrae the most common element to survive in the archaeological record.

A high proportion of bird remains originating in housefloor deposits are too fragmented to identify beyond class. However, there is an abundance of wing elements (figure 4-5), which account for a total of 65.8% of all identifiable bird elements in the housefloor assemblage.

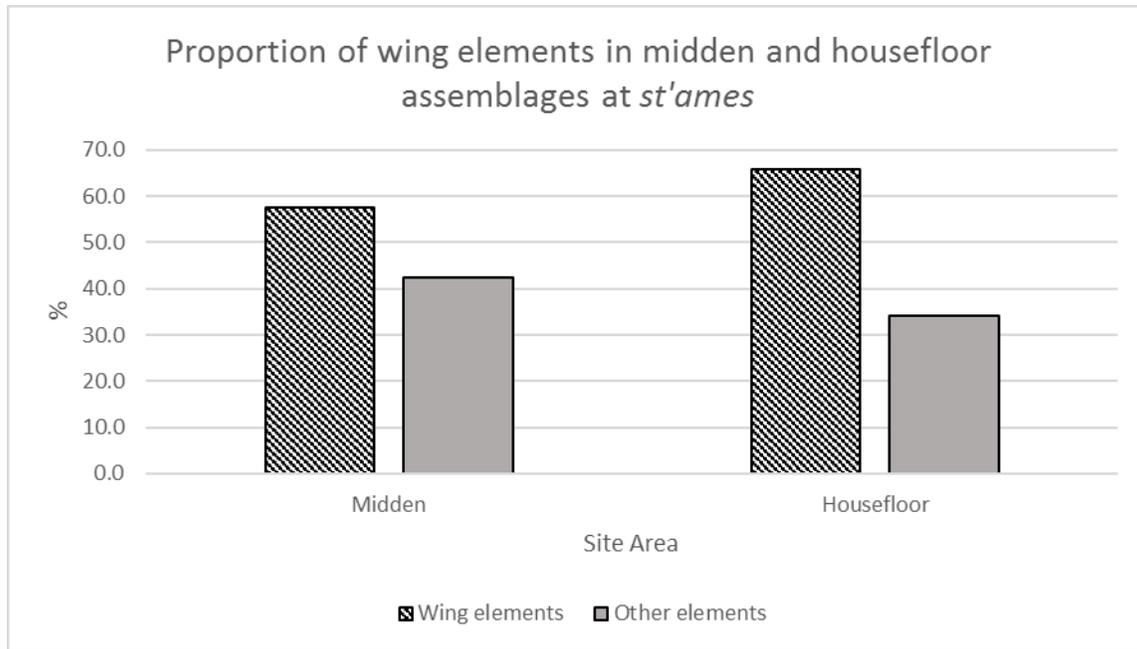


Figure 4-5. Clustered bar graph of the overall proportion of wing elements in comparison to other skeletal elements in both areas at st'ames

Wing elements are likewise most abundant in the midden assemblage (57.7%), but fewer bird elements were recovered from the midden assemblage overall. The patterning in the housefloor deposit is consistent with Pacific Northwest coast patterns noted elsewhere (e.g., Trost 2005, Schalk 1993), in which wing bones are the most common bird elements recovered. This may be due to factors such as processing of remains for transport (Bovy 2012). While overall the elements present in both assemblages are too similar to indicate differential treatment of particular species, and sample sizes for birds are relatively low, it is interesting to note that bald eagle remains are present primarily in housefloor deposits, and the majority of identified elements are distal phalanges (talons), which are traditionally ritually significant (Bouchard and Kennedy 1976a:74).

4.3.3. Burning and Weathering

Examining the burning of elements between areas one sees a much higher proportion of calcined (white) bone in housefloor deposits, making up 35.93% of housefloor assemblage in contrast to only 3.31% of midden deposits. Blackened or grey

specimens are also more abundant in the housefloor. Overall, 85.19% of fauna from midden contexts are unburned, compared to 49.14% from housefloor units. However, in both midden and housefloor deposits, fish remains have a much lower level of burning than other classes. While absence of calcination or burning does not indicate absence of cooking (Nicholson 1993), the greater degree of burning in housefloor areas is consistent with the presence of hearths and food or tool processing within house contexts, which also correspond to the higher level of fragmentation (Arcas 1998:206).

Weathering in midden and housefloor deposits does not differ at a significant level. Both areas show a high concentration of low-level weathered samples that are consistent with deposition and minor exposure and few more weathered remains based on Behrensmeyer's scale (1978). Proportionately, the midden and household assemblages are almost identical in distribution of weathered remains, indicating that the post-depositional processes to which remains were exposed in both areas were equivalent. As such, weathering contributes little to understanding of the social significance of faunal remains at *st'ám̓es*.

4.4. Regional Comparison

While there are some notable differences in the distribution of faunal remains between the midden and housefloor at *st'ám̓es*, it is difficult to evaluate the significance of these variations without considering how they relate to regional patterns. To do so, I compare the *st'ám̓es* faunal assemblage to four other sites within the Salish Sea (Dionisio Point, Port Hammond, Cove Cliff, and British Camp) considering the ways that people might have interacted with them in the past. By looking at the richness and evenness of distribution between sites, in addition to the abundance of particular taxa within the contexts in which these remains are found, it is possible to see how the *st'ám̓es* faunal assemblage compares to other regional archaeofauna. This allows one to situate the remains from *st'ám̓es* within a more social environment by identifying trends of faunal significance.

4.4.1. Comparison of regional faunal abundance

When one considers the specific taxa identified at each site and their levels of abundance, the *st'ám̓es* faunal assemblage is primarily consistent with regional patterns. The abundance of avian taxa at all the sites is low (table 4-9), with proportionately fewer species identified per site in comparison to mammals or fish.

Table 4-9. NISP of bird species identified at select sites on the Salish Sea (DP - Dionisio Point, PH - Port Hammond, CC - Cove Cliff, BC - British Camp, S - St'ám̓es)

Species	DP	PH	CC	BC	S
Ducks	48	83	41	24	75
Gull, tern or jaeger	1	1	11	16	12
Bald Eagle	1	10	3	0	6
Grouse	0	2	0	0	4
Falcon or Hawk	0	0	1	0	2
Grebes	0	0	4	4	1
Goose	0	17	1	0	1
Geese, ducks and swans	0	16	8	41	0
Puffins, murre and guillemots	0	1	0	6	0
Cormorants	0	0	0	4	0
Loons	1	0	7	2	0
Passerines	0	0	2	1	0
American coot	0	0	0	1	0
Bluebirds, robins, thrushes	0	0	0	1	0
Cranes, rails and coots	0	0	0	1	0
Great blue heron	0	1	1	0	0
Stellar's Jay	0	0	1	0	0
Crow	3	0	0	0	0
Auks	2	0	0	0	0
Total	56	131	80	101	101

Of all classes, the bird assemblages show the most specialization. Each avian assemblage in this study is dominated by members of the Anatidae family, which

consists of duck, geese, and swans. The fact that Anatidae account for the majority of every avian assemblage in this study is reflective of the importance that ducks (and to a lesser extent geese and swans) played in diets of these communities across the Salish Sea. The abundance of waterfowl in these bird assemblages is typical of many long-term residential sites throughout the region (Ewonus 2011), which are located in close proximity to the marine habitats that they frequent. Family Laridae (primarily gulls) are second in abundance to Anatidae at *st'ám̓es* and British Camp, while other taxa range more widely in their representation across sites. Although Port Hammond's bird assemblage is proportionately the largest of all five sites, it has the lowest richness. As an inland riverine site, this is consistent with the availability of bird taxa in the surrounding environment, as an abundance of waterfowl are present in the Fraser Lowlands.

Other bird taxa account for a cumulative minority of the individual assemblages, which may reflect the importance of duck hunting and the environmental availability of this taxa across the Salish Sea, in both freshwater and marine habitats. Bald Eagle remains are perhaps the most notable of the other taxa, historically present in both Coastal Western Hemlock and Coastal Douglas Fir climate zones, and are represented at four of the five sites. The specimens present at *st'ám̓es* are dominated by talons or distal phalanges, accounting for 83% of the identified eagle remains, while raptors account for proportionately less of the assemblages at all other sites but Port Hammond.

In contrast to the low numbers of bird taxa, the number of fish remains identified are higher than any other class at four of the five sites. Overall, the taxa identified are widely representative of the fish available on the Salish Sea and associated fresh water areas. While NISP varies, the proportions of key types of fish as salmonids and herring (table 4-10) are high, with some regional variations as one would expect based on local environmental conditions. This is consistent with the importance of fish as a dietary staple across the Northwest Coast and specifically the Salish Sea. In keeping with the low levels of evenness, most sites show concentrations of particular fish taxa rather than an even distribution of all species present, dominated either by Pacific salmon (Port Hammond) or Pacific Herring (Dionisio Point, Cove Cliff, *st'ám̓es*, British Camp).

Table 4-10. Regional comparison of all fish identified at select sites on the Salish Sea (DP - Dionisio Point; PH - Port Hammond, CC - Cove Cliff, BC - British Camp, S - St'ámes)

Species	DP	PH	CC	BC	S
Pacific salmon	451	571	831	3590	2824
Herring and sardines	7696	7	2656	12760	1088
Cods	53	0	1	34	502
Alaska Pollock	15	0	4	0	265
Flatfish	187	0	46	131	163
Dogfish	590	0	44	1007	75
Eulachon	0	48	91	0	72
Plainfin midshipman	55	0	31	0	62
Greenling	237	0	5	0	28
Rockfish and Sculpins	906	0	66	1168	22
Perch	165	0	162	777	16
Ratfish	13	0	0	89	1
Bony fishes	1529	39	0	0	1
Smelts	0	0	78	4	0
Cartilaginous fish	0	0	10	1	0
Northern Anchovy	0	0	724	0	0
Rocksole	20	3	3	0	0
Snake prickleback	0	0	1	0	0
Suckerfish	0	0	1	0	0
Sturgeon	1	54	0	0	0
Minnow	7	2	0	0	0
Rainbow trout	0	2	0	0	0
North Pacific hake	48	0	0	0	0
Sablefish	6	0	0	0	0
TOTAL	11979	726	4754	19561	5119

At *st'ámes*, the fish present occupy a range of habitats, from the rocky intertidal zone, such as rockfish and greenling, to deep water such as cods and Alaska Pollock, as well as sandy bottom shores such as dogfish, perches, and flatfish. Most abundant, however, are salmon, for which the site was strategically located close to runs on nearby rivers, and herring, which historically spawned in eelgrass beds near the site. These essential taxa are followed in abundance by cods and Alaska Pollock, indicative of offshore fishing

(Arcas 1998), while the moderately common flatfishes and Spiny Dogfish were likely present in local waters as they are in modern times (Hart 1975, Levy and Levings 1978). For the most part, it is apparent that the fish in the *st'ám̓es* assemblage are associated with environments close to the site.

Salmon is the most abundant fish taxa at *st'ám̓es*, accounting for 55.18% of the fish remains in the assemblage, while herring is the second most abundant. The only other site dominated by salmon is Port Hammond, which, like *st'ám̓es*, is located in close proximity to spawning grounds. At sites where herring accounts for most of the fish assemblage, such as Cove Cliff, British Camp, and Dionisio Point, salmon and other taxa are present at lower levels. As a fish that occupies a range of habitats, from the eelgrass and kelp beds of the shallows in which it spawns to the deeper ocean where it spends most of the year, and both of these environments are represented at the three sites where it is the most abundant taxa, making herring locally available. Even where it is not the dominant fish taxa, the abundance of herring at most of the sites in this study goes against long-held academic beliefs of the primacy of salmon on the Northwest Coast, and ties into increasing acknowledgement of the important role that herring and other taxa play as a food source across the Salish Sea (e.g., McKechnie et al. 2014).

However, local variations in fish taxa reflect the different conditions at each site. Rockfish and sculpins are present at all sites except Port Hammond, but they are more abundant at British Camp and Dionisio Point, which are characterized by access to the rocky foreshore or open water that these species prefer (Hart 1975). Dogfish are also more abundant at Dionisio Point and British Camp than any of the other sites, perhaps a result of their offshore or rocky intertidal habitats, both of which are present around these sites. Port Hammond's fish assemblage stands out as significantly smaller than the others, and features less diversity of taxa. As an inland site on the Fraser River, it is unsurprising that the fish present are those that are known to spawn in the river waters, such as salmon and eulachon, or are known in the river, such as sturgeon. Notably, the abundance of cods and Alaska Pollock in the *st'ám̓es* assemblage is not seen at any of the other sites, raising the question if they were simply not as common in the local waters or if deep water fishing was not as important. the abundance of family Gadidae (specifically Alaska Pollock and Pacific Cod) stands out. Gadidae account for 15% of the

overall fish assemblage at *st'ám̓es*, in comparison to the other sites where cods and pollock account for less than 1% of assemblages.

For the most part the mammals identified at *st'ám̓es* are consistent with those present at other sites across the Salish Sea (see table 4-11).

Table 4-11. Regional comparison of all mammals identified at select sites on the Salish Sea (DP - Dionisio Point; PH - Port Hammond, CC - Cove Cliff, BC - British Camp, S - St'ám̓es)

Species	DP	PH	CC	BC	S
Dog	53	147	45	46	653
Deer	21	28	3	146	97
Deer, elk or goat	4	28	29	128	24
Sea mammal	1	0	0	0	7
Beaver	0	4	18	51	6
Seal	5	3	7	0	6
Domestic cow	0	0	2	0	4
Mink	0	0	3	0	3
Bear	0	3	1	0	3
Marten	0	0	0	0	2
Mountain goat	0	0	0	1	1
Rat	0	0	0	0	1
Wolf	0	0	0	0	1
Dolphin or porpoise	0	0	0	36	0
Sea lion, seal, or walrus	3	0	3	4	0
Whale	1	0	0	2	0
Wapiti	9	36	9	1	0
Otter	0	0	0	2	0
Artiodactyl	1	11	8	0	0
Cougar	0	0	5	0	0
Rodent	5	1	4	0	0
Bobcat	0	1	1	0	0
Domestic pig	0	0	1	0	0
Squirrel	0	0	1	0	0
Muskrat	0	1	0	0	0
Raccoon	0	1	0	0	0
Total	103	264	140	417	808

The *st'ám̓es* mammal assemblage is comparable only in number of taxa to Cove Cliff, which may be related to a broader variety of species available to people in the inlet environments in which both sites are located. *St'ám̓es*, however, has a significantly higher mammal NISP as a result of the abundance of dogs. It also has several rare taxa that are not identified elsewhere, such as wolf and marten. In contrast, the two island sites have the fewest mammal taxa present despite the greater overall sizes of their assemblages.

At each site, the total mammal assemblage is small when contrasted to NISP of fish, despite comparative richness. All five sites show similar distribution of primary mammal taxa. When Canids are excluded from analysis, deer or members of family Cervidae (deer, goats, and elk) account for the majority of mammal assemblages at most of the Coast Salish sites examined, although the Gulf Island sites (Dionisio Point and British Camp) have fewer land mammals represented in their assemblages than the Inlet sites at Cove Cliff and *st'ám̓es*. At *st'ám̓es*, deer account for 12% of the total mammal assemblage, while Cove Cliff is dominated by the broader category of deer, elk, or goats. Deer are the most common large ungulate in both Coastal Western Hemlock (CWH) and Coastal Douglas Fir (CDF) climate zones, (Meidinger and Pojar 1991), making them readily available throughout the region. As deer and wapiti are traditionally among the most economically significant land mammals in Central Coast Salish territories, the dominance of medium-large artiodactyls follows established patterns (Barnett 1955, Trost 2005).

Smaller quantities of less common taxa reflect local variations in mammal assemblages. Beaver is abundant at Cove Cliff and British Camp, but less common at *st'ám̓es* and Port Hammond. As a creature that is associated with relatively flat terrain and slow moving water in CWH forests (Meidinger and Pojar 1991), they may have been present around Cove Cliff, but beavers are less common associated with CDF climate zones, making the British Camp assemblage stand out. Although low concentrations of sea mammals suggest a greater focus on land mammals at most sites, a sample of Dolphin or Porpoise remains is identified at British Camp, which is consistent with the site's access to open water. Whale remains are only identified in faunal assemblages at

Dionisio Point and British Camp, which are likewise found more commonly in the open waters of the gulf, although a whale rib dagger is present in the artifact assemblage at *st'ám̓es*. In contrast, small numbers of seal are present at all sites besides British Camp, which today are common in the waters around the Salish Sea. Rarer taxa, such as small carnivores like mink or marten, big carnivores such as bear, or the mountain goat are present throughout CWH climate regions but uncommon at any of the sites. Overall the Salish Sea mammal assemblages have lower diversity than fish assemblages, and most show a focus on medium-large land mammals that were locally available. However, this does not exclude an influence of social factors on the presence of these species.

Although canid remains are consistently present in moderate numbers at all of the sites, *st'ám̓es* stands out for the high proportion of remains identified as domestic dog. Of the 934 land mammal bones identified past class level, 69.9% (n=653) represent Canid remains in some form and of these, many are intact or nearly-intact elements. This accounts for a majority of the mammal assemblage at *st'ám̓es*, a significantly greater proportion of dog remains than identified at any of the other sites in this study. By comparison, the site that shows the next highest level of abundance of Canid remains is Port Hammond, where they make up 19.7% (n=147) of the mammal assemblage and represent a minimum of 11 individuals (Antiquus 2001). Moreover, the *st'ám̓es* Canid remains are mostly intact. Even without taking into account NISP, the *st'ám̓es* assemblage stands out in the region for the proportionate dominance of Canid remains. Due to the cultural significance of domestic dog in Central Coast Salish communities as documented hunters, companions, and wool-bearers, the abundance of remains deserves further consideration.

4.4.2. Richness and Evenness

As richness is linked to sample size (Grayson 1984), it was necessary to determine the comparative richness of each assemblage (figure 4-6). By constructing a sample-based rarefaction curve, one can see that *st'ám̓es* is of moderate richness when the assemblages are standardized by resampling each assemblage separately to explore their richness at comparable sample sizes.

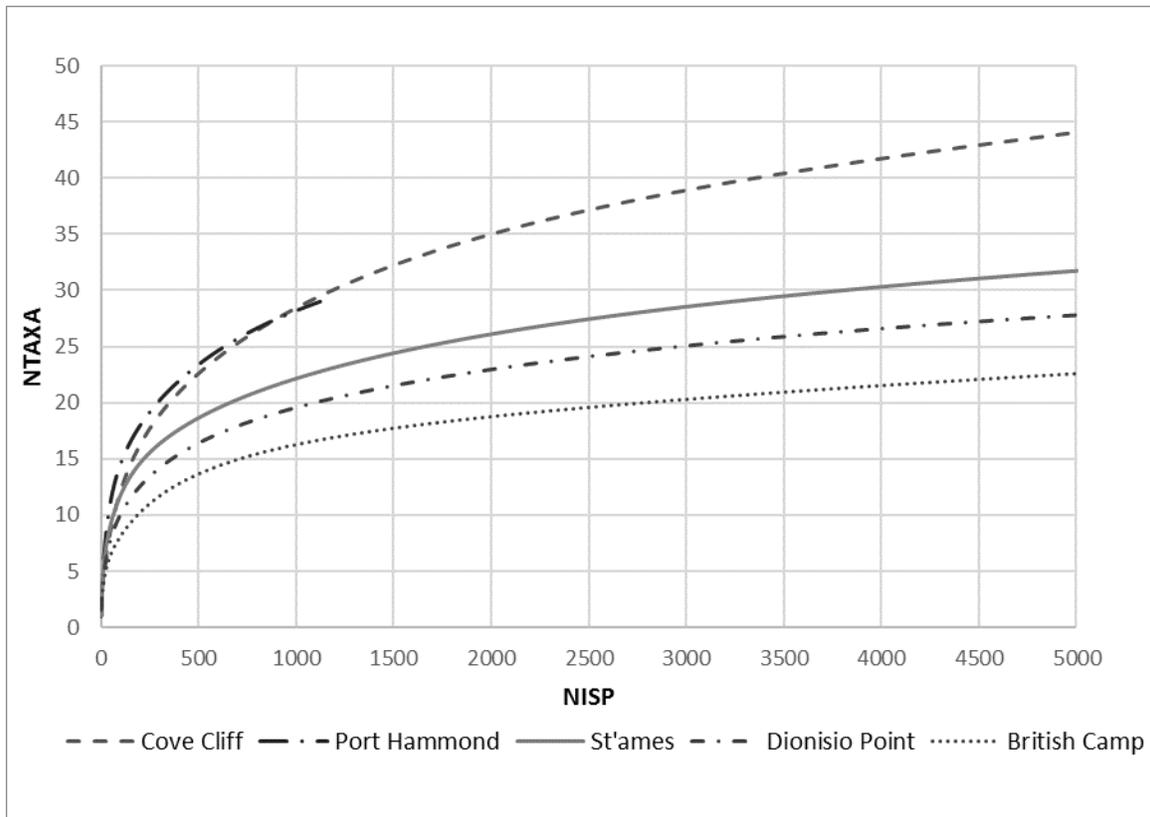


Figure 4-6. Species Rarefaction curve from five sites in the Salish sea standardized at 5000 specimens, calculated using EstimateS (Colwell et al 2012).

In general, these samples are comparable, however Figure 4-6 indicates that Port Hammond has not been sampled sufficiently to be confident in analysis of diversity. Cove Cliff, which shows few signs of long-term habitation, is the richest site despite its comparably small assemblage, at just over 5000 NISP identified. In contrast, the diversity of species represented in the *st'ámes* assemblage is moderate, comparable to that of the other village sites, as at Dionisio Point and British Camp where evidence of houses is also present (Ewonus 2006, Pegg 1999). The most obvious differences in richness between these sites are likely the result of environmental or seasonal variation, or size of assemblages. Despite these variations, the richness of all five sites illustrate the traditional use of wide variety of species across the Salish Sea.

Exploring the diversity of the *st'ámes* assemblage indicates that the *st'ámes* assemblage is more evenly distributed than the other sites studied (table 4-12).

Table 4-12. Evenness of Salish Sea assemblages based on the Shannon Diversity Index

	Shannon's H	Shannon Index of Evenness
Port Hammond	0.82	0.56
St'ár̓mes	0.77	0.51
Cove Cliff	0.71	0.43
Dionisio Point	0.61	0.40
British Camp	0.55	0.37

Shannon's H was calculated for each assemblage to determine the heterogeneity of taxa, and was then used to calculate the Shannon Index of Evenness. With a Shannon Index of Evenness of 0.51, the *st'ár̓mes* assemblage has the second highest evenness value of all five sites. The *st'ár̓mes* assemblage is more evenly distributed than those of Dionisio Point, British Camp, and Cove Cliff, which show a higher degree of specialization, particularly focusing on several fish taxa. Overall, the Shannon Index of Evenness indicates a low-moderate level of evenness at most of the Salish Sea sites, with the lowest values observed at Dionisio Point and British Camp. This may be influenced by the larger assemblages present at these sites, as in general a larger sample is more likely to have greater taxonomic richness, in which case taxa are less likely to be evenly distributed (Lyman 2008). Port Hammond, which shows the most even distribution, is also the smallest faunal assemblage and located in a riverine context, which influences the diversity of taxa identified. When one looks at the specific taxa represented, one sees that most sites are dominated by several common taxa, usually salmon and herring. These are ultimately the most prevalent species, as one or the other (if not both) appear as the most abundant taxa in every site, although most show secondary concentrations of other taxa from a variety of marine environments (e.g. Ewonus 2006). In contrast, the *st'ár̓mes* assemblage is dominated by dog remains in addition to the expected herring and salmon, followed by Pacific cods, which influence the evenness values. From this, it becomes clear that although these are rich assemblages, they are dominated by a few, abundant taxa, indicating some degree of specialization.

4.5. Summary

The richness and evenness of taxa at *st'ám̓es* are mostly consistent with other sites across the Salish Sea, showing a higher degree of evenness than other sites in the assemblage. This greater evenness is in part due to the abundance of canid remains in the assemblage relative to other taxa. The *st'ám̓es* assemblage also shows a greater variety of fish used, if not as common as salmon or herring, with moderate abundance rather than the high specialization seen at Cove Cliff, Dionisio Point, and British Camp. Overall, the variation between sites in taxa present and numbers thereof is primarily due to factors such as local abundance, environmental context, and seasonality, there are few things that stand out as indicators of social significance. The fish assemblage at *st'ám̓es* is of highest density in the midden deposits and is dominated by Pacific Herring and salmon, which is consistent with the practice of processing fish outside of dwellings (Arcas 1998). The presence of eagle talons in assemblages, known ethnographically for use in dancing and related to hunting taboos for Squamish Nation (Bouchard and Kennedy 1976:73), may shed light on use of these elements ritually in the past.

The most unique aspect of the *st'ám̓es* assemblage is the abundance of canid remains and canid burials, in comparison to other sites of similar age and stage from the region. Bones identified as domestic dog or *Canis sp.* account for a significantly larger proportion of the mammal assemblage than at any other site studied. While there is little that can be said about the significance of animals at *st'ám̓es* in human lives without drawing upon ethnographic records and oral traditions, the variation in taxa present reflect at the most basic level the subsistence relationships of people and animals. This in turn may allow one to explore in more detail the social dynamics that are entangled in traditional practices.

Chapter 5. Dogs at *st'ám̓es*

The presence of canid remains at sites across the Salish Sea is not uncommon, however the canid remains at *st'ám̓es* stand out due to their abundance. A total of 653 canid remains (*Canis familiaris* and *Canis sp.*) were identified at the site, comprising the majority of the mammal assemblage, with several specimens found in pit contexts in both midden and housefloor units. This exceeds the number of canid specimens identified at sites of comparable age in the region. Due to the presence of specimens previously identified as both woolly and village dogs and extensive ethnographic accounts, the *st'ám̓es* dogs offer an opportunity to explore the social relations between people and animals in the archaeological record. This puts them in a unique position as they are “both products of and participants in human culture” (Schwartz 1997:2). Domestic dog remains provide insight into the complex and shifting dynamics of human-animal relationships. The social significance of the *st'ám̓es* dogs is examined through skeletal analysis, stable isotope and DNA analysis, and consultation of Squamish Nation histories.

5.1. Things that live with people

Historically, two types of dogs were observed in the Central Coast Salish region: the larger short-haired village dog, associated with hunting and a smaller long-haired or woolly dog (Crockford 1997) (figure 5-1). Based on archaeological evidence small dogs existed in the region as far back as 6000 years (Barta 2006:82), which may support the existence of woolly dogs in the deep past.

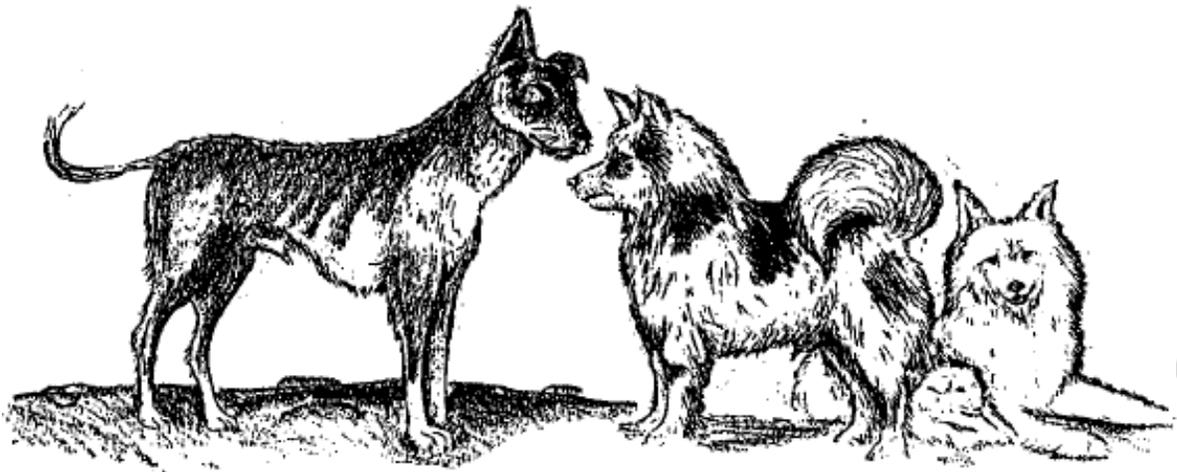


Figure 5-1. Reconstruction of possible appearances of wool and village dogs by C.J Pye, based on ethnographic records and skeletal remains (Crockford and Pye 1997)

Coast Salish oral traditions mention the existence of a breed of woolly dog bred specifically for its use in textiles, namely Coast Salish blankets, where its wool was mixed with that of mountain goats (Bouchard and Kennedy 1976a:12, Schulting 1994, Schwartz 1997, Barnett 1955:119). While village dogs were useful for hunting, woolly dogs are said to have been kept by women, whose wealth was counted in the number of dogs they owned (Schwartz 1997:56). Ethnographic accounts from the eighteenth century support these traditions. European explorers such as Galiano (in Howay 1918) and Vancouver noted the existence of Pomeranian-like dogs whose long, fine hair could be “lifted up by a corner without causing any separation” and spun into yarn (Roberts 2005, Howay 1918). Portrayals of woolly dogs in European art are rare, but Paul Kane’s work is notable for its depiction of a small white dog in the foreground of a painting of a woman weaving a blanket on a loom (figure 5-2, 1848-1856, Royal Ontario Museum) from Vancouver Island, believed to be a woolly dog. Later sketches by Kane show the

woolly dog to be a small, Spitz-like breed (Crockford 1997), which is coherent with the descriptions by explorers.

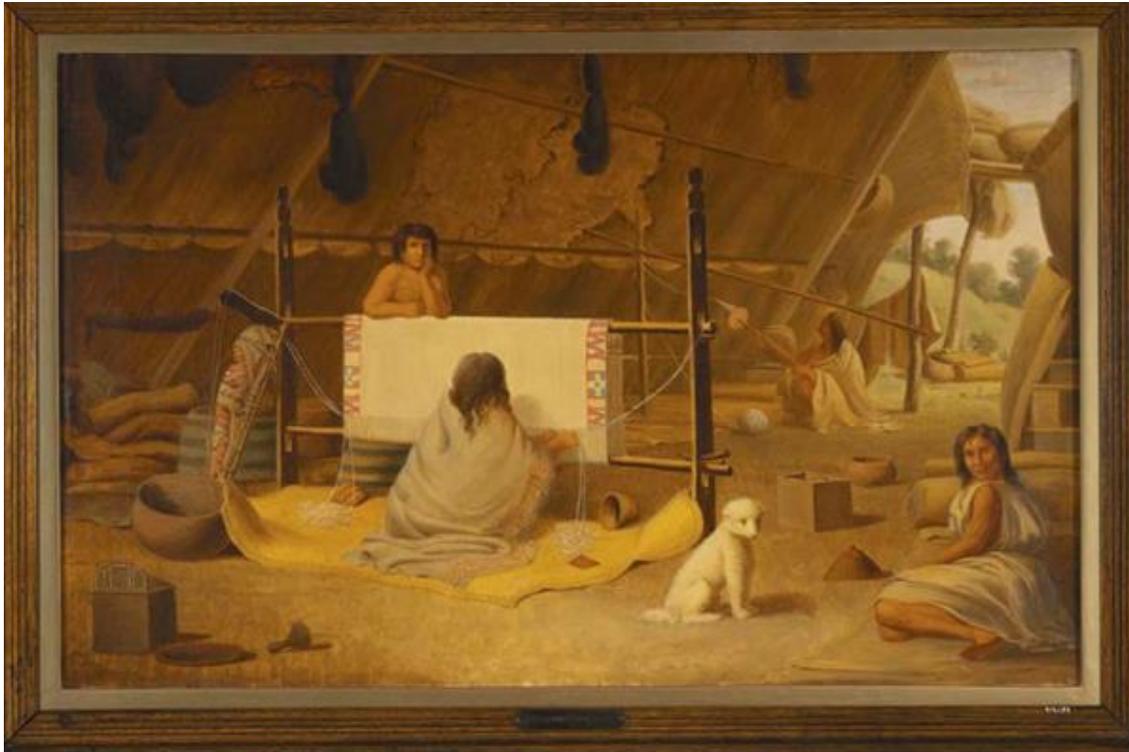


Figure 5-2. "A Woman Weaving a Blanket" Paul Kane, 1849-1856, depiction of wool dog in foreground, c.o Royal Ontario Museum © ROM

These dogs would have had to be kept separately from the short-haired village dogs to preserve the long-haired trait, which was recessive to shorter hair (Crockford 2000). Breeding has shown that in modern dogs, long-haired and short-haired crosses possess hair of intermediate length, suggesting that the offspring of such interbreeding would more closely resemble the short-haired parent (Crockford 2005). Ethnographic records suggest that in some places the woolly dogs were kept on small islands where they were tended daily, or inside houses, to minimize the possibility of interbreeding with the roaming village dogs (Scouler 1905, Kissell 1929, Ashewell 1978: from Solazzo et al. 2007). Living so closely with people, woolly dogs occupied a distinct social position from other dogs in Coast Salish villages. From a social perspective, woolly dogs were valued for their fur and thus were important wealth items in and of themselves (Schwartz 1997:56). As such, they were carefully managed. Traditionally, woolly dogs were so

valued in Squamish Nation that “if anything went wrong, a woman would grab her dog before her child” (Louis Miranda in Bouchard and Kennedy 1976b:11). One ethnographer recorded of the Puget Sound Salish that “in earlier times a woman’s wealth was measured in the number of dogs they owned,” (Schwartz 1997:56). Dogs were rare and highly significant, therefore tended carefully. While village dogs were mainly permitted to roam free, in some Salish Sea communities they were said to be fed salmon entrails after processing (Haeblerlin and Gunther 1930:22). In Squamish Nation tradition, dogs were cared for and kept inside (Barnett 1955) or, in the case of some hunting dogs, kept tethered outside by a special leash (Bouchard and Kennedy 1976b:11).

There are few known samples of blankets made with wool from woolly dogs, one of which originated at Yale and is today kept in the Smithsonian museum (Solazzo et al. 2011). However, dog hair blankets are well-documented by early European explorers and subsequent testing of one such blanket (Schulting 1994) supports the inference that dog hair was indeed used in this fashion, contrary to earlier arguments (e.g., Gustafson 1980). Throughout the nineteenth century, dog wool in blankets was gradually replaced by that of sheep, and woolly dogs as a distinct breed disappeared by the mid nineteenth century with the introduction of the Hudson’s Bay Blanket (Howay 1918), diminishing the need to keep woolly dogs as a distinct breed, which disappeared because of subsequent interbreeding with village dogs (Crockford 1997, Schulting 1994).

Osteometric analysis (Crockford 1997) supports the existence of two types of dogs in this region, while more recent aDNA analysis (Barta 2006, Barsh et al. 2002, Zimmerman 2014) blurs the distinctions between ‘small dog’ and ‘large dog’ typically used to differentiate archaeological remains. Instead, studies suggest that coat quality rather than dog size may have been what differentiated the two types of dog in Coast Salish communities (Barta 2006, Barsh et al 2002, Zimmerman 2014), making them more difficult to detect in archaeological assemblages. These studies have identified a range of haplotypes present on the Northwest Coast, the most ubiquitous of which is Haplotype D, the most common haplotype seen at Pacific Northwest sites (Barta 2006). Haplotype I is rarer but distributed over a wider geographic region, while Haplotype E has only been identified so far in a wool dog sample from Namu (Koop et al. 2000).

Other major regionally specific haplotypes include Haplotype A, which has been found to occur frequently in canid assemblages from outer central coast sites such as Namu, and Haplotype B, which is more widely distributed at both inland and coastal sites but less common (Barta 2006:93). Size-based analysis continues to be a factor in many studies of woolly dogs, but must be treated cautiously rather than accepted as incontrovertible evidence of dog type.

5.2. Skeletal Analysis

Canid remains are the most abundant mammal identified at *st'álm̓es* and were recovered from both midden and housefloor contexts. They are identified as domestic dog (*Canis familiaris*) based on direct skeletal comparison and reference manuals. Dogs have names and a variety of terms in Squamish language, such as the general term for a domestic dog (*skwemáy'*) compared to the term for a special type of hunting dog (*sk'ínu7*) or a special type of long-haired dog with hair hanging over its eyes (*kwepkqúpus*). However, linguistic research suggests that “even monolingual oldtimers referred to [coyotes] as ‘coyotes’” which suggests recent introduction into the region as there is no Squamish word to refer to them (Bouchard and Kennedy 1976a:15). This is supported by other records of coyote movement in the region (Ministry of Environment 1980:2).

Element distribution of canid remains between the two areas of the site is consistent, dominated primarily by teeth, phalanges, metapodials, and vertebrae, as these elements are more numerous in the skeleton and thus more likely to preserve in the archaeofaunal record. However, significantly higher numbers of dog remains were recovered from midden deposits (EU 1, 2, 11, 12, and 26) as a result of the presence of four identified pits containing nearly-intact canine skeletons. The higher density of dog remains associated with midden units is also associated with a lower degree of weathering, burning, and carnivore gnaw marks (table 5-1).

Table 5-1. Proportion of burned canid specimens recovered from *st'ámes* based on site area

	Unburned	Black	Grey	White	Total
Midden%	98.56	1.08	0.18	0.18	100
Housefloor%	82.47	13.4	1.03	3.09	100

Comparing the proportions of burned dog bone in each area shows similar distribution, with a higher proportion of calcined and blackened dog bones in housefloor deposits. The burning of dog remains does not differ spatially at a significant level. Browened canid remains are weathered rather than burned based on condition of the specimens and taking this into account, most of each area's canid assemblage is unburned. Considering the generally respectful treatment accorded to dogs in death at *st'ámes* based on ethnography, oral traditions and archaeological evidence, as well as the value accorded to particular dogs in life, it makes sense that canid remains would show similar treatment in each area. However, there is a higher proportion of blackened and calcined bone in housefloor deposits that is consistent with the presence of hearths and living areas, bones being affected by the processes of daily life, and increased likelihood of disturbance after deposition. This is significant when considering the presence of a possible burial in housefloor unit 23.

Midden deposits show a much lower level of weathering than canid specimens from housefloor deposits (table 5-2), likely because a majority of remains from the midden were recovered from pit contexts.

Table 5-2. Proportions of weathered *Canis* remains recovered from *st'ámes* based on site area

Weathering	1	2	3	4	5	Total
Midden%	51.53	46.32	2.15	0	0	100.00
Housefloor%	25.77	49.48	24.74	0	0	100.00

Even if these were not deliberate burials, the remains from midden contexts still would have been less exposed to trampling or heavy wear than remains from the housefloor, and as a result show a lower proportion of highly weathered bones than those from the housefloor. In contrast, in general remains recovered from the housefloor were exposed to more of the processes of daily life such as trampling and burning that might contribute to weathering effects observed. Dog elements from the pit context in EU 23 show higher degree of weathering than elsewhere in the housefloor deposits (table 5-3).

Table 5-3. Proportion of weathered canid remains compared between Unit 23 and all other housefloor units

	1	2	3	4	5
Unit 23	4.17	66.67	29.17	0.00	0.00
Housefloor Units	32.88	43.84	23.29	0.00	0.00

While dog remains are second in abundance to deer in housefloor contexts, they are nonetheless more abundant than in other sites of the region. EU 23 shows higher concentrations of Canid remains than any other units from the housefloor and include higher proportions of remains identified as *Canis familiaris*, accounting for 24.4% of canid remains recovered from all housefloor units. EU 23 canid remains are associated with a pit, which suggests dogs were buried in the housefloor as well as the midden, and remains from this unit were submitted for DNA and stable isotope analysis to complement osteometric analysis conducted in an earlier study (Arcas 1998).

In addition, canid remains recovered from housefloor deposits were more likely to be identified as *Canis sp.* rather than *Canis familiaris* due to a higher level of fragmentation, and are represented by a lower NISP than in the five midden units. For the most part they are spread throughout the twenty-four units in low numbers. It is possible that these remains were brought into the house by other dogs at the site, as scavenging by dogs is a common source of disturbance post-deposition (Marciniak 1999:309). Alternatively, these dog remains may have been curated within the house by humans. It is interesting to note a high relative concentration of mandibles recovered from housefloor deposits. While the number of canid remains confidently identified as

domestic dog is low, six mostly-intact canid mandibles were found in housefloor units, accounting for the high proportion of teeth (32.8%) in the housefloor dog assemblage. Moreover, there are three left mandibles and three right mandibles represented, meaning that MNI=3 in this context, but no other cranial elements found. As the variation of other elements present is low, this suggests that the mandibles may have been used within the house for some specific purpose. Ethnographic records do not specify a possible use of the mandibles but Hill-tout (1900) notes the practice of the Dog Dance among Coast Salish peoples in which a dog was consumed by a dancer whose guardian spirit was a wolf in a normally taboo act. It is possible that the *st'ámes* dog mandibles are likewise representative of a ritual practice.

5.3. Isotopic Analysis

Previous stable isotope analyses of canid remains are used as a proxy for studying human diets where human remains are not accessible (Ames et al 2015, Guiry et al 2011, Cannon et al. 1999). The results of these studies allow for insight into the primary protein sources in an organism's diet, as opposed to archaeofaunal assemblages that can be skewed by taphonomic factors and cultural practices. This is based on different ratios of carbon isotopes in the atmosphere and marine CO₂ reservoirs (Chisolm, Nelson and Schwarcz 1983), and therefore allows analysis of whether an organism's diet was primarily consuming terrestrial C₃ plants as opposed to C₄ plants such as maize or marine-plankton based food chains. As trophic level based upon each protein source increases, so too does the isotopic ratio.

Stable nitrogen isotope values between 13.0 δ¹⁵N‰ to 16.4 δ¹⁵N‰ represent a marine diet based on anadromous fish such as salmon, sturgeon and eulachon in contrast to freshwater fish, terrestrial mammals and ducks, whose 15N values range between 3.8 δ¹⁵N‰ to 9.6 δ¹⁵N‰ (Ames et al. 2015:276). Stable carbon isotope values between -13.4 δ¹³C‰ to -15.9 δ¹³C‰ are likewise indicative of diet based on anadromous fish, while a diet based on freshwater fish, terrestrial mammals and ducks shows a carbon isotope signature between -17.8 δ¹³C‰ to -23.3 δ¹³C‰.

Although the *st'ámes* sample of four dogs is small, it is comparable to sample size from similar studies across the region and beyond (e.g., Ames et al 2015, Byrd et al, 2013, Bocherens et al. 2015). At *st'ámes*, the stable isotope results obtained by Beta Analytic (2015) indicate a range of $\delta^{13}\text{C}$ value falling between -13.2 to -14.6 (table 5-4). These fall well within the expected range of dogs who had a marine diet based on anadromous fish, which is typical of canid remains recovered from archaeological contexts on the Northwest coast (e.g., Ames et al 2015, Cannon and Yang 1999, Barta 2006, Grier 2006).

Table 5-4. Stable Isotope results based on four canid samples submitted to Beta-Analytic Inc. (2015)

Sample Name	Site	Element	Unit	Level	Age (Cal BP)	Location	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$
Beta – 415815	DkRs 6	Tarsal	1	13	1305 – 1265	Midden	-13.3	15.5
Beta – 415816	DkRs 6	Tarsal	1	13	1300 – 1260 and 1200 - 1190	Midden	-13.2	15.8
Beta – 415817	DkRs 6	Metacarpal	12	9	935 - 795	Midden	-14.6	12.9
Beta – 415818	DkRs 6	Rib	23	10	1265 - 1065	Housefloor	-13.2	15.6

Since the stable nitrogen isotope values cluster between $\delta^{15}\text{N}$ 12.9 to 15.8, this supports the conclusion that the main component of the *st'ámes* dogs' diets was anadromous marine fish. The sample from EU 12 stands out compared to the others with a $\delta^{15}\text{N}$ value of 12.9 and $\delta^{13}\text{C}$ value of -14.6. While an outlier in the context of the four remains sampled, these still fall within the expected range of values for a diet based on anadromous fish for both stable carbon and nitrogen isotopes. This variation may be explained by the fact that, based on the lack of epiphyseal fusion in the majority of dog remains recovered from EU 12, the sample likely belongs to an immature canine, and as a result the stable isotopic values may be affected by suckling. Including this outlier, the mean nitrogen value for dogs is 14.95 $\delta^{15}\text{N}\%$, while the mean carbon value is -13.58 $\delta^{13}\text{C}\%$.

Other studies have established that coyote and wolf stable carbon isotope values are based on terrestrial protein sources (Barta 2006:115, Darimont and Reimchen 2002), providing more evidence that the *st'ám̓es* specimens represent domestic dog. Whether drawn from midden or housefloor contexts, all the dogs sampled in this study had diets based primarily on an anadromous marine protein source. Ethnographic records state that it was common for salmon waste to be fed to dogs in Northwest Coast communities in the early twentieth century (Haeberlin and Gunther 1930:22), and the stable isotope values of the *st'ám̓es* samples suggest it is possible that this practice extends into the distant past.

Based on the above samples, the close range of radiocarbon dates for the two specimens from EU 1 suggest that they belong to the same dog. Overall, the stable isotope values derived from samples from pit contexts in the midden do not differ substantively from that of the housefloor. If the two samples from EU 1 do belong to the same dog, the sample is small enough to restrict the conclusions that it is possible to draw. However, that dog remains from all areas of the site, whether located in the midden or from housefloor contexts, show similar marine-based isotopic signatures that reflect some degree of human involvement in the dogs' diets, whether the dogs were scavenging salmon waste from processing or were deliberately being fed as valued companions.

5.3.1. Regional Comparison of Isotopic Values

To consider how the *st'ám̓es* samples relate to other studies from across the Northwest Coast, stable isotope values were compared to assemblages from Namu, BC (Cannon et al 1999) and Cathlapotle, Oregon (Ames et al. 2015). Stable isotope analysis of the *st'ám̓es* dog remains show that they cluster closely with one outlier, while canid remains from Namu and Cathlapotle are more widely distributed (see figure 5-3). While the stable nitrogen and stable carbon ratios of all samples are within a range that supports the dominance of anadromous marine proteins in canid diets, the sites show enough difference to indicate local variations. The similarities between canid assemblages are particularly clear when compared to the mean grey wolf stable isotope values ($-22.29 \pm$

0.24 $\delta^{13}\text{C}\%$ and $6.26 \pm 0.25 \delta^{15}\text{N}\%$,) from modern specimens ($n=17$) across the Northwest Coast (Darimont & Reimchen 2002).

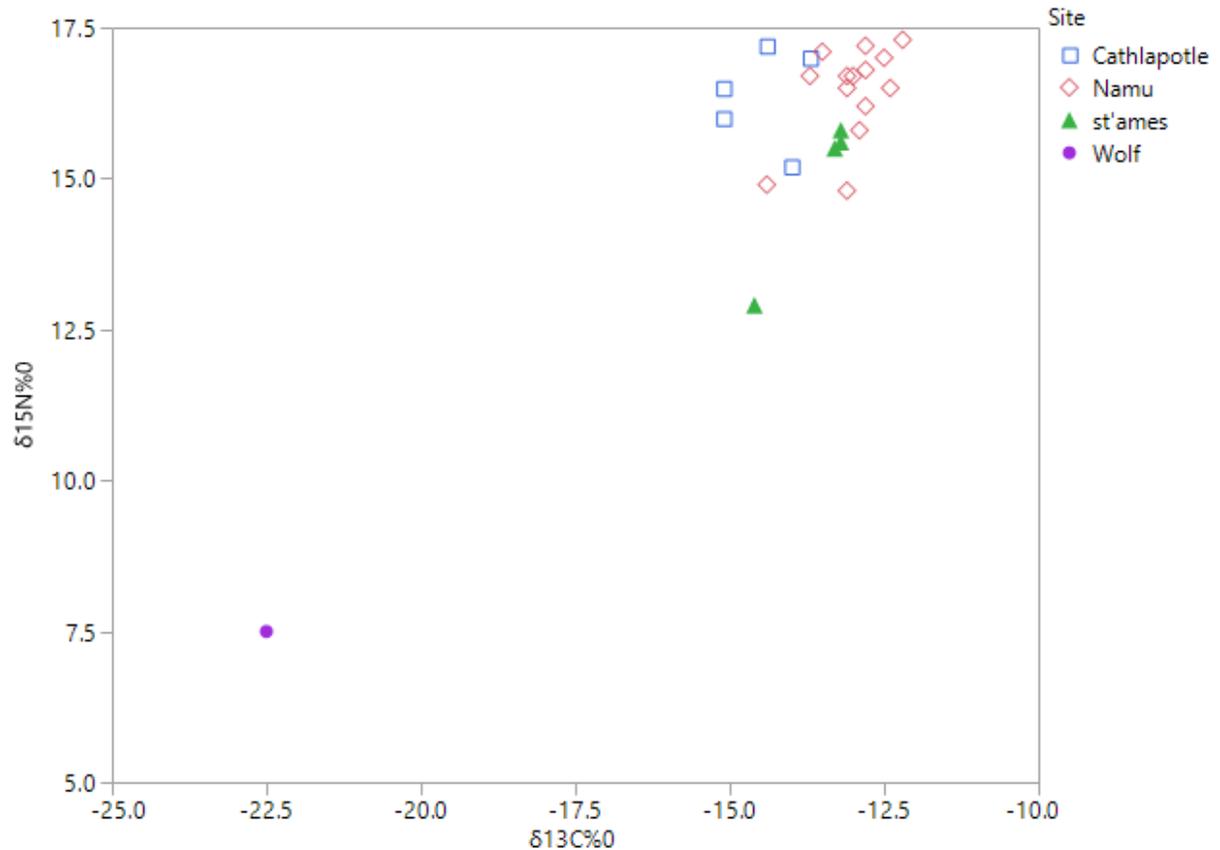


Figure 5-3. Stable carbon and nitrogen isotope ratios from st'ames compared to values obtained from Canis familiaris specimens at Cathlapotle (Ames et al 2015) and Namu's Late Phase (Cannon et al. 1999), mean standard grey wolf values from specimens sampled across the Northwest Coast (Darimont & Reimchen 2002)

Due to the recent application of this technique to the study of dog diets and limited nature of appropriate specimens, there are comparatively few samples across the entire Northwest Coast, and as a result the sites to which the st'ames assemblage must be compared range from the central coast of BC (Namu) to the Columbia River in Oregon (Cathlapotle). However, it is evident that the st'ames specimens fit within the overall distribution of stable isotope values from the Late Phase of other sites in the region, while still clustering closely together. Values from the Namu Late Phase cluster on one

edge, while values from Cathlapotle are concentrated towards the other end of the distribution, and *st'ám̓es* values fall in the middle.

The most distinctive outlier is from the *st'ám̓es* EU 12 sample, which has an uncharacteristically low nitrogen isotope value of 12.9 $\delta^{15}\text{N}\%$. As previously discussed it may be skewed because of the dog's comparative immaturity and is unlikely to reflect a deliberate cultivation of a different diet in life. This sample is also the latest date (935 – 795 cal BP) obtained from the *st'ám̓es* samples, which could indicate temporal variation in the marine protein source in dog diets, based on differing availability of fish in this period. In contrast, the stable isotope values of the housefloor sample from EU 23 are very close to those of the midden samples from EU1, indicating no difference in the primary protein source of dogs between site areas. Regardless of this subtle variation, the four dog remains sampled from *st'ám̓es*, like other dogs sampled from across the Northwest Coast, fall within the range of stable carbon and nitrogen isotope values representative of a diet based primarily on anadromous fish. The close range of three of the *st'ám̓es* samples in time (dated between cal BP 1065 – 1305) and stable isotope values may indicate a consistent protein source during the period in question.

From this comparison, it is apparent that there was minor variation in what dogs ate on a regional scale, which supports the claim that dogs on the Northwest Coast were fed anadromous fish such as salmon (Haeberlin and Gunther 1930:22). Moreover, it highlights the differences in diets between domestic dogs and wild canids, in this case grey wolves (Darimont and Reimchen 2002). The influence of terrestrial proteins in wolf diets creates a distinction between their diet and those of domestic dogs on the Northwest coast. Considering the mean carbon and nitrogen values for each site, the *st'ám̓es* results cluster more closely with those from Namu. However, stable isotope values indicate that their diets were not identical at each site, suggesting that other locally available anadromous fish such as eulachon may have been a primary source of marine protein in domestic dog diets, as is suggested to be the case at Cathlapotle (Ames et al 2015: 276). The question of which anadromous fish provided the marine protein source for dogs at *st'ám̓es* is less clear without conducting stable isotope testing of salmon or eulachon remains to establish a comparative value. Ethnohistorically, it was known as a key eulachon fishing site for Squamish Nation (Bouchard and Kennedy

1986:308) but the faunal assemblage does not reflect a corresponding abundance of eulachon.

5.4. Ancient DNA of canid remains at *st'ámes*

DNA extraction was completed successfully for three of four samples submitted for analysis (Table 5-5), selected from the same contexts as the stable isotope samples to test if a distinction between woolly and village dogs could be found. These samples were chosen from specimens that were subjected to osteometric analysis in the initial Arcas report (1998). While DNA sequences for all three closely resemble dog, indicating that they are domestic dog (*Canis lupus familiaris*) rather than wolf or coyote, only fragments from RR1 and RR4 could be fully amplified to allow identification of haplotype.

Table 5-5. Canid remains from *st'ámes* submitted for aDNA analysis (Royle 2016)

Lab Code	Beta Lab Code	Borden Number	Calibrated Date (cal BP)	Haplotype	$\delta^{13}C$	$\delta^{15}N$
RR1	Beta-415818	DkRs-6	1265-1065	I	-13.2	+15.6
RR2	Beta-415815	DkRs-6	1305-1265	N/A	-13.3	+15.5
RR3	Beta-415816	DkRs-6	1300-1260/1200-1190	N/A	-13.2	+15.8
RR4	Beta-415817	DkRs-6	935 -795	I	-14.6	+12.9

Further analysis of RR1 and RR4 indicate that they are members of Clade A, which is one of four major dog lineages, and is the most diverse and common clade identified among both modern and ancient dogs (Ames et al. 2015, Brown et al. 2013, Zimmerman 2014). Genetic evidence suggests that it is likely this clade originated in the late Pleistocene (~18 800 BP) in Eurasia (Salvolainen et al. 2002, Thalmann et al. 2013).

Moreover, comparisons of sequences from RR1 and RR4 show that both belong to Haplotype I (Royle 2016). This haplotype was widespread across the British Columbia coast throughout the pre-contact period, identified from dog remains at sites throughout Coast Salish (Dionisio Point, Tla'amin, *st'ámes*), Nuxalk (Anuctix, Nitlilquotlank), and Nuu-chah-nulth territories (Zimmerman 2014:80). Beyond this, Haplotype I has been

identified at Cathlapotle in Oregon (Ames et al. 2015), and Teotihuacan, Mexico (Leonard et al. 2002) (table 5-6).

Table 5-6. Archaeological Sites where previous studies have identified dogs exhibiting Haplotype I (c.o. Royle 2016)

Site	Location	Traditional Territory	Age	NISP	Reference
Cathlapotle (45CL1)	Oregon, U.S.A	Chinook	AD 1792 to ca. 1830	2	Ames et al. (2015)
Teotihuacan	State of Mexico, Mexico	Multi-ethnic city	1,300 years BP	1	Leonard et al. (2002)
Nitliliquotlank (FaSu-2)	British Columbia, Canada	Nuxalk	670 to 550 years BP	1	Barta (2006)
T'ukw'aa (DfSj-23A)	British Columbia, Canada	Nuu-chah-nulth	870 to 690 years BP	1	Barta (2006)
Dionisio Point (DgRv-3)	British Columbia, Canada	Hul'qumi'num	1800 to 1400 cal. years BP	1	Barta (2006)
Kleh Kwa Num	British Columbia, Canada	Tla'amin	499 to 312 cal years BP	3	Zimmerman (2014)
Rasmussen Bay	British Columbia, Canada	Tla'amin	Not Reported	1	Zimmerman (2014)
Grace Harbour	British Columbia, Canada	Tla'amin	Not Reported	1	Zimmerman (2014)
EaSe 2	British Columbia, Canada	Tla'amin	Not Reported	3	Zimmerman (2014)

This haplotype persists in dog breeds today such as Chihuahuas and Chinooks, among several other dog breeds that are hypothesized to have originated in the Americas (Royle 2016). While not as common as Haplotype D, which is pervasive in Northwest Coast dog populations by 4000 BP, Haplotype I is spread more widely, reaching beyond geographic and cultural boundaries. At *st'ámes*, radiocarbon dating indicates that although the two specimens share a haplotype they are separated by 130-470 years cal BP, which may indicate genetic continuity of the dog population over time. However,

more dated DNA samples from the *st'ámes* dogs are required before any firm conclusions about the implications of this persistence may be drawn.

5.5. Dogs at *st'ámes*

At *st'ámes*, a minimum number of 10 dogs were initially identified in the faunal assemblage based on osteometric analysis (Arcas 1998) (table 5-7).

Table 5-7. Osteometric analysis of dog remains recovered from *st'ámes* excavation units, reproduced from Arcas 1998 (Crockford)

Assessed Dog Breed	Excavation Unit	MNI	Part of a Burial	Assessment Confidence
Village Dog	1	2	Yes	High
Woolly Dog	1	1	Yes	High
Woolly Dog	12	2	Yes	High
Mixed Breed?	12	1	Yes	Low
Village Dog	26	1	Yes	High
Woolly Dog	26	1	Yes	High
Woolly Dog	23	1	Unknown	High

Initial analysis suggested that the *st'ámes* specimens were a mixture of wool and village dogs, and samples were selected from four of the contexts in which osteometric analysis was completed to confirm the identifications. However, the aDNA results are not consistent with the osteometric identifications. Both RR1 and RR4 came from specimens that were originally classified as woolly dogs but were found to belong to Haplotype I, which is not associated thus far with the woolly dog phenotype. While this may support the conclusion that size is not a reliable indicator of woolly dogs (e.g., Barta 2006, Barsh et al. 2002, Zimmerman 2014), it is also possible that the DNA samples were from different dogs than the specimens analysed by Arcas.

Dog skeletons were found partially articulated in Units 1, 12, and 26, potentially representing burials, but the most complete interment came from Unit 12. Radiocarbon dates from dog remains recovered from EU 12 support the pit inhumation, dating between 935 – 795 cal BP in contrast to dates from the same layer elsewhere in the

midden deposits that date to between 1416 – 1063 cal BP. It is a documented custom of Straits Salish groups that deceased dogs be buried “out of the way, away from the house” (Suttles 1974:105), so the dog burials at *st’ám̓es* is consistent with this practice regardless of the type of dog. Most of the pits in which the articulated dog remains were found in midden deposits, as would be expected if one was seeking an easily accessible spot away from the house, but the presence of the burial in the housefloor is contrary to this pattern. Stable isotope and aDNA results do not indicate any factors to set this specimen apart from those in the midden.

There is a diverse assemblage of terrestrial animal and bird remains present at *st’ám̓es* but this is not reflected in canid diets. While the zooarchaeological analysis indicates that there would have been a variety of remains available for scavenging, all the dogs sampled in this study reflect a marine-based diet, which suggests some level of human involvement. There is no indication from stable isotope values of a mixed terrestrial- and marine-based diet for any of the dogs analysed at *st’ám̓es*, which would be expected if they were scavenging from the midden or processing areas. Although some remains do show signs of carnivore chewing, stable isotope analysis does not indicate that this played a role in diets of *st’ám̓es* dogs. Likewise, the abundance of bird and mammal remains in the faunal assemblage is not represented in the carbon or nitrogen values.

That anadromous fish was the primary protein source may be indicative that the dog diets were managed by humans, as is suggested to have been the case for woolly dogs (Scouler 1905, Kissell 1929, Ashwell 1978, Schwartz 1997). However, regional studies indicate that this pattern is seen at other sites beyond the Coast Salish territory in which one would expect to see a differentiation in the keeping of woolly and village dogs. Rather, unless the woolly dog was more widely spread pre-contact, which is unlikely based on recent aDNA studies (e.g., Barta 2006, Zimmerman 2014), management of dog diet seems to have been practiced across the region, regardless of type. This is supported by aDNA analyses of dogs from the *st’ám̓es* assemblage that show that at least two of the remains share a haplotype and comparable stable isotope signatures.

The presence of Haplotype I in the *st'ám̓es* dog remains is consistent with other analyses of dog DNA in the Salish Sea region, as it is rare but widespread (Barta 2006, Zimmerman 2014). In Tla'amin territories, Haplotype I is the most commonly identified among dog remains, as four of twelve samples were found to belong to this group (Zimmerman 2014), but present in low numbers at several other sites. This is in contrast to Haplotype D, which is unique to the Northwest Coast and present at almost all sites in the region where dog DNA has been studied (Barta 2006). At Dionisio Point, a sample of five domestic dogs shows a diverse array of haplotypes (Barta 2006), unlike the dominance of a single haplotype at *st'ám̓es*. The widespread nature of Haplotype I and its identification at sites outside the Salish Sea region mean that it is unlikely to represent the Salish woolly Dog (e.g. Ames et al. 2015), but may indicate some other desirable characteristic for which people traded (Barta 2006). Moreover, the haplotype previously associated with confidently identified woolly dogs is Haplotype E (Barta 2006, Koop et al. 2000), which supports the interpretation that the two specimens analysed from burials at *st'ám̓es* are village dogs.

Although a higher number of dog remains were recovered from the midden due to the presence of an articulated dog skeleton and other remains found in in pit contexts, a potential burial is also associated with housefloor deposits in EU 23. RR1 was recovered from a pit feature, while RR4 is recovered from a near-articulated skeleton associated with a pit feature in EU12, the midden. Radiocarbon dates indicate that they are separated in time by as much as 300 years. Together with zooarchaeological data, this suggests that in addition to sharing a haplotype, dog remains from midden and housefloor contexts do not reflect significantly different levels of diet or post-depositional treatment. The proportions of burning, weathering, and carnivore gnawing of canid remains are consistent across the site. This supports oral histories and ethnographic records from Squamish Nation that indicate the social significance of dogs in the community (Bouchard and Kennedy 1976a:11-15).

The dates obtained from the four samples submitted for stable isotope analysis are primarily concentrated in the earlier phase of site occupation between 1305 – 1065 cal BP from both pit and housefloor contexts, with one midden pit burial dating to 935 – 795 cal BP, suggesting that burial of dogs was an ongoing practice at *st'ám̓es*. However,

more DNA analysis of dog remains from both midden and housefloor deposits at *s'tames* must be conducted before spatial or temporal patterns in the treatment of canid remains may be identified. That these two burials are most likely village dogs does not mean that woolly dogs were not present at the site, as currently unidentified canid remains may be revealed to be more likely candidates for Salish woolly dogs. Regardless of type, these results have implications for the social significance of dogs in the community.

Chapter 6. Social Significance of animals at *st'ámes*

To contribute to a more meaningful exploration of the social significance of the *st'ámes* faunal assemblage, I integrate multiple perspectives into the interpretation of zooarchaeological remains. As animals are a major aspect of the landscape, they gain significance through their engagement with wider traditions such as the existence of non-human kin (Reimer 2012). Despite this, the social significance of animals is difficult to detect in the archaeological record as it leaves few, if any, physical traces. While social significance might be reflected by documented place names or rituals (Hill 2012), these can seldom be traced in the distant past. Nonetheless, it is important to consider the roles that animals played in human lives. In the colonial context of North America, the sites and materials studied by archaeologists are not dead or static but parts of living cultural landscapes (Reimer 2012).

Existing literature discusses the risks of using the ethnographic record as a source for exploring meaning in the distant past, such as the risk of portraying indigenous cultures as static entities (e.g., Grier 2006). However, where continuity can be demonstrated between an ancient group and descendent communities, the integration of oral histories and ethnographic records contribute to the exploration of social significance in archaeological assemblages (Reimer 2012). At *st'ámes*, which has been inhabited continuously from 1500 BP to the present day, the ties between the Squamish Nation and their ancestors at this place in the landscape is strong. Archaeologically rare or unusual fauna and patterns identified in an assemblage may support the exploration of social significance when considered alongside regional data, oral histories, and ethnographic records. To fully examine the human-animal relationships represented in the *st'ámes* assemblage, one must consider the site within its regional and cultural context.

While there is local variation in the species represented at *st'ám̓es*, the taxa are overall representative of a Late Phase Central Coast Salish community, occupying this place in the landscape over at least 1500 years. When compared to Cove Cliff, Port Hammond, Dionisio Point and British Camp, the *st'ám̓es* assemblage is of moderate richness but has more evenly distributed taxa. While the abundance of specific taxa indicates a level of subsistence specialization, intersite comparison of the *st'ám̓es* Shannon index value shows a greater number of taxa used more evenly at the site, shaped by the ubiquity of domestic dogs. Identifying the ways in which *st'ám̓es* relates to regional patterns allows one to build a framework for exploration of social significance. Environmental factors play a significant role in the availability of animals at an individual site and only once addressed may one effectively analyze other influencing factors in an assemblage.

6.1. Does the *st'ám̓es* faunal assemblage reflect broader social trends?

While unusual taxa offer possible insight into social significance, the most common species identified in the *st'ám̓es* assemblage were consistently important in the lives of the humans who lived at the site. Their role as subsistence resources does not preclude them from possessing social significance, as nature and culture are deeply intertwined in Squamish culture (Reimer 2012:18) and the meaning the species possess differs according to context. The broader assemblage may be similar to other Coast Salish sites of the era but is distinctive in others, such as the abundance of dog remains. All the animals within Squamish landscape are a part of traditions shaping perception of the landscape through place names and oral traditions, hunting and subsistence practices, and settlement patterns.

6.1.1. Things that go on land

The mammal assemblages at each site show similar distribution of taxa when Canids are excluded from analysis. Except at Port Hammond, mammal remains are

present in lower numbers than fish but more common than birds, making up a moderate proportion of overall faunal assemblages. *St'ám̓es* follows this trend. Deer and other members of the Cervidae family are notable for being key elements of traditional subsistence and economic practices throughout the Salish Sea (e.g. Rahemtulla and Hodgetts 2001). They are often the most common taxa in Salish Sea mammal assemblages, as observed at *st'ám̓es* and British Camp, and are abundant throughout CWH and CDF climate zones. At *st'ám̓es*, certain taxa are identified in smaller numbers in the faunal assemblage that are not present in most of the other sites studied. Small carnivores such as mink are present in the region, particularly in wetlands, estuaries, and intertidal habitats of CWH zones (Meidinger and Pojar 1991), and are found at both *st'ám̓es* and Cove Cliff. Mountain goats, identified at *st'ám̓es* and Dionisio Point, favour more remote terrain, such as steep cliffs and mountainous terrains that are more difficult to access for human hunters. However, *st'ám̓es*' location close to a trailhead for an overland route to Indian Arm allows access to these high-altitude areas (Arcas 1998). Taxa such as black bears and seals are both locally available throughout the Salish Sea region and are identified in low numbers at all five sites, while wolf was historically present across CWH zones (Meidinger and Pojar 1991: 105) but identified only at *st'ám̓es*. The variation of mammals at these sites suggest they were an influential part of human lives even though they may not have been as significant dietary staples as fish on the Northwest Coast.

As one of the most abundant classes in the *st'ám̓es* assemblage, land mammals provide a good example of the ways that animals straddle boundaries between subsistence and social dynamics. Deer, the most common land mammal other than dogs, traditionally have multiple layers of significance. Squamish ethnography states that to have a successful hunt, a hunter must uphold appropriate social taboos, and following a hunt the remains must be treated appropriately to ensure that the deer returned to the area (Bouchard and Kennedy 1976a:33). This respect was integral to ongoing relations between humans and deer. Without proper treatment, animals would not continue to offer themselves to hunters so it was vital that hunters demonstrate appropriate behavior. This is not unique to Coast Salish peoples but is a central dynamic of relations

between hunters and animals in many communities around the world (Ingold 2000, Russell 2012, Sykes 2014).

Deer were economically important for the use of antlers as gaming pieces, sinew as sewing thread, and long bones as a raw material for tools (Bouchard and Kennedy 1976a:36, Hodgetts & Rahemtulla 2001:57). Such significance is reflected in the presence of worked bone and antler in mammal assemblages and high degree of long bone fragmentation at sites across the Northwest Coast, which is also evident in the *st'ám̓es* mammal assemblage. In addition, in the ethnographic period deer possessed ritual significance, as hooves were attached to staves or worn around the ankles by novice dancers (Bouchard and Kennedy 1976a:37). Thus, one must consider this importance when evaluating the role that deer played in the lives of *st'ám̓es*' inhabitants.

While other species were less common than deer, there is evidence of their social significance in the ethnographic record. Among the less-abundant mammal species identified at *st'ám̓es*, several mink bones were recovered from housefloor deposits. Traditionally, mink pelts possess spiritual and healing through shamanic ritual (Bouchard and Kennedy 1976a:21, Barnett 1955) and may also have been used to adorn clothing. Mink is not ethnographically recalled to have been hunted or used as food but their pelts were used by Indian doctors in healing, coming alive when commanded (Louis Miranda in Bouchard and Kennedy 1976a:21). When considered with reference to their cultural significance, the physical context of the mink bones in the heart of ritual and social activity housefloor deposits may be linked to such a practice.

Another significant mammal species in Squamish ethnography is the mountain goat, which is represented by a single element in the assemblage. This species was not locally available at *st'ám̓es* but could be hunted in the surrounding mountains. Ethnographically, mountain goat is associated with hunting rituals as they could only be obtained by individuals with special powers (Barnett 1955). They were challenging to acquire and valued highly (Bouchard and Kennedy 1976a:45). The wool of mountain goat is known to have been important for weaving (e.g., Coast Salish Blankets) when mixed with fibres such as dog hair or plants. One of the most important uses of mountain

goat wool in the ethnographic period was in blankets, which were symbols of wealth and distributed to guests of potlaches, one of the most well-known social rituals of the Northwest Coast. In addition, mountain goat horns could be made into spoons or hooves attached to rattles (Bouchard and Kennedy 1976a:45) while fat was used for food. Although archaeologically rare, Squamish ethnography indicates that mountain goat possesses distinct social significance both as a component of human rituals and economic resource. While a single mountain goat element is not directly indicative of these practices in the past, it links the *st'ám̓es* assemblage to these deeper levels of meaning and tradition.

Although wolves historically lived throughout the Salish Sea region, wolf remains were not found at Port Hammond, Cove Cliff, British Camp, or Dionisio Point, and are archaeologically uncommon. In a 1991 survey of about twenty Salish Sea zooarchaeological assemblages, wolves were found in only three (Hanson 1991:189), which makes the identification of a wolf element at *st'ám̓es* notable. The wolf element was recovered from housefloor deposits, situating it within one of the core social and ritual locations of a Coast Salish community (Barnett 1955, Lepofsky et al. 2009). Linked to this cultural framework, the presence of wolf is socially significant. According to Squamish Nation oral history, wolves were not killed because they had raised an illegitimate child left out for them rather than eating it, and thus wolf is an ancestor of the Cheakamus people (Bouchard and Kennedy 1976a:9). Barnett suggests that Coast Salish peoples did not kill wolves because they were skilled hunters who made powerful guardians and supernatural helpers (1955:93). Ethnographically, people for whom wolf was a guardian spirit sometimes participated in the “Dog-Eating Dance” in which a small dog was consumed (literally or figuratively) to “get well” (Bouchard and Kennedy 1976a:10). It is possible the wolf at *st'ám̓es* is associated with such a ritual, or may have been representative of a social practice such as a supernatural helper. The rarity of wolf overall makes it interesting to speculate about its presence at the site and given the lack of representation of other wolf elements, it is unlikely to represent an important economic or subsistence resource. However, regardless of the role it played at the site in the past, wolf is bound within this cultural and archaeological context that shapes how people interacted with and understand the significance of this species.

6.1.2. Things that swim

Fish are a dietary staple across the Salish Sea, and Central Coast Salish archaeology is full of cases where fish dominate the faunal assemblage (e.g., Trost 2005, Ewonus 2006, Pegg 1999, Grier 2006, McKechnie 2014), helped in part by the wide array of species present in the waters over a year. This is well supported by oral traditions and ethnographic records (e.g. Bouchard and Kennedy 1976b, Hill-Tout 1900, Barnett 1955, Suttles 1970) that emphasize the importance of fish in human diets. Throughout the region, ethnographic records document the ways that fish are interwoven with human social systems. Recent literature discusses the ways in which these social structures are linked to resource management, such as the complex social systems that exist around ownership and use of fishing locations, which are in turn linked to proper management of fish (Campbell and Butler 2010, Deur and Turner 2005, McKechnie and Moss 2016). Particularly good fishing spots are owned by individuals (Barnett 1955, Bouchard and Kennedy 1976b, Suttles 1990, Matson and Coupland 1995) and might be loaned to other individuals in times of abundance. Thus, dealing with fish was a matter of daily life that touched not only human interactions but human engagement with the landscape.

The taxa at each site reflect the use of a variety of different environments, which is particularly evident in the fish assemblages. While the most abundant species are those that were present in the local environment, whether herring (as at Cove Cliff, British Camp, and Dionisio Point) or salmon (as at *st'ám̓es* and Port Hammond), the variety of others range more widely. Salmon and herring are the most abundant fish in the *st'ám̓es* assemblage, both known to have been traditionally important resources for Squamish Nation (Bouchard and Kennedy 1976b) as well as other Coast Salish groups (Barnett 1955, Drucker 1965, Suttles 1970). The archaeological abundance of these resources support their oral historical and ethnographic significance, which manifested not only in roles as subsistence resources but in complex resource management strategies and traditions. Salmon and herring are both available close to *st'ám̓es* in the Squamish River and Howe Sound respectively, making them practical resources as well as culturally significant. Archaeologically, the dominance of these species is consistent

with the most abundant taxa at the other Salish Sea sites, suggesting a degree of specialization in Salish Sea fisheries.

Although the *st'ám̓es* fish assemblage is less rich than sites such as Dionisio Point, key species present are similar to those throughout the Salish Sea. However, it is also reflective of the locally abundant taxa in and around Howe Sound. At *st'ám̓es*, the abundance of cod and pollock is unusual when compared to the other Salish Sea sites. Today, there is a Pacific Cod population in the Salish Sea (Fishery Report 2001:67) that may have been available to peoples throughout the region in the past. Pacific cod and Alaska Pollock may inhabit a range of environments but are typically bottom fish. The abundance of flatfish at *st'ám̓es* compared to the other sites, reinforces the potential significance of deep water fishing at the site. Assorted flatfishes are also identified at the site in higher proportions, with comparable numbers seen only at British Camp where the sample assemblage is significantly larger than at *st'ám̓es*. Flatfish are likewise typically bottom dwellers (Hart 1975), which may imply a focus on offshore fisheries at *st'ám̓es*. Spiny Dogfish is identified at every site except Port Hammond, again singled out as an inland riverine site, which limits access to the varied marine habitats of the Salish Sea's only shark (Hart 1975:45-56), and in moderate abundance at *st'ám̓es*.

While the *st'ám̓es* fish assemblage is on the whole characteristic of archaeological sites throughout the region, Squamish Nation ethnography illuminates the significance of these species. Significant literature has been devoted to the role of salmon both pre- and post-contact within archaeological contexts (e.g., Butler and Campbell 2008, Cannon and Yang, Grier 2006) across the Northwest Coast. For Squamish people, the First Salmon Ceremony, in which the spiritual provider is thanked for the previous year's harvest, and prayers are said for abundant fish in the coming run, is a practice that continues to this day (Reimer et al. 2016: 17). The first salmon of the season is caught and processed specially before the bones and entrails are thrown back into the river (Bouchard and Kennedy 1976b:16-17, Suttles 1970). The ceremony is presided over by a ceremonial specialist and must be held before the fishery can begin (Reimer et al. 2016:17), to ensure continued reciprocity and abundance of fish by reinforcing respectful relations. Salmon are both revered and depended upon as an

important resource, leaving a mark on material culture such as ceremonial objects that may be involved in the First Salmon Ceremony (e.g., Reimer et al. 2016) and more mundane objects of fishing and processing. Moreover, human relationships with salmon are marked on the landscape through the construction of fish traps, which reflect ties to the Salmon People (Reimer 2012:58). In Squamish oral tradition, there are numerous histories related to fish, particularly salmon. One such example is the Salmon People who feature frequently in Squamish oral traditions from the time of the Transformers (e.g. Hill-Tout 1900), which is the reason that salmon bones and entrails must be returned to the water to ensure future runs of fish (Bouchard and Kennedy 1976b:21-22).

In the *st'ám̓es* assemblage, herring are the second-most common fish. Ethnographically, they are noted to be significant species, (Bouchard and Kennedy 1976b:4) whose abundance in the sheltered bays of Howe Sound made it possible to obtain in great quantity to be stored for winter. As a result, herring were an important subsistence resource (Louis Miranda in Bouchard and Kennedy 1976b:25), but their significance is not limited to food. The cultural importance of herring is reflected in the legend of the Deserted Youth (e.g., Hill-Tout 1900), in which an abandoned young man receives a gift from the Sun that allows him to catch any number of herring in a time of shortage and thus earns the respect of the village that abandoned him. Their subsistence importance links herring to a wider role in social systems.

Of the other more abundant fish identified at *st'ám̓es*, ethnographic records provide little data concerning their social significance beyond the knowledge that they were eaten, while some ethnographically important species (e.g. eulachon) are present in low numbers archaeologically. Spiny Dogfish is an exception, notable as it is a traditionally taboo food (Bouchard and Kennedy 1976b) with a low subsistence value. Cultural knowledge provides some possible explanations for its presence in the *st'ám̓es* assemblage. Ethnographic documents suggest that the rough skins of spiny dogfish were used as sandpaper for woodworking, while dorsal spines could be used as sewing needles (Bouchard and Kennedy 1976b:102, Stewart 1977). Fish oil (*sxwes*) rendered from Dogfish, as well as ratfish, livers was of medicinal value (Bouchard and Kennedy 1976b:102). Moreover, this high oil content may have been used to supplement diets

that were protein-rich or contribute to diets when other foods were scarce (Cannon 2000). Dogfish are also known to be a herring predator (Monks 1987) and their presence in the assemblage may be a by-product of the herring industry. Thus, the quantity of spiny dogfish intersects with its economic significance and social factors, if the taboo against its consumption existed in deep history.

6.1.3. Things that fly

Like the fish assemblage, the birds identified at *st'ám̓es* are generally consistent with those seen at other sites across the Salish sea and are mainly species whose primary significance is subsistence-related, such as ducks and gulls. Most observed differences in the bird assemblages may be attributed to environmental factors shaping the taxa available at each site. Members of family Anatidae were the most commonly identified birds at all five Salish Sea sites by a wide margin, representative of the abundance of waterfowl in waters throughout the region, while other taxa such as grebes, herons, and loons are present in trace numbers. At *st'ám̓es*, ducks are the dominant bird taxa with a lesser abundance of gulls, and a variety of each were known to Squamish Nation in the ethnographic period (Bouchard & Kennedy 1976a:67). Gull eggs were also collected and eaten, gathered from specific places in the landscape around Squamish where they were known to be abundant, such as the Seagull Islands at the head of Howe Sound (Bouchard and Kennedy 1976a:80). However, birds make up a much smaller proportion of the overall faunal assemblages than either mammals or fish and *st'ám̓es* is no exception. Of the few other species represented, Bald eagle remains follow gulls in abundance. Ethnographic records suggest that the more common ducks and gulls, which are represented primarily by wing elements, were primarily significant as subsistence resources while the eagle remains are dominated by talons. The taboo against eating eagles makes it unlikely that the presence of eagle talons in the *st'ám̓es* assemblage can be explained by subsistence factors.

Waterfowl, locally available and primarily hunted for food, exemplify the blurring of the lines between social significance and subsistence. Mallards, the most commonly identified ducks at the site, were traditionally considered good eating (Louis Miranda

in Bouchard & Kennedy 1976a). In Squamish oral tradition, Mallard played a role in Skunk's potlach, in which it gained its vertical take-off tendency as a result of trying to escape Skunks' smell by flying straight up (Bouchard and Kennedy 1976a:67). Ethnographically documented methods of hunting ducks take advantage of this by communal hunting strategies, involving large numbers of people hiding in the bushes in a low overhanging area to startle the birds airborne, where they could then be caught (Bouchard and Kennedy 1976a:67). According to Bouchard and Kennedy (1976a:107-8) the softer covering feathers of waterfowl were kept and scattered to placate spirits. Moreover, in an intersection with human ritual practices, dancers and hunters adorned their heads with feathers or down on important occasions (Barnett 1955), and the practice of spreading feathers is said to give strength to one's guardian spirit's powers (Bouchard and Kennedy 1976a:107).

As a species that was not traditionally important for a role in human diets, Bald Eagles are an interesting example of the social significance accorded to birds in life and their value in human societies. According to Squamish tradition, bald eagles were never to be harmed as it was a bald eagle who appeared after the great flood to give fish to the survivors at Cheakamus, a Squamish village (Bouchard and Kennedy 1976a:73). Although hunting of eagles is traditionally taboo because of their kin-relationship with the Squamish people, ethnographic records reflect another level of social significance by their role in ritual practices. Ethnographically, eagle down is used to adorn the heads of dancers, while feathers and talons are used for ornamentation (Bouchard and Kennedy 1976a:73-74, Barnett 1955). This traditional practice illustrates how social beliefs shape human-animal interactions on multiple levels, as the mythological and historical role of eagles shapes their relationship with Squamish people. In keeping with taboos, it is possible the eagle elements could be collected from fallen individuals, emphasizing the complex nature of relationships between humans and animals.

6.2. Things that Live with People

The most distinctive aspect of the *st'ám̓es* faunal assemblage is the abundance of dog remains. While Canids are not uncommon at sites throughout the Salish Sea, such high numbers as are identified in the *st'ám̓es* midden are rare. It is also notable that several of these domestic dog specimens were recovered from pit features in midden and housefloor deposits, as no other fauna at *st'ám̓es* were associated with features of any kind. This suggests that at least some of these dogs were intentionally buried.

6.2.1. Social Context of Dogs on the Salish Sea

Occupying a unique place in human societies as a non-human-being living in close quarters with people, domestic dogs are not only part of human lives but of human culture (Schwartz 1997). They embody the blurring of nature and culture more than any other species. Deliberate burials of domestic dogs such as those seen at *st'ám̓es* are the most direct reflection of their social significance of dogs in human lives.

In Coast Salish communities, as in many other communities of the Pacific Northwest Coast, village dogs fulfilled multiple roles as guardians, hunters, scavengers, and companions. In contrast, the iconic woolly dogs were a wealth source linked closely to human social practice and status by providing wool for blankets. As blankets were a central feature of potlaches, this made them a source of prestige (Hill-Tout 1895, Suttles 1987, Kissell 1929). Early encounters along the coast provide numerous accounts of small dogs who were shorn like sheep to provide wool for weavings, living closely with people (Masson 1889, Scouler 1905, Vancouver 1792). Throughout history, woolly dogs have occupied a unique place of importance in Coast Salish communities.

It was not just woolly dogs that were socially significant to peoples living around the Salish Sea—Barnett notes that hunting dogs were “cared for and kept inside, a bed made beside owner” (1955). How far this practice extends into the past is unknown, but the burials of dogs of all sizes at *st'ám̓es* suggest that dogs were valued enough for

people to wish them respectfully interred regardless of type. In Squamish culture, village dogs were important to the economy in their role as hunters (Bouchard and Kennedy 1976a:11). Ethnographically, they were carefully trained to hunt animals such as mountain goat or deer and when not hunting, village dogs could be tethered on a rope outside of the house to prevent them from running off to chase animals (Bouchard and Kennedy 1976a:11).

Dogs held an integral role in human communities, whether as a source of wealth, resources, companionship, or hunting skills. Oral traditions such as “The Deserted Youth” story or “The Story of the Chief’s Daughter” legend of Squamish nation illustrate their significance, both of which include dogs engaged in activities that eventually lead to the great respect of their people (Hill-Tout 1900). The presence of domestic dogs at *st’ám̓es* throughout its long history of occupation indicates that they played a role in human engagement with one another (through their role in definition of status) and the environment (as hunters and companions), linking the site to wider significance of dogs in human lives across the Salish sea.

6.2.2. Social Significance of Dogs at *st’ám̓es*

Based on ethnographic data and oral histories, domestic dogs at *st’ám̓es* had multiple degrees of social significance. Historically, village dogs and woolly dogs were involved with human lives, occupying differing roles but receiving similar degrees of human investment in diet, care, and training. The archaeological dog assemblage from *st’ám̓es* supports the importance of domestic dogs at the site, indicating that not only did humans influence their diets but some dogs were valued highly enough to bury.

Several dog specimens at *st’ám̓es* are associated with pit features, primarily in the midden assemblage from EU 12 and EU 1. However, a significant number of domestic dog remains were also associated with a pit feature from EU 23 in the housefloor assemblage. The potential interment is interesting to note as according to ethnographic records, dogs were traditionally buried away from primary living areas (Barnett 1955:). However, stable isotope and aDNA analysis indicate that it is similar in

all respects to contemporaneous burials from the midden. Any features that led to its unique location of interment have not preserved in the archaeological record. While it is possible that the interment of a dog in the housefloor (RR1) indicates a shift in practices over time, RR4 (EU 12) dates to a later period of occupation and returns to midden interment. Consequently, there is little evidence to allow speculation one way or another with regards to shifting burial practices. The unique placement of the housefloor specimen may be tied to ritual activities, such as the dog-eating dance noted among Squamish peoples in the ethnographic period (Barnett 1955), or may be more mundane. More radiocarbon dates and stable isotope analysis of *st'ám̓es* dog remains are required before one can discuss in depth the factors that may have influenced the burial of dogs at the site.

Initially identified as woolly dogs based on osteometric analysis, both of the *st'ám̓es* dog samples from which aDNA results were obtained were identified as Haplotype I. It is currently thought that this haplotype is spread over too wide a region to be a likely candidate for the Coast Salish woolly dog (Ames et al. 2015, Barsh 2006), which ethnographic evidence suggests were restricted geographically to the Salish Sea, but is a rarer Haplotype among Northwest coast dog with an interesting distribution. The more ubiquitous Haplotype D is abundant at sites through the Northwest Coast, crossing language and cultural barriers, while Haplotype I is limited to more recent sites within Coast Salish territories (Zimmerman 2014). Its rarity makes it interesting to consider in relation to the social significance of domestic dogs of *st'ám̓es*, although the limited nature of the sample makes it difficult to speculate about its meaning. It is possible that, were other samples to be analysed, a wider array of dogs would be represented at *st'ám̓es*.

Based on the radiocarbon dates obtained for RR1 and RR4, haplotype I persisted at the site over an extended period. While the osteological and genetic analysis offer little evidence as to the significance, its widespread nature may suggest that these dogs were being traded widely for some desirable characteristic. The presence and subsequent burial of Haplotype I dogs at *st'ám̓es* may be reflective of their role in networks of trade, migration, or kin relations between communities (Zimmerman

2014:74, Barta 2006). As a result of the limited range and rarity of this haplotype, Zimmerman proposes that Haplotype I dogs at Tla'amin may be associated with networks of exchange between certain communities (2014), and fitting the *st'ám̓es* dogs into this context offers interesting avenues of exploration. It is consistent with the range of other haplotype I dogs on the Northwest Coast. Unlike most sites where Haplotype I has been identified, such as Tla'amin and Cathlapotle (Zimmerman 2014, Ames et al. 2015), it accounts for the entirety of the successful samples at *st'ám̓es* rather than being identified alongside other more common haplotypes such as D or A. However, further research is required to discover whether other dogs at the site share the haplotype.

Although current evidence suggests that the *st'ám̓es* dogs are more likely village dogs than woolly dogs, the burials indicate that they were valued in the ancient *st'ám̓es* community, enduring over an extended period. Stable isotope analysis points to a primarily anadromous marine-based protein source, which supports a level of human involvement in dog diets at the site. Such involvement is consistent with traditions documented in ethnographic records and oral histories, in which dogs were fed salmon waste (e.g. Haeberlin and Gunther 1930). While the dog remains themselves reveal few specifics of the social significance of domestic dogs at *st'ám̓es*, the existence of burials and their abundance link the site to the social dynamics of human-dog relationships throughout the Salish Sea. The intersection of dogs, culture, and the natural world is illustrated by an oral history from the time of the *Xaay Xaays*, or Transformer brothers,

“...[who] traveled up the Squamish River and heard activity up in the mountains. They came across a group of young men and their hunting dogs. The Transformers asked the hunters what they were doing, they replied that they were hunting Mountain Goats. The transformers watched their hunts and witnessed the slaughter of many goats. They told the young men to stop what they were doing, but they disagreed. Thus, the Transformers turned them into stone, with the large peaks of this mountain range being the men, and the smaller shorter peaks being their dogs.” (Reimer, Personal Communication 2017)

This area is called *Tse'wilx*, or the Tantalus Range, across the Squamish River from what is today downtown Squamish, and is still known as a good place to hunt mountain goats (Bouchard and Kennedy 1986:390). This history exemplifies the way that dogs and people are tied to the landscape, through the activities in which they engage

together such as hunting and daily interactions, and through the cultural knowledge that shapes interactions with the world. Ultimately, *st'ám̓es* dogs are part of greater traditions of significance of both village and woolly dogs throughout the region.

6.3. Beyond food: zooarchaeology in a wider context

While the *st'ám̓es* faunal assemblage is in general reflective of patterns of subsistence practices seen across the Salish Sea, it is the stories and practices unique to Squamish Nation that make it socially significant. At *st'ám̓es*, people have occupied this place in the landscape over the past 1500 years, and continue to live there today. While environmental contexts account for many of the faunal variations present, others, such as the presence of dog burials and abundance of eagle talons, stand out. The examples presented here illustrate the social significance of animals to communities, emphasizing the importance of integrating multiple perspectives in the analysis of archaeological animal remains. People engaged with animals in the past in diverse ways, as persons as well as resources. These relationships are often complex, shifting boundaries between economic and social significance, shaped by cultural values such as the embodiment of right relations. Ethnographic records and oral traditions demonstrate important aspects of the social significance of animals in human lives that may not preserve in the archaeological record. Regardless of how far into the past they extend, animals are linked to the beliefs of descendent communities through the ways that people engaged with and continue to engage with the world. Stories such as the eagle assisting ancestors during the flood or tales of the Transformers shape the personhood of animals as they are encountered into the present, intertwined with the people and beings who once interacted in the landscape. Traditions such as the respect owed to animals in hunting are entangled not only in the way one understands the world but engages with it.

In Ingold's ontology of dwelling, humans are immersed in active engagement with the other components of a dwelt-in world, encompassing landscape, animals, and all other beings, which structure understanding of the world as well as daily life (2000). This

engagement with other beings in the dwelt-in world structures all subsistence activities and interaction with the landscape, making it a useful perspective when analysing the significance of a faunal assemblage. Not only do humans and animals have subsistence relationships, but they can shape human movement through the world and settlement locations because of seasonal movements (Ewonus 2014, Marciniak 2005), leave their mark on the landscape through place names, oral narratives, and resource management (Hill 2012, Deur and Turner 2005, Reimer 2012, White 2011). In Squamish tradition, the boundaries between culture and nature are not discrete, with history recorded in oral traditions associated with specific places (Reimer 2012). Humans are not separate from their environment but one component of it, engaging with the other creatures in it on a daily basis, and these relationships are shaped by the history written in the landscape.

The ecological perspective in zooarchaeology is useful, as it allows us to study how people used animals at a site in the past, insight into their subsistence practices, material culture, seasons, hunting practices, and economy. However, by drawing on oral tradition and ethnography in zooarchaeological analysis, one can begin to explore the intricacies of the social significance of animals in human lives in the past. In many traditional cultures, animals are persons in their own right (Bouchard and Kennedy 1976, Ingold 2000, Hill 2012, Russell 2012, Suttles 1978, Overton & Hamilakis 2013) and must be treated with respect through appropriate practices to ensure their continued presence. Consequently, to study them only from a perspective of how they were useful to people overlooks some of the roles they played in human lives.

6.3.1. Recommendations for future research

To expand on the study of social significance of animals in archaeological contexts, interviews with elders and other members of modern descendent communities about the significance of animals would further the aim of incorporating multiple perspectives of the significance of animals in human lives. By exploring other strands of evidence of the roles of animals in human lives, there is potential to create more relevance between the study of zooarchaeological remains and descendent communities. There is also opportunity in the study of stable isotope ratios and ancient

DNA analysis of domestic dogs at *st'ám̓es* and the across the Northwest Coast. While there is a growing number of studies exploring dogs as a proxy to human diets (e.g. Ames et al. 2015, Zimmerman 2014), studying the stable isotope ratios of archaeological dogs allows one to explore the relationship between canines and humans in the past. Moreover, by adding more samples of DNA analysis to the study of the *st'ám̓es* assemblage, one can delve deeper into the potential presence of woolly dogs at the site and the significance of Haplotype I dogs. A larger sample of canid remains submitted for isotopic analysis combined with DNA studies could reveal new dynamics of social relationships in the past, or support those known from ethnographic records and oral traditions..

Additionally, DNA analysis of the dogs in the *st'ám̓es* assemblage allows one to see how these specimens fit into regional patterns of movement and interaction. There are several distinct haplotypes of dogs identified on the Northwest Coast (Barta 2006, Ames et al 2015, Zimmerman 2014), and creating a broader sample base of the haplotypes of *st'ám̓es* dogs would allow one to see how they compare to broader patterns of the interactions of people and movement of goods across the landscape. This would permit exploration of broader social relationships between the people of *st'ám̓es* and the Northwest Coast, as well as the role that domestic dogs played in these dynamics. These avenues for research offer potential to explore the social dynamics of relationships between humans and animals in the archaeological record more deeply.

6.4. Conclusion

The *st'ám̓es* assemblage provides an example of the potential of zooarchaeology, when combined with ethnographic records and oral traditions, to elucidate aspects of the social significance of animals in human lives. Taking these factors into account in zooarchaeological research can also contribute to relevance in contemporary society. Not only does social zooarchaeology address the role of animals in human lives in the past, but draws upon the significance that they hold for descendent communities today. These dynamics are tied to landscape, the relations between

humans and the natural world, which in turn influences how people relate to animals. Consequently, such research has the potential to contribute to more productive discussion of multiple perspectives of the significance of animals that may be more relevant to descendent communities.

While social dynamics are difficult to detect in the archaeological record, their significance to modern descendants as well as past communities makes the study of social relations valuable to archaeology inquiry. Beyond food, animals were and continue to be a vital component of human existence, shaping interactions with the landscape, belief systems, daily activities, and one another. Studying the context of faunal remains and the ways that an assemblage differs on a regional level in light of human-animal relationships also contributes to the development of social zooarchaeology. However, further research will shed light on the specific ways in which humans and animals interacted in the past. Stable isotope analysis and aDNA studies offer opportunities to expand the understanding of the relationships with animals that live with people and the ways these are embodied in material remains. Through such analysis, it is increasingly possible to study how people engaged with animals as more than food.

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Appendix A.

Supplementary Data File

Description

The attached Excel spreadsheet includes the raw data as gathered from the *st'ámes* faunal assemblage in the SFU Zooarchaeology lab. Materials are identified to class, counted, and weighed. Where possible, element, taxa, and other data are also recorded. Where categories are marked as 'U,' that type of information is undetermined for the specimen in question.

Filename:

St'ámes_raw_data.xls