CHAPTER 6

The Use of Large Terrestrial Mammal Bone on the Northwest Coast

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Introduction

Discussions of Northwest Coast faunal-economy tend to focus largely on diet and seasonality, with far less attention paid to non-dietary constituents. In Northwest Coast middens marine taxa tend to numerically overwhelm terrestrial mammals, resulting in the argument that land-mammals provided a secondary and minor nutritional source in subsistence systems that were primarily marine focused. However, large terrestrial mammals were more than nutritional resources; they also provided valuable raw materials used for a number of types of material culture. Archaeologically this fact is reflected in the ubiquity of artifacts made of terrestrial mammal bone. For example bone and antler were commonly used as raw materials for elements of composite marine harvesting equipment. Bone and antler harpoons, barbs and hooks have been recovered in abundance at various Northwest Coast sites.

The economic contribution of terrestrial mammals is almost always inferred from the non-modified archaeo-faunal remains and rarely from the artifact assemblages. The rare weighting of this non-dietary contribution results in an under-evaluation of the overall importance of land-mammals in marine economies. When zooarchaeological evidence is combined with worked bone and antler remains, the importance of terrestrial mammals is revealed not only in their relative nutritional contributions, but also in their raw material contributions. As such, terrestrial mammals may have been more important to the economy as a whole in pre-Contact times than is realized.

By the time the ethnographers were making their observations, Northwest Coast peoples had replaced much of their traditional raw materials with new materials such as iron. This shift to metal would have had the effect of limiting the importance of land mammals as a source of raw materials for tools. As iron and other raw materials became more commonly available, the need to capture terrestrial mammals may have declined so that during the ethnographic period activities such as hunting and trapping of deer and elk had lost some of their value.

The Pre-Contact Period

The Peoples of the Northwest Coast are renowned for their complex stratified societies, large sedentary villages dependent on stored surpluses, rich ritual and artistic traditions, and large trade networks, all based on a maritime way of life (Suttles 1990). In most cases the economic basis for this phenomenon was the surplus capture, processing and storage of the various species of Pacific salmon, supplemented by various marine organisms. Although this maritime focus likely developed during the late Pleistocene/early Holocene (Carlson 1998:31), mid-Holocene stabilization of hydrological and ecological regimes may have been an important contributing factor to an increase in numbers of anadromous fish in major coastal waterways in subsequent millennia (Fladmark 1975). Archaeologically there appears to have been a marked intensification of use of marine and riverine resources on the Northwest coast after 5000 BP [5730 cal BP] (Ames and Maschner 1999; Cannon 1991:48; Matson and Coupland 1995), indicated in the rising relative frequencies of fish bones (particularly salmon). Marine and riverine taxa heavily dominate coastal faunal assemblages after this time, a trend corroborated by stable isotope studies on archaeological human (Chisholm 1986) and dog (Cannon *et. al.* 1999) skeletal material that indicate high levels of marine protein consumption.

Although some Northwest Coast communities used sophisticated and group intensive methods such as reef netting for procuring marine resources (Suttles 1974), these methods

were restricted to specific localities. Fish weirs and all manners of traps were, however, common throughout the coast and interior. These methods undoubtedly provided much of the marine harvest, although in archaeological middens on the coast, the appearance of bone tools in high numbers is also indicative of their importance in procuring marine resources.

Prior to European contact, bone from land mammals served as the raw material for a wide variety of tools and implements, a number of which were used for harvesting marine resources. Northwest Coast peoples manufactured a variety of harpoons, fishhooks, leisters, spears and specialized implements such as the herring rake. Most of these were composite tools in which wood was the primary raw material though bone and antler barbs were used in a number of implements, and bone and antler pieces were important elements in fixed and toggling harpoons and in other technologies (Stewart 1977). Archaeologically these bone and antler elements appear in impressive quantity in many sites (Table 6:1), even though the wooden elements rarely survive. Deer (*Odocoileus hemionus*) and wapiti (*Cervus elaphus*) were primary sources of raw material for production of bone and antler artifacts. Ethnographic and ethnohistoric works document the use and importance of bone technology in fishing and woodworking industries, as well as in other aspects of daily life on the Northwest Coast (Boas 1891; Barnett 1955; Stewart 1981; Suttles 1974).

Archaeological middens on the other hand exhibit an overwhelming number of fish and other marine taxa in comparison to unworked land mammal elements particularly from deer and wapiti. The sheer mass of marine faunal remains at a site can be quite impressive in both volume and quantity. Terrestrial mammal bone may be under-represented in faunal samples due to various taphonomic processes such as marrow extraction, tool manufacture, scavenging by dogs and other animals, and differential bone density survivorship, although the articular ends of such bones are usually not used as part of the finished tool, and are identifiable as faunal remains. Many Northwest Coast zooarchaeological reports document very high numbers of bone fragments that are unclassified beyond "land mammal" or "artiodactyl" due to fragmentation. In some cases as few as 20% of the total mammal sample can be identified to lower taxonomic categories (e.g. Arcas 1996). This lack of identification serves to heighten the statistical dominance of the easily identifiable salmon vertebrae (Hodgetts and Rahemtulla 2001:57), although fish bones in general are softer and survive less well than land mammal bones, and this factor could help even out the equation. Those same sites with quantities of fish bone also contain large numbers of bone and antler artifacts most commonly made on deer and wapiti elements.

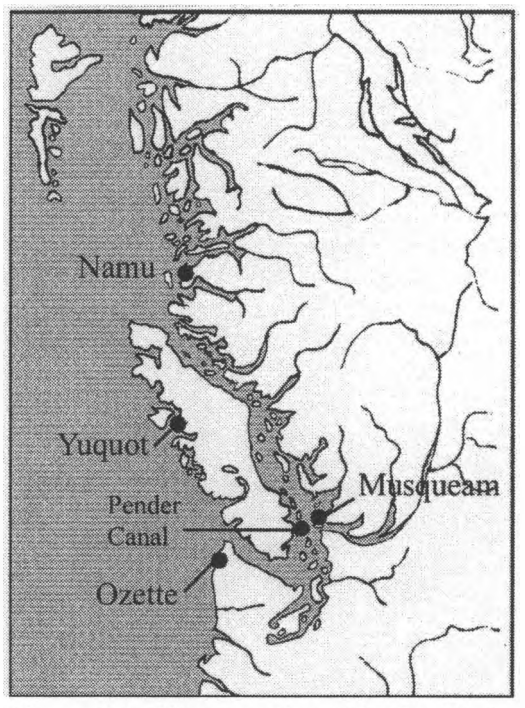

Figure 6:1. **Sites mentioned in the Text.**

This dichotomy is highlighted at many Northwest Coast sites (Fig. 6:1, Table 6:1). At the Ozette site, terrestrial mammals are poorly represented in the archaeofauna and yet this class is relatively far more significant as a raw material for bone artifacts. Ozette is unique in being one of a handful of Northwest Coast localities in which the inhabitants practiced intensive whaling (and other sea mammal harvesting). In view of this the majority of bone artifacts are made on whale bone; however, removal of whalebone artifacts from the sample reveals that only 11% of the remaining artifacts are made on sea-mammal other than whale, while an overwhelming 89% are made on land-mammal, most likely deer. An additional 1,174 bone artifacts were not classified to taxon, and Huelsbeck (1994:50) opines that many of these are made on land mammal bone. The Ozette data suggest that terrestrial mammal elements were highly selected for tool manufacture, and that they are under-represented in the faunal collection (Huelsbeck 1994:49).

Table 6:1. Northwest Coast sites with deer/wapiti faunal samples versus artifacts made on terrestrial mammal bone and antler (after Hodgetts and Rahemtulla 2001:Table 1).

Site	Deer/Wapiti (% of total site fauna by NISP)	Modified bone and antler Total	(% land mammal)	Sources
Namu	1.3	168	97.0	Cannon 1991 Carlson 1995
Yuquot	N/A	133	80.2[1]	Rick 1980
Pender Canal Sites	1.9	1675	99.1	Hanson 1995 Carlson 1986
Ozette	1.2	952	44.2, 88.8[2]	Huelsbeck 1994
Musqueam(DhRt 4)	0.7	34	89.5	Pratt 1992 Stiefel 1985

[1] This is one of very few analyses that attempted to identify species and elements from artifacts. A sample of 133 was submitted, 58 were unidentifiable but are thought to be deer, these are included in this figure. Unfortunately no information is available on mammalian fauna.

[2] First figure includes whalebone artefacts; second figure represents land-mammal artifacts after removal of whalebone artifacts.

Namu is a multi-period site on the central coast of British Columbia (Fig 6:1). Cultural deposits here span some 10,000 [11,400 cal BP] years and include shell midden beginning at roughly 6500 BP [7450 cal] (Carlson 1996). Deer is the most common mammal at Namu throughout the sequence although as in many Northwest Coast sites, fish remains grossly overwhelm mammalian elements (Cannon 1991). Also as in other sites, the vast majority of bone artifacts are made of terrestrial mammal bone (Table 6:1).

Some 168 artifacts from the same deposits at Namu are classified as modified bone and antler (Table 6:1). Many of these are complete or fragments of barbs, harpoons and other types used in composite marine harvesting implements. The vast majority of bone tools (97%) are made of terrestrial mammal elements, with a smaller number of sea-mammal or bird bone. Once again, the fact that deer accounts for only 1.3 % of total faunal remains at Namu indicates the importance of terrestrial mammals cannot be simply gauged from archaeofauna alone. This pattern is evident at several other Northwest Coast sites (Table 6:1), providing support to Conover's (1978) contention that deer procurement at Namu was driven by a need for non-dietary elements such as hides and bone, and not by nutritional needs.

Although many archaeologists comment on the importance of terrestrial mammal bone for tool production (e.g. Cannon 1991:23; Ham 1982; Hanson 1995:43), these comments are rarely followed up with an assessment of the actual economic importance of land mammals. While bone artifacts from these sites have been analyzed in terms of typology and function, less emphasis is put on identification of elements and species from which the artifacts were derived. Given the nature of some bone artifact types on the Northwest Coast and rates of fragmentation, such identifications may be a difficult task. Nonetheless, such analyses would be potentially useful in measuring the importance of land-mammals as raw material sources (Hodgetts and Rahemtulla 2001).

There is also some suggestion that terrestrial mammal bone and antler was selectively transported to and curated at these sites for the purpose of tool manufacture. Cannon (1991:23-27) conducted a brief taphonomic exercise comparing the Namu deer data to Brain's (1980:117) study on differential goat skeleton survival in Hottentot camps. Overall the relatively strong correlation between the Namu deer data and Brain's published values (r_s=0.64, P <.005), led Cannon to suggest that whole carcasses were brought back to the site, however, there may be a modest selection for elements (limbs) used in tool-making. More recently the Namu data were subject to comparison with Lyman's (1984) deer bone density values, and the results are very similar to the goat data analysis (Cannon 1999: pers. com.).

At Crescent Beach Ham (1982) found wapiti elements accounted for 75% of mammalian remains recovered in 12 of 31 excavated layers. Ham classifies body parts into three general categories, head, body, and limb. Wapiti limb elements are anomalously high in most layers with the exception of Layer 4, which exhibits a

high preponderance of "body" elements and a virtual absence of "head" elements. With caution Ham argues that selective transport of limb elements and antler for tool production was likely (1982:364). A fairly wide sample of bone and antler tools was recovered in addition to nearly 300 tiny chips of antler, leading Ham (1982:269) to suggest that tool manufacture took place at the site.

This apparent selection for limb elements is interesting in light of the many Northwest Coast ethno-historical references to the importance of lower limb elements, particularly metapodials in artifact manufacture (Boas 1909: 505, 1921: 157; Barnett 1955:101; Suttles 1974: 91, 115). One such stock pile was discovered at the Pender Canal site, DeRt 1 (R. Carlson pers. comm. 2002). Some authors discuss stockpiling of such elements for future tool production (e.g. Suttles 1974:91) and in some cases metapodials were stored under water in order to keep them from being detected by dogs. It is possible that the archaeological over-representations of limb bones are remnants of once larger stockpiles depleted via modification for marrow and/or modification into various artifact forms. This practice may be difficult to gauge solely through examination of the non-modified faunal assemblage. The presence of artifacts made on terrestrial mammal bone provides another line of evidence.

Stringent foci on diet and seasonality downplay the contribution of terrestrial mammals; this oversight potentially creates an added bias in gauging the importance of various economic constituents. Part of the problem may reside in conceptual approaches where modified bone is categorized as a separate class of material culture from unworked bone. This process begins in the field where "bone artifacts" are collected, bagged and classified separately from "faunal material." In many cases different individuals conduct analyses of the two material categories, and this leads to an arbitrary division whereby bone tools are conceptually distanced from their raw material sources. Paradoxically, while bone and antler tools are viewed as important mechanical elements in the maintenance of prehistoric marine subsistence, the value of hunting and trapping terrestrial mammals for the raw materials is understated. Inclusion of bone and antler tools in faunal analyses, with the goal of identifying species and elements, would partially mitigate this problem. With a few exceptions (Driver 1984, 1985; Lugg 1986; Rick 1980) faunal analysts do not normally examine bone tools for zoological classification. This inclusive approach would yield a more refined estimate on economic contributions, and can be done in addition to functional and typological analyses (Hodgetts and Rahemtulla 2001).

The Ethnographic Period

On the whole most ethnographies probably downplay the economic role of large terrestrial mammals, focusing instead on maritime resources (e.g. McIlwraith 1949). While many ethnographers discuss traditional bone and antler tool manufacture, it is apparent that by the time of their observations in the 19th and 20th centuries many of the traditional technologies had been substantially altered or replaced by iron and other new raw materials. Despite this situation there are good ethnographic descriptions on the manufacture of traditional implements, probably from knowledge retained within the aboriginal communities. Deer and wapiti provided much of the bone and antler raw material for these composite implements as described by Boas 1909:505; Barnett 1955:101; Gunther 1936:117; Suttles 1974:106, 115 and Swan 1870. Lower limb elements seem to have been particularly favoured, perhaps due to the presence of large flat areas that are advantageous to producing certain tool types. Boas (1909:494, 505) describes several traditional methods for working bone in the process of manufacturing composite tools. Interestingly, the specimens he illustrates (Boas 1909:489) are archaeological examples; contemporary specimens were not available or did not exist. In fact, Boas indicates that many of the contemporary composite implements are made of iron while retaining traditional forms (1909:494). This observation suggests that traditional raw materials were not commonly used in the manufacture of these implements at this time. Stewart (1977) also illustrates a number of traditional fishing and hunting implements transformed by the use of iron.

Western raw materials and goods transformed aboriginal use of the landscape and had repercussions for social systems. While having this rich ethnographic base to draw from is certainly a luxury, careful reading is necessary to understand the nature of the transformations that took place with European contact. In this manner, a more rigorous and holistic understanding of pre-Contact lifeways can be achieved.

Conclusions

From a faunal-economic perspective, terrestrial mammals may have been more important in pre-Contact Northwest Coast communities than

is presently argued. Hunting and trapping of terrestrial mammals in these coastal communities may have been driven primarily by the need for raw materials, and secondarily by nutritional desire. It seems fairly certain that on the Northwest Coast, large terrestrial mammal bone and antler played a role in sustaining marine/riverine economies. These raw materials were also modified into a variety of other forms used in daily life; this is borne out by the number of bone and antler artifacts recovered from middens. Archaeofaunal contents on their own may not reflect the economic import of terrestrial mammals. An integrative approach that combines unworked faunal material with zoological identification of bone and antler artifacts is more productive for evaluating roles of various taxa in lifeways of coastal peoples (Hodgetts and Rahemtulla 2001). Although the focus of this paper has been on bone and antler raw materials used in marine harvesting technologies because they are preserved in the archaeological record, other mammalian raw materials could have been equally important such as hides, sinews, internal organs, fat, hooves and more. Terrestrial mammals would have been formidable packages of raw materials *and* meat and marrow.

With a focus on economy, bone tools can be viewed as results of a production trajectory where raw materials are procured, processed, used and discarded much like other portable technologies such as stone tools (see for example papers in Odell 1996). The obvious difference with land mammals is the additional nutritional and non-nutritional (hide, internal organs, etc.) resources they provide. Far from serving nutritional purposes only, large land-mammals may have been highly valued as packages of raw material. As such, production of bone and antler technologies probably entailed some degree of logistical sophistication involving scheduling, transport, and stockpiling of raw materials. In this light, the importance of terrestrial mammals is heightened above that indicated in ethnographies and many zooarchaeological studies, especially where bone tools were important in the maintenance of marine subsistence.

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