

ECONOMIC PREHISTORY OF THE NORTHERN BRITISH COLUMBIA COAST

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Abstract. The northern British Columbia coast includes the coastal mainland and the Queen Charlotte Islands. The archaeological record of this region is not as well known as other parts of the Northwest Coast. The period between ca. 10,000 and 5000 BP is known only for the Queen Charlotte Islands, and then only poorly, while the period after 5000 BP is represented best on the mainland, particularly through excavations in Prince Rupert Harbour. Evidence from adjacent portions of the coast clearly indicates that during the earlier period the northern British Columbia coast was occupied by hunter-gatherers using marine resources and habitats. In the subsequent period, people made use of an array of littoral and marine habitats, exploiting a wide range of resources, including the hunting of whales off the Queen Charlotte Islands. The regional economies appear to have undergone significant intensification around 3500 BP with the emergence of a storage-based economy and subsistence patterns marked by logistical moves to offshore islands and other similar locations. Faunal remains from different sites suggest that marine mammals were generally important resources, though exploitation patterns appear to have been localized.

Environmental Setting

The area discussed here includes both the northern British Columbia mainland, from Princess Royal Channel to the border between British Columbia and Alaska, and the Queen Charlotte Archipelago. This group of islands is separated from the mainland to the east by Hecate Strait and from the Alexander Archipelago of insular southern Alaska to the north by Dixon Entrance (Fig. 1). Culturally, this area is the southern portion of the northern subarea of the Northwest Coast culture area. This northern subarea, which is sometimes called the Northern Maritime subarea (Suttles 1990), contains the historic territories of the Haisla and Tsimshian on the mainland and the Haida on

the Queen Charlotte Islands. The Tsimshian include four groups speaking closely related languages: the Southern and Coast Tsimshian on the coast and the Gitksan and Nishka on the Skeena and Nass rivers respectively.

The Modern Environment

The coastal topography of British Columbia and southeast Alaska consists of two north-south trending mountain ranges separated by a partially drowned lowland. The Insular Range of British Columbia and southeast Alaska is the more westerly of the two mountain ranges. Vancouver Island, the Queen Charlotte Islands, and Alaska's Alexander Archipelago form the visible portions

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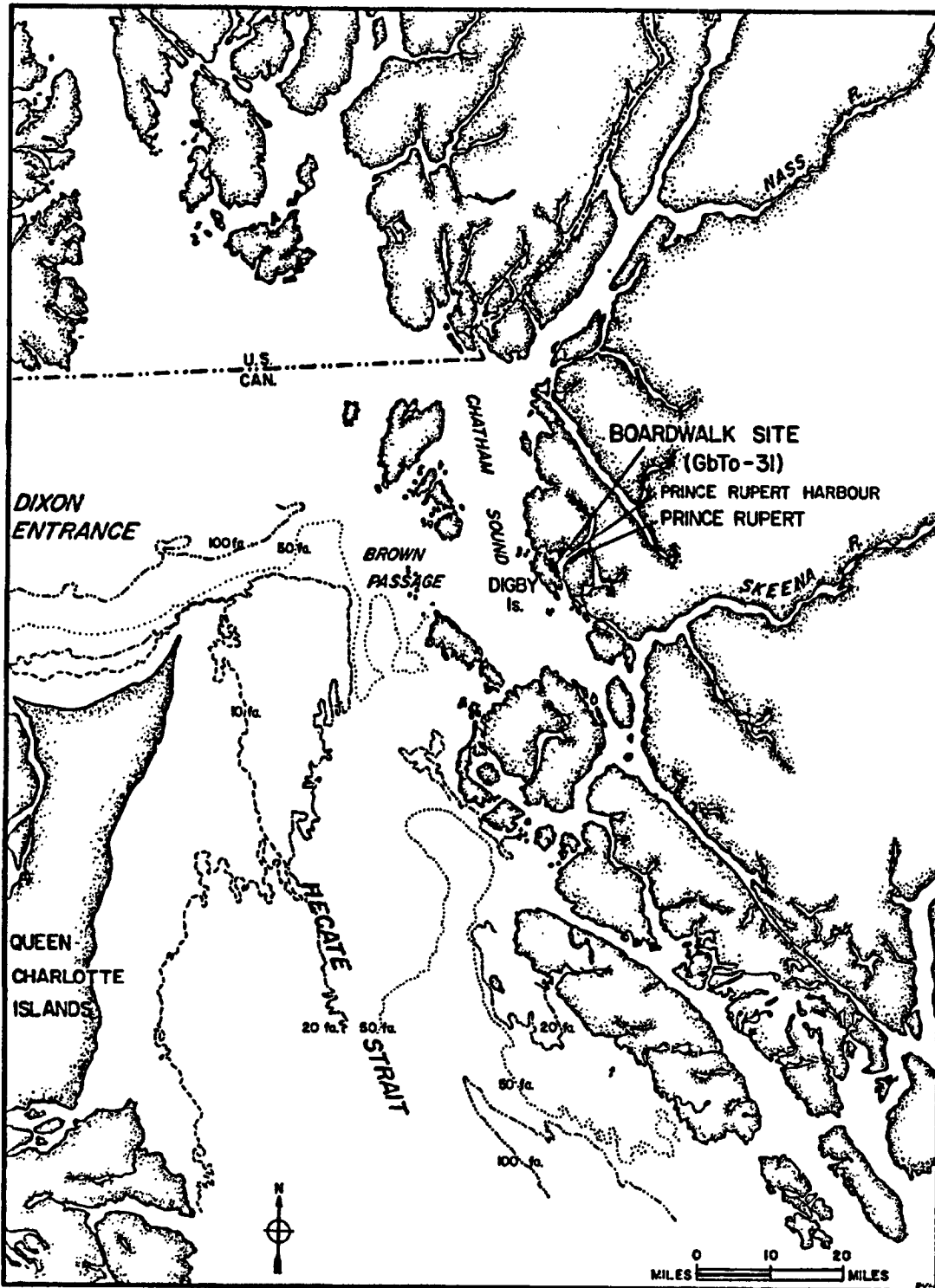


Figure 1. Map of the region, including localities mentioned in the text.

of the Insular or outer mountains (usage after Fladmark 1975). These outer mountains are generally quite rugged, creating a complex, reticulate coastline broken by bays of all sizes, islands, and fjords.

East, or inside, of these outer mountains is the coastal trough, which includes the Hecate depression of the northern British Columbia coast. The coastal trough is characterized by elevations below 120 m. Although much of it is drowned, there are many broad, flat areas above sea level, including the eastern side of the Queen Charlotte Islands and smaller islands in the Prince Rupert region of the mainland coast (Fig. 1). These islands are low, surrounded by shallow waters and, at low tide, enormous mud flats.

The Coast Range of the British Columbia-Alaska mainland is the second, inner mountain range. It is a very rugged, alpine range that was extensively glaciated. Its ocean frontage is broken in many places by long, narrow fjords flanked by sheer cliffs. The waters at the foot of these mountains are filled with islands. The mountains generally rise to elevations of 2000 to almost 2800 m above sea level.

The Queen Charlotte Islands lie some 50 to 130 km west of the mainland and are about 250 km long. Average distance from the island groups to the mainland is 70 km. There are two main islands, Graham in the north and Moresby to the south. These are escorted by well over a hundred lesser islands. The two main islands are reminiscent of a kite, with Graham Island the kite's triangular sail and Moresby its dangling tail. The west side of the islands is the western edge of the outer mountains and is precipitous and steep in places, while the eastern side is lower and flatter.

Except for seas off the western side of the Queen Charlotte Islands, the waters of the region are relatively sheltered. They vary in depth from more than 150 fathoms to less than 20. Deltaic deposits from the Skeena River have created extensive shallow banks around a number of small island groups. These banks are extremely rich marine habitats. The marine waters of the northern British Columbia coast are ecologically very productive because of interacting factors (Stewart 1977).

Halibut (*Hippoglossus stenolepis*) and herring (*Clupea pallasii*) are the major marine fish of the region (Carl et al. 1967). Halibut spawn in waters between 150 and 225 fathoms mainly between the months of November and January (Stewart 1977). Such deep waters occur in Dixon Entrance. Young halibut live in much shallower waters, but as they age and grow, they move into deeper water. Younger fish are available for exploitation over a broader region. Large spawning schools of herring occur periodically in Prince Rupert Harbour, drawn by the eelgrass (Hoos 1975). The annual

movements of herring are not predictable and the fish are sensitive to fluctuations in salinity.

A range of sea mammals, from small whales (*Cetacea*) to sea otters (*Enhydra lutris*), is found in the general region (Cowan and Guiguet 1965). Whales are more commonly found in deeper, pelagic waters, though killer whales (*Orcinus orca*), harbor porpoises (*Phocoena phocoena*), and Dall's porpoises (*Phocoenoides dalli*) have been sighted in coastal waters (Hoos 1975). Northern fur seals (*Callorhinus ursinus*) are usually found in Dixon Entrance and Hecate Strait but are occasionally observed in more coastal waters (Stewart 1977). Northern sea lions (*Eumetopias jubata*) and the ubiquitous harbor seal (*Phoca vitulina*) are present. Sea otters were once found in the shallow banks and rocky reefs of the Prince Rupert area. A variety of terrestrial mammals occurs on the northern British Columbia mainland. Of these, sitka deer (*Odocoileus hemionus sitkensis*) were probably the most important in Coast Tsimshian subsistence.

The mainland coast is drained by the Skeena and Nass rivers, two of the major rivers on the Pacific coast of North America. Both rivers support significant salmon runs. The Nass also possesses the major spring eulachon (*Thaleichthys pacificus*) run on the northern Northwest Coast (see below). Banks and shallows composed of the Skeena's deltaic deposits have also formed at the mouths of the three sea channels into the Skeena's estuary.

The Skeena's salmon runs are second only to those of the Fraser River in British Columbia (Hoos 1975). Although sockeye (*Oncorhynchus nerka*) is the primary species, pinks (*O. gorbuscha*), coho (*O. kisutch*), chum or dog (*O. keta*), and chinook (*O. tshawytscha*) also run in the Skeena. Runs occur between mid-summer and mid-autumn. Other anadromous fish in the Skeena are steelhead (*O. mykiss*) and four other species of smelt (*Osmeridae*), including eulachon. The eulachon run on the Nass is in late winter and early spring. Smelt oil was a highly prized part of the native diet.

Terrestrial environments are dominated by the coastal temperate rainforest. The major forest trees are western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*) (Hoos 1975). Other coastal forest trees include yellow cedar (*Chamaecyparis nootkatensis*), lodgepole pine (*Pinus contorta*), sitka spruce (*Picea sitchensis*), amabilis fir (*Abies amabilis*), and Douglas fir (*Psuedotsuga menziesii*). Despite the apparent uniformity of the rain forest ecozone, it is remarkably diverse.

The region has a modified maritime climate (Hoos 1975)—cool and wet. Maximum precipitation falls in October, minimum in June. Summers can also be foggy. The Queen Charlotte Islands can

be particularly stormy, but provide little protection for the mainland from storms. Rainfall is heavy. The frost-free period on the mainland runs from mid-April to early November, approximately 200 days.

The region is ecologically rich, partly due to the conjunction of several physiographic boundaries and four biotic zones. Ocean currents, upwelling, tidal flux, and the mixing of salt and fresh water produce complex, nutrient-rich marine and littoral environments. On a finer scale, the environment can be described as patchy, or fine-grained. For example, shallow banks and tidal flats are highly localized. Resources such as salmon are localized in both time and space.

Paleoenvironments

The last major glacial stage in British Columbia, the Fraser glaciation, began sometime between 25,000 to 30,000 BP and reached its apogee ca. 14,500 to 15,000 BP. The ice sheet was thinner on the northern coast than in southern British Columbia and only extended some distance out into the Hecate Lowland (Clague 1984). Onset of deglaciation in the Hecate Lowland appears to have been quite rapid. Clague (1984:47) cites a radiocarbon date of $12,700 \pm 170$ BP (GSC-2290) as a minimum date of deglaciation in the Prince Rupert Harbour. Stations upstream on the Skeena, such as Terrace, may not have been deglaciated until ca 10,000 to 10,500 years BP.

As the ice retreated, the sea followed it; however, the sea level histories of the outer and inner coasts are different. On the inner coast, Clague (1984:51) has established the height of an early (pre-8000 BP) marine transgression in the Terrace-Kitimat area at 200 m "higher relative to the land than at present" and suggests, based on Huessler's (1960) earlier estimates, that sea levels were 40 to 135 m higher at Prince Rupert during this post-glacial transgression than at present. Sea levels may have briefly achieved their modern position in the Prince Rupert region about 8000 to 8500 years ago and then fallen to a position somewhat lower than at present. The modern shoreline was established around 5000 BP.

On the outer coastline of the Queen Charlotte Islands, sea levels were at -100 to -150 m perhaps 13,000 years ago. They rose rapidly, and by 8000 to 5000 years ago were higher by perhaps 10 to 15 m than at present. (At the same time they were at or below their modern position on the mainland coast.) They have subsequently fallen to their modern position. Acheson (1991) suggests that the west coast of Moresby Island was occupied after 2000 BP because of a lowering of sea levels.

The late glacial appears to have been cold and dry (Huessler et al. 1980, 1985). Portions of

Graham Island seem to have been never or only briefly glaciated (Warner et al. 1982), and may have been a refugium for plants and animals. The climate of the coast became warmer after 13,000 BP. Heusser calculates an increase of mean annual temperatures of some 3° C by 8000 years ago. This same period was increasingly dry. Hebda and Whitlock (1997:243) interpret this period as one marked by "severe summer drought, greater-than-present summer solar radiation and lesser-than-present winter solar radiation"—i.e., sunnier summers and less sunny winters. Beginning around 7000 BP the coast's climate became colder and wetter as a consequence of increasing rainfall and less sunny summers (Hebda and Whitlock 1997). The coast's rainforest began to develop as a result of this shift in climate. There was a cold-wet maximum between 5000 and 2000 years ago. A pollen core from Prince Rupert Harbour supports this general model (Banner et al. 1983). The coast's rainforest began to develop after 7000 BP.

Prehistoric Cultural Sequence

The prehistory of the region can be divided into two broad periods: the Archaic or Early Period and the Late Period (also called Developmental [Fladmark 1982] or Pacific [Ames 1991; Ames and Maschner 1999]). The Archaic period began perhaps as early as 10,000 BP and ended ca. 5000 BP. The Pacific period began at that time and ended with direct contact with Europeans toward the end of the eighteenth century. The Pacific Period is usually divided into three subperiods: Early (5000–3500 BP), Middle (3500–1500 BP), and Late (1500 BP to contact). This simple system masks significant local sampling gaps.

The Archaic Period

There are no established Early Period components on the mainland, except for an assemblage just pre-dating 5000 BP at the Paul Mason site, in the Skeena River's Kitselas Canyon, some 100 miles from the river's mouth. Coupland (1985) assigns this assemblage to his Bornite Phase. There also may be Archaic Period deposits in Prince Rupert Harbour (Ames n.d.)

Essentially, the Archaic Period is known only for the Queen Charlotte Islands. The Early Period assemblages there are dominated by microblades and unifaces and contain few bifaces. Fladmark places these materials into his Moresby Tradition (Fladmark et al. 1990). Much of the work on the Early Period of the Queen Charlottes has focused on raised beach lines dating from the postglacial marine transgression of ca. 8000 to 6000 BP. The sites are ephemeral, lacking features except for small open hearths. Microblades are a distinctive

feature of the Archaic in northwestern North America. The Queen Charlotte Islands materials are technologically similar to materials found to the south at Namu and Bear Cove (Coupland 1998), though these assemblages differ in other important ways, and to the north at Ground Hog Bay, Hidden Falls, and elsewhere in southeast Alaska (Moss 1998), as well as farther afield in mainland Alaska. Microblades occur in Coupland's Bornite Phase materials in Kitselas Canyon.

Most Moresby Tradition sites lack organic materials of any kind. The Cohoe Creek site on Graham Island is an exception. It is a small shell midden, with radiocarbon dates spanning the period between ca. 6200 and 4900 BP (Ham 1990).

Pacific (Late, Developmental) Period

The Pacific Period sequence is based almost entirely on eleven excavated sites in Prince Rupert Harbour on the mainland coast (Ames n.d.; MacDonald and Inglis 1981) (Fig. 2). That sequence is itself heavily reliant upon the Boardwalk site

(GbTo31), a quite extraordinary site that has no excavated parallel elsewhere on the northern Northwest Coast, including the portions discussed here and by Moss (1998). The Prince Rupert sequence does not stand on Boardwalk alone, but is significantly shaped by that site (Ames n.d.).¹ Work in Kitselas Canyon has also produced a Pacific Period sequence (Allaire 1979; Coupland 1985). The period is poorly known on the Queen Charlotte Islands, where it is placed in the Graham Tradition (Fladmark et al. 1990).

Early Pacific (ca. 5500 to 3500 BP)

This period is marked by the appearance of large, extensive shell midden deposits in Prince Rupert Harbour. Excavated exposures are limited and artifact assemblages small. There are no residential features. The material culture is virtually the same as in subsequent periods, although a number of artifact types common in later assemblages are absent (MacDonald and Inglis 1981; see below). It is not clear whether the absences are a reflection of

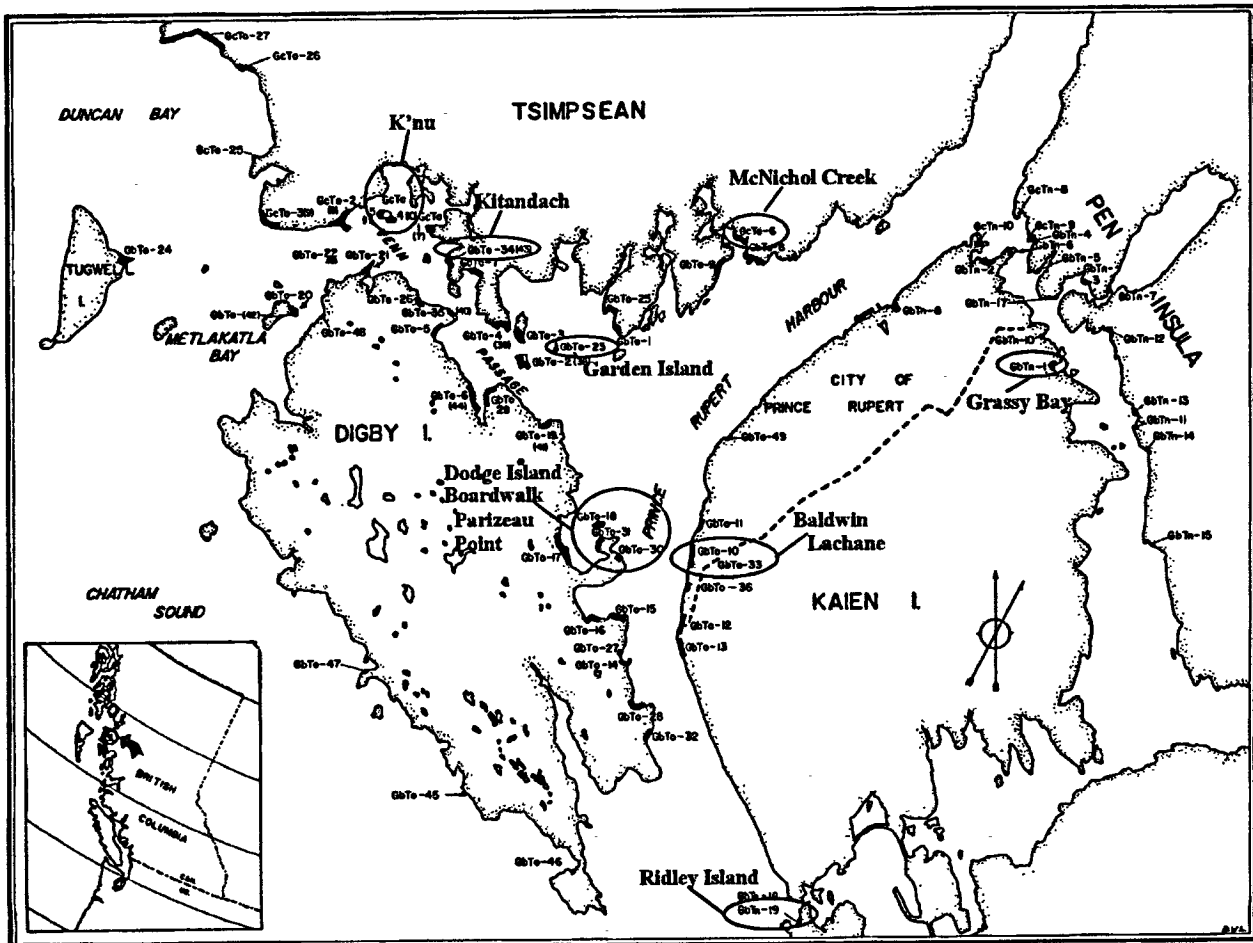


Figure 2. Map of Prince Rupert Harbour, showing excavated sites.

the early material culture or are a sampling problem. Only two artifact types—antler tines with worn and crushed tips (similar to antler tine pressure flakers) and barbless harpoons—are distinctive of the Early Pacific deposits in Prince Rupert Harbour.

Blue Jackets Creek on Graham Island is the primary Early Pacific site on the Queen Charlottes. It is notable for the presence of relatively elaborate human burials (Severs 1973, 1974). The Blue Jackets Creek deposits also contain a rich artifactual and faunal record.

Middle Pacific (3500 to 1500 BP)

This period is the most dramatic in the mainland sequence. The Paul Mason site, in Kitselas Canyon, contains a Middle Pacific village with 12 rectangular depressions, 10 in a double row facing the canyon, that mark the position of small rectangular surface dwellings—the earliest such structures on the Northwest Coast. The village is dated between 3200 and 2800 BP (Coupland 1985). The Boardwalk site also probably contains a contemporary two-row village. Cemeteries, usually behind the house rows, are present in several Prince Rupert sites. Burial patterns indicate the formation of some kind of an elite by ca. 2500 BP (Ames n.d., Fladmark et al. 1990). There is also strong evidence for warfare (Cybulski 1994). It is generally considered that the basic forms of Northwest Coast culture, including its economic and sociopolitical organization, were present by the end of this period (e.g., Matson and Coupland 1995), though some workers date that development earlier, during the Early Pacific (e.g., Carlson 1998). Prince Rupert Harbour was abandoned one or more times after 2200 BP. It may have been completely abandoned for a brief period around 1700 BP (Archer 1992).

Few sites on the Queen Charlotte Islands have components dating to this period, and these are on Graham Island. Blue Jackets Creek is the principal site. Its terminal date is about 2000 BP. Generally, developments on Graham Island parallel those in Prince Rupert Harbour after about 3000 BP, though there are important differences in detail (Fladmark et al. 1990). The middens are smaller, for example, and there is as yet no direct evidence of structures during this period.

Late Pacific (1500 BP–Contact)

Prince Rupert Harbour was fully reoccupied during the first few centuries of the Late Pacific. Most investigators (e.g., MacDonald and Inglis 1981) believe that the deposits of this period represent the fully developed historic ethnographic Tsimshian culture (e.g., MacDonald and Inglis 1981; Fladmark et al. 1990). By the beginning of this period,

Northwest Coast culture was also well established up the Skeena River at Kitselas Canyon (Allaire 1979; Ames 1979; Coupland 1985). While the data for the mainland overwhelmingly indicate continuity with the historic cultures, they also suggest some interesting changes. The beginning of the period is marked by the cessation of midden burial along the entire Northwest Coast. Individuals had been buried in shell middens on the coast since ca. 5000 BP. Between 4000 BP and 3500 BP, cemeteries were present. While not everyone was buried in middens (Cybulski 1993), a significant number were. This practice virtually ceased by 1000 BP. In Prince Rupert Harbour, there are some suggestions of shifts in settlement patterns ca. 1000–700 BP.

Recent survey along the west coast of Moresby Island in the Queen Charlotte Islands suggests that this coastline was first intensively occupied after 1700 BP, but that rectangular houses and small villages may not have been present until after 900 BP (Acheson 1991).

Significance of Maritime Activities over Time

While this paper emphasizes artifacts and faunal remains, there are other approaches to determining the relative roles of terrestrial and maritime resources in human diets. The chemistry of human bone is one of these. Chisholm and his associates, (1982, 1983) used a sample of a few human skeletons recovered along the coast and dating over a span of the last 5000 years. Their results suggest that marine resources constituted more than 90% of the diet. More recently, Dixon conducted an isotopic analysis on a human jaw recovered from On-Your-Knees cave in southeast Alaska. The jaw, that of a male, is older than 9000 BP and is the earliest known human skeletal material on the Northwest Coast. The analysis indicated that virtually all of his protein was marine in origin (Carlson 1997). It is important to stress here that these studies indicate the source of dietary protein, not the full diet. They cannot discriminate between protein from a clam and that from a whale; thus, very different diets can produce quite similar results.

Evidence for Maritime Activities

The Queen Charlotte Islands

There are few data on subsistence patterns in the Queen Charlotte Islands before ca. 1700 BP. The earliest sites on the islands are generally located on fossil beach lines produced by early Holocene marine transgressions, and presumably point to exploitation of nearby marine resources. The virtual absence of sites in any other context pre-

cludes the use of settlement patterns to make inferences about subsistence at this time.

There are only two published sites predating 2000 BP with reported faunal remains, both on Graham Island, adjacent to Massett Inlet. The Coho Creek site (FjUb-10) is an extensively disturbed shell midden at the eastern end of the inlet. Ham (1990) collected samples from the surface of the site and from the walls of backhoe trenches. Three radiocarbon dates—two on charcoal, one on shell—from the upper half of the deposits span a period from ca. 6200 to 4900 BP (Ham 1990). Midden remains include sea urchins,² whelks, limpets, barnacles, bay mussels, horse clams, basket cockles (*Clinocardium nuttallii*),³ and little neck (*Protothaca staminea*) and butter clams (*Saxidomus giganteus*). Vertebrate remains collected from the midden surface include those of black bear (*Ursus americanus*), caribou (*Rangifer tarandus*), seal (*Phoca vitulina*), delphinids, birds, and carangids (shad or jack mackerel?). The relationship between these few remains and the radiocarbon dates is unknown.

Blue Jackets Creek (FIUa-4) is located on Massett Sound, the entry into Massett Inlet. Severs (1974) dates the site between ca. 4300 BP and 2000 BP. The site is a deep shell midden (maximum depth of some 270 cm), with constituents varying from sand and sandy loam to whole and crushed shell. The midden contained a common variety of intertidal species, including butter clam, basket cockle, wrinkled purple (*Nucella lamellosa*), blue (edible, bay) mussel (*Mytilus edulis*), little neck clam, dire whelk (*Searlesia dira*), sea urchin (*Strongylocentrotus* sp.) and limpet (*Acmaeidae* sp.). Other, less common forms are barnacle (*Balanus* sp.), horse clam (*Tresus capax*), great pacific or weathervane scallop (*Patinopecten caurinus*), and california mussel (*Mytilus californianus*). A single piece of dentalium (*Dentalium pretiosum*) was noted. Among recovered vertebrates are sea otter, cervids (including *Rangifer* sp.), loons (*Gavia immer*), seals (pinnipeds), black bears, canids, cetaceans, salmon, and Pacific halibut. Severs observes that large sea mammal bones are more common in the upper levels of the site.

Evidence for the period after 2000 BP comes from Acheson's (1991) survey and testing project on the west coast of Moresby Island. He located some 114 sites, and tested 18 of them, along 245 km of coastline, within an area centered on Anthony Island. Of the sites, 99 are "residential," and these are further separated into Group 1, Group 2, rockshelters, and caves. Group 1 sites are middens larger than 1000 m²; Group 2 sites are smaller than a 1000 m². Group 1 middens are strongly associated with evidence of houses, while Group 2 middens almost exclusively lack such evidence. The tested sites are dated by 39 radiocar-

bon dates spanning the period from ca. 2200 BP to 300 BP, although only four dates are earlier than 1700 BP. Acheson (1991) credits the stabilization of sea levels in this area for permitting extensive settlement at that time. Virtually all excavated evidence for house floors postdates 900 BP.

Salmon and rockfish (*Sebastes* sp.) are the dominant fish in Acheson's samples, of 25 taxa listed. Group 1 sites generally have more fish taxa (average of 19.5) than do Group 2 sites (average of 11.6). Rockshelters and caves have even fewer. Acheson argues that salmon were stored while rockfish were consumed immediately. Salmon are represented primarily by postcranial elements, suggesting they were butchered (cf., Ames 1994; Butler and Chatters 1994), while rockfish elements span the entire skeleton. Importantly, salmon became common with the appearance of house floors in the middens.

Terrestrial mammals, including canids, are very rare. The mammalian assemblages are almost all sea mammals, including whales, porpoises, sea otters, northern fur seals, northern sea lions, and harbor seals. Sea otters are ubiquitous and present in large numbers in most sites, as are harbor seals. Interestingly, three of the five tested Group 1 sites contain large numbers of whale elements. The Haida of the Queen Charlottes have not been numbered among the Northwest Coast's whalers, so this is both startling and significant. Sea mammals also increased in number with the appearance of house floors at around 800 BP.

The dominant species in all sites are salmon, rockfish, sea otters, harbor seals, alcids and California mussel, irrespective of whether the site was residential. Acheson (1991:155) concludes, "[t]he pattern suggests that the residents favored a narrow range of resources at the possible expense of more site specific, secondary resources." These prehistoric settlements were clustered on the outside coast, rather than in more sheltered waters, which is not surprising given the focus on sea mammals. The fish present encompass a range of marine habitats, from high tide to benthic.

The British Columbia Mainland

The majority of archaeological data for the northern British Columbia mainland was produced by excavations and subsequent analyses of the North Coast Prehistory Project (NCPP) conducted by the National Museum of Man (now, Civilization) of the National Museums of Canada (MacDonald and Inglis 1981). Eight sites were excavated within Prince Rupert Harbour and a ninth, Lucy Island, on an island in Chatham Sound west of the harbor (Fig. 1). Prior to that, Drucker (1943) and Borden and Baldwin (Calvert 1968) tested sites in the harbor. More recently, one of the NCPP sites (GbTo-

33) was revisited prior to its destruction (Simonsen 1988), a tenth site was salvaged in the late 1970s (GbTo-19) (May 1979), and an eleventh (GcTo-6) tested in the early 1990s (Coupland et al. 1993). Work was renewed at GcTo-6 (McNichol Creek) during the 1996 and 1997 field seasons. The archaeofaunas of six of these sites have been analyzed at least to the level of species lists, and faunal data from two of the Prince Rupert Harbour sites, Boardwalk (GbTo-31) and Grassy Bay (GbTn-1), have recently been summarized (Stewart and Stewart 1996). My discussion differs from that presented by Stewart and Stewart (1996) since I am able to integrate faunal remains with the recovered artifacts and to assign assemblages to time periods. All of the data discussed here are integrated for the first time. Evidence for subsistence changes can also be derived from changing artifact assemblages and settlement patterns (Ames n.d.).

In addition to Prince Rupert Harbour, subsistence-related data were recovered from the Greenville burial site (Cybulski 1993) in the lower Nass River, and quite limited evidence from sites in the Kitselas Canyon of the Skeena River, some 100 miles above the river's mouth (Allaire 1979; Coupland 1985). Grant Anchorage, another site on the mainland coast, produced no faunal evidence (Simonsen 1973).

The Prince Rupert data are reviewed first by summarizing the faunal, artifactual, and settlement pattern data by time period. The accompanying tables and graphs only summarize the available evidence; fuller accounts are presented in Stewart (1977), Stewart and Stewart (1996), and Ames (n.d.). The discussion does not include birds, for which there is a rich record in the harbor. The bone element counts (NISP) used in the following discussion are NISP/100 excavated cubic meters, not NISP or percentages. This practice is defended elsewhere (Lyman 1991; Ames n.d.).

Prince Rupert 3 (5500–3500 BP). The available evidence, though quite limited, shows that a variety of littoral and maritime environments was exploited. The relative roles of marine and terrestrial resources are presently impossible to determine.

The PR3 archaeofaunas are derived from only two analytical units⁴ from the Boardwalk site; therefore, what can be said is limited (Table 1). The mammalian assemblages are dominated by canids, cervids (probably all coast deer), beaver (*Castor canadensis*) and porcupine (*Erethizon dorsatum*), sea otters, harbor seals, and other large terrestrial mammals—also probably deer. River otters (*Lutra canadensis*), mountain goat (*Oreamnus americanus*), and mustelids are present in small numbers, as are whales and dolphins. The large number of dog remains raise interesting interpretive problems. In these middens, dogs are often directly and indirectly associated with human

graves, as well as having their own graves. Stewart (1977), however, notes butchering and burn marks on some elements, suggesting that dogs may have been eaten. Excluding dogs from the sample makes cervids the dominant mammal, and has a significant impact on the relative proportions of land mammal to sea mammal elements in Prince Rupert 3 (Fig. 3). Almost the full range of mammals exploited during later periods is present in this first period, including cetaceans and delphinids, though given their very small numbers, these may have been scavenged rather than hunted in open waters.

Recovery techniques at Boardwalk limit the fish (and mammal) samples to large bones; therefore, conclusions must be tentative, but fish present in these early deposits are spiny dogfish, ratfish, and flatfish. Any relatively small boned fish, including herring, will have been missed.

A range of shellfish was collected, but bay mussels seem to predominate. It is difficult to assess the relative dietary importance of mussels, since the only available evidence is the volume of the middens themselves and how rapidly they accumulated. If the harbor's first occupation was ca. 8000 BP, then the middens accumulated quite slowly; if first occupation was at 6000 to 5000 BP, then middens accreted more rapidly.

The Prince Rupert 3 deposits contain the basic subsistence-oriented tool kit present throughout the harbor's prehistory (Table 2), including ground slate points, barbed and barbless harpoon heads, and bone and antler foreshafts. Notably absent during this first period are bipoints, harpoon valves, and net sinkers. Net sinkers are rare enough in later deposits that their absence at this time could be attributed to sampling. The dual absence of bipoints and harpoon valves is suggestive, but may also be a function of sampling. Bipoints are commonly thought to arm an array of fishing tackle, as well as valved harpoons. The ground slate blades and unilateral harpoon heads indicate hunting of relatively large marine mammals, fitting with the presence of harbor seals in the faunal assemblages. The barbless harpoon heads may be heads or foreshafts with a retrieval line attachment.

Of the 10 sites excavated in the harbor, five have radiocarbon dates predating 3500 BP. Of these, occupational history is best known for the Boardwalk site. The earliest occupation of the site appears to have been on relatively flat areas somewhat above but adjacent to the beach. Boardwalk achieved its maximum areal extent (7000 m²) by ca. 4000 BP. Stewart and Stewart (1997) suggest the site was occupied year-round at this time, based on seasonality analysis of the Boardwalk fauna. The site appears to have been a two-row village at that time.

Table 1. Summary of Prince Rupert archaeofaunas through time.*

	Prince Rupert 3		Prince Rupert 2		Prince Rupert 1	
	NISP	NISP\100 m ³	NISP	NISP\100 m ³	NISP	NISP\100 m ³
LAND MAMMALS						
Bear	3	2.48	20	3.03	26	9.74
Beaver/porcupine	55	45.45	205	31.01	92	34.46
Cervids	299	247.11	1008	152.50	767	287.27
Dall sheep	0	0	0	0	4	1.50
Mountain goat	3	2.48	23	3.48	16	5.99
Mustelids	6	4.96	37	5.60	9	3.37
River otter	5	4.13	21	3.18	5	1.87
Sheep/goat	0	0	0	0	4	1.50
Canids	723	597.52	453	68.53	103	38.58
Unidentified	136	112.40	86	13.01	206	77.15
SEA MAMMALS						
Cetaceans	2	1.65	7	1.06	1	0.37
Delphinids	2	1.65	4	0.61	0	0
Fur seal	13	10.74	58	8.77	7	2.67
Harbor seal	28	23.14	197	29.80	155	58.05
Sea lions	1	0.83	46	6.96	8	3.00
Sea otter	152	125.62	961	145.39	517	193.63
Seal	5	4.13	60	9.08	24	8.99
Unidentified	57	47.11	138	20.88	101	37.83
TOTALS						
Total land mammals	1230	1016.53	1853	280.33	1232	461.42
Total land mammals w/o canids	507	419.01	1400	211.80	1129	422.85
Total sea mammals	259	214.05	1471	222.54	813	304.49
Grand Total	1489	1230.58	3324	502.87	2045	765.92

* NISP and excavated volumes on which this table is based are from Ames n.d., Coupland et al. 1993, Hull 1980, May 1979, Stewart 1977, Stewart 1980, Stewart and Stewart 1996.

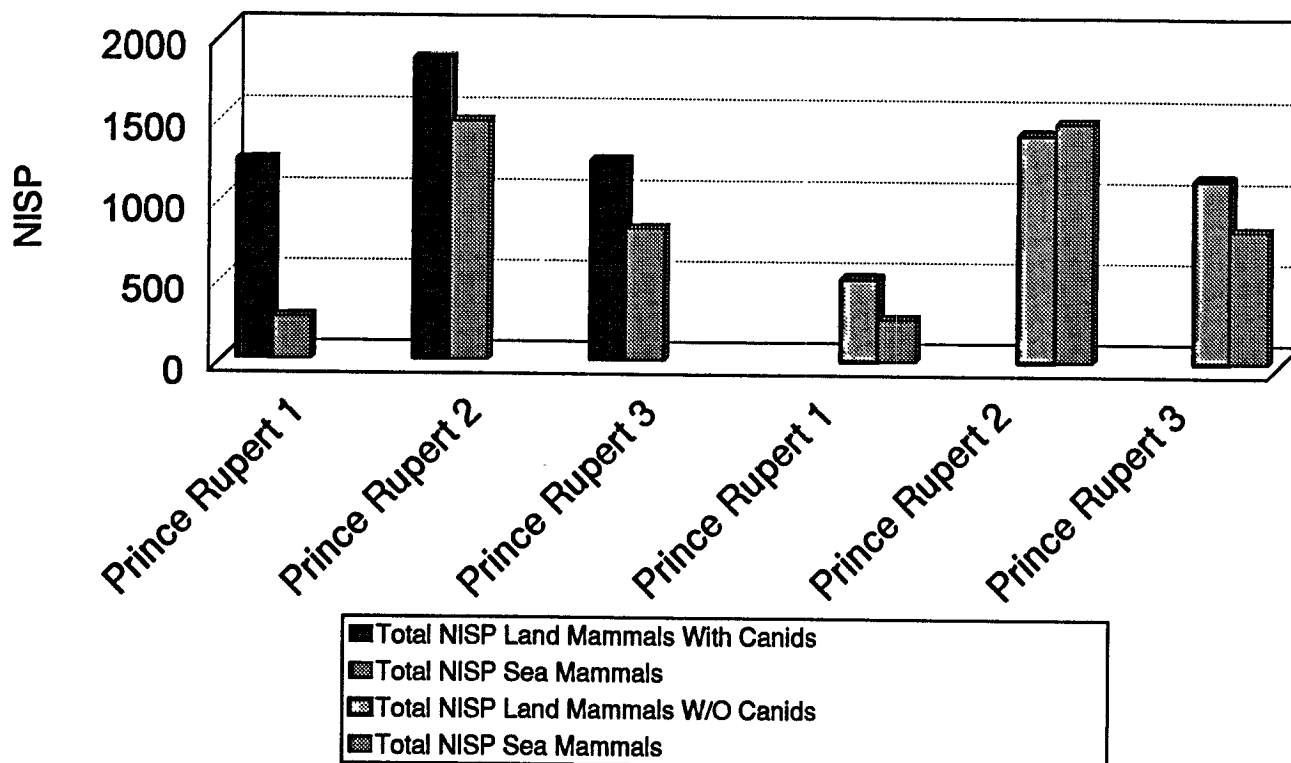


Figure 3. Bar graph illustrating the relative proportions of total land mammal NISP (with canid elements included and excluded) to sea mammals in Prince Rupert Harbour through time.

Prince Rupert 2 (3500 BP–1500 BP). Prince Rupert 2 is well represented. The period is spanned by seven datable analytical units from NCPP sites, of which six (all from Boardwalk) have analyzed faunal remains. In addition, Ridley Island and McNichol Creek are assigned to the end of the period.

Sea mammals represent virtually half of the mammals. The numbers of all forms of sea mammals increase, but NISP of sea otter elements increases the most dramatically. Though cervid NISP increases, their density declines markedly. The density of canid remains also declines, which is interesting because during this period these sites were used not only as residences but as cemeteries as well. This decline occurs despite a major increase in funerary ceremonialism, which sometimes involved canid burials. This may indicate a shift in the economic and social roles of dogs.

Salmon appear in the deposits for the first time, as do eulachon and herring. The presence of herring at Ridley Island and McNichol Creek is certainly the result of recovery techniques, since herring spawn in the harbor. These two PR 2 sites were excavated using techniques appropriate for recovering small fish bones while Boardwalk was

not. Simonsen (1988) also recovered eulachon at the Lachane site (GbTo-33). The first appearance of salmon at Boardwalk may reflect sampling, but that is less likely. At Boardwalk, salmon are present for the first time in at least three analytical units postdating 3500 BP, but are absent from two analytical units predating 3500 and from one spanning the period from 4200 to 3000 BP. It seems likely that had salmon vertebrae been present in any numbers in the earlier analytical units, at least one vertebra would have been recovered. In the single analytical unit where the number of salmon bones can be quantified, it is by far the most common fish.

The presence of salmon and eulachon in the harbor is particularly significant because eulachon does not occur in or near the harbor, while salmon run in the harbor only in small numbers (McNichol Creek supports a small run). Both forms are anadromous and Prince Rupert is not on any likely migration route to the Skeena or Nass. Either their migration routes were different in the past or, much more likely, they were acquired elsewhere, processed, and transported to the harbor. I take this as evidence of both logistical movement and storage. Herring do spawn in the harbor, making

Table 2. Summary of Prince Rupert subsistence-related artifacts* through time. Number of artifacts per 100 m³.

	PR3	PR2	PR1
Bipoint	0	11.12	6.13
Barbed harpoon	8.33	20.38	9.61
Barbless harpoon	1.35	0	0
Barbed harpoon fragment	0	0.53	0.65
Harpoon valve	0	17.67	8.91
Barbed point	2.13	7.29	0.99
Fixed point	10.72	57.49	20.09
Hafted point	32.45	258.07	149.69
Socketed point	0.54	4.92	3.73
Other points	5.13	55.99	10.80
Foreshaft	0.54	8.79	1.30
Slate point	1.61	5.67	0
Slate point fragment	11.00	38.65	7.75
Flaked point	0	2.75	0
Net weights	0	2.73	2.60

* Based on data from Ames (n.d.). Artifact counts do not include artifacts from McNichol Creek or Ridley Island.

use of extensive shallows covered with kelp and eelgrass to deposit their eggs. These are the same environments where sea otters could be taken in large numbers. The presence of flatfish, including halibut and flounder, indicates exploitation of deep-water habitats as well. These are available within the harbor and close by.

Increased densities of mountain goat may also point to increased logistical movement. In this case, task groups would have been going to the alpine areas on the mainland and higher islands.

Harpoon valves, bipoints, bilaterally barbed harpoon heads, and net weights appear in the deposits for the first time, as do a wide array of bone point/bone barb forms, broken harpoons, and complete ground slate points (which suggest repair and refitting of marine mammal hunting gear in the harbor). The density of subsistence-related artifacts increases 680%. One class, hafted points (which could have been fishhook barbs, armed leisters, etc.), increases by almost 800%. These technological changes accord well with the evident intensification of sea mammal hunting and fishing indicated by the faunal remains. Other technological changes include the appearance of woodworking tools (adzes, mauls), the use of wooden boxes as coffins, and the presence of houses. Cybulski (1993) suggests that the use of boxes as coffins indicates the capacity to make storage boxes of the kind used ethnographically.

Settlement pattern changes indicate intensified exploitation of very shallow marine environments within the harbor as well as use of more distant marine habitats. Three sites were first intensively occupied during this period; two of them relevant here. Garden Island (GbTo-23) is a small island located in the most extensive shallows in the harbor. While the first evidence of occupation is as early as 4000 BP, intensive occupation did not begin until ca. 3000 BP. The shallows where it is located contain extensive kelp forests and would attract herring, sea otters, and other resident marine life. The second site is GbTp-1, a midden located on Lucy Island in Chatham Sound, the first body of open water west of Prince Rupert. The site was first occupied ca. 2400 BP. It is surrounded by extensive shallows, but is also near waters more than 70 fathoms deep. The site appears to be a shellfish collecting station. Unfortunately, the faunal assemblage from neither site has been analyzed.

The end of PR2 is marked by the partial to full abandonment of many sites in the harbor, beginning as early as 2200 BP, if not earlier. By this time, portions of Boardwalk had been abandoned. Archer (1992) collected shell samples from the surface of a number of Prince Rupert middens, and these dates cluster in the period between 1700 and 1400 BP.

Prince Rupert 1 (1500 BP-contact). During the early years of this period, old sites, such as Boardwalk and Garden Island, were reoccupied, and new sites, such as Grassy Bay, were occupied for the first time. While the latter two appear to have been residential sites for at least part of this period, it is not clear that Boardwalk was. Further, Boardwalk was abandoned again by the seventeenth century AD. During the eighteenth and nineteenth centuries, the Coast Tsimshian maintained their principal towns in the harbor. Boardwalk was not even owned by one of the Coast Tsimshian groups (MacDonald et al. 1987). None of the historic Coast Tsimshian town sites has been sampled.

The faunal assemblage from this period is dominated by remains from Boardwalk and may reflect its non-residential role. Fewer mammalian elements are present, though their density (NISP/100 m³) increases, with the decline primarily in sea mammal remains. Sea otters are still the second most common mammal. The numbers of other marine mammals decline sharply and for the first time dolphin are absent. Among the terrestrial mammals, canids decline significantly. This may in part reflect the cessation of midden burial and associated practices involving dog burials. Dall sheep (*Ovis dalli*) is the only new terrestrial mammal, with only four elements present. The variety of identified fish at Boardwalk also declines, maybe due to sample size.

The artifact assemblage is a composite of analytical units from three sites. It too shows an overall decline in the number—but not the diversity—of artifact types related to subsistence. There is a shift among hafted bone points from those with contracting hafts to those with parallel-sided hafts. The relative rankings (based on density) of artifact types change little. The only artifact type to disappear is complete ground slate points. Aside from subsistence-related artifacts, there is a major increase in the density of heavy-duty woodworking tools such as celts and mauls, perhaps relating to the building of larger houses or even canoes.

Settlement patterns remain essentially the same, though with shifts in site functions. Garden Island was reoccupied and was a historic village location. Grassy Bay is a small midden located on a small intertidal flat. It appears to have been a general-purpose site until ca. 1200 BP, when it became a small residential site. In fact, the residential history of Grassy Bay mirrors that of Acheson's Group 1 sites, though it became a residential site somewhat earlier.

Other Sites

The only other sites in the general region that are germane to this paper are the Greenville Burial Ground site on the Lower Nass River, and the Kitselas Canyon sites. Greenville dates between ca. 1600 and 500 BP, essentially PR3. While the main purpose of the excavations was to retrieve the burials present in the shell midden (Cybulski 1993), faunal materials were recovered and analyzed. Canids are the dominant mammal, as we might expect given the use of the site as a cemetery, but sea mammals as a group dominate the assemblage. Interestingly, sea otters are a minor constituent. Salmon and smelt (*Osmeridae*, probably eulachon) are by far the most common fish. The marine assemblage is exactly what one would expect if the occupants of the site hunted the sea mammals following salmon and eulachon runs upriver.

Faunal preservation was poor in the Kitselas Canyon sites and few bones were recovered (Alaire 1979; Coupland 1985). Coupland's sample from Paul Mason was primarily of charred and calcined bones. The significance of Kitselas to this discussion is the presence of the Paul Mason village site and the strong likelihood that it was supported by fishing and storage of salmon (Coupland 1985).

The Evolution of Maritime Adaptations and Interregional Dynamics

Early Littoral/Maritime Adaptations on the Coast

A long-standing debate on the Northwest Coast concerns whether its earliest occupants brought a maritime, riverine, or terrestrially oriented subsistence economy with them. Was the coast first occupied by peoples with a generalized riverine economy moving out from the interior and then north? Or was it occupied by peoples with a maritime focus moving down the coast from the north, perhaps ultimately from Beringia and eastern Asia, perhaps even representing the first inhabitants of the hemisphere? Examples of the riverine economy are the Windust and early Cascade phase (ca. 10,800 BP–7000 BP) occupants of the Columbia Plateau. The best candidates for the maritime people are the late Pleistocene inhabitants of eastern Beringia and Northeast Asia. Despite the debates, we really know virtually nothing about the earliest subsistence economies on the coast and there are no relevant data from the sites discussed here.

The available evidence (see Ames and Maschner n.d.; Coupland 1998; Matson and Coupland 1995; and Moss 1998 for current reviews) are extremely thin and preclude only an exclusively terrestrial economy. What we can say is that (1) they had boats, though we do not know their size and seaworthiness; (2) they at least had hooks and lines so they could take flatfish; (3) they very likely had nets and basket traps, probably weirs; (4) they took an array of vertebrates, ranging from those flatfish to rabbits; (5) they had barbed points, though it is not known whether these were harpoon heads or fixed points (for spears); (6) they used shellfish, but not on the same scale as in subsequent periods; (7) they did not use lances armed with ground slate points; and (8) the vast majority of the protein consumed by the young man whose bones were recovered at On-Your-Knees cave was marine in origin. None of this eliminates either a fully maritime economy or a more generalized subsistence base.

There is good indirect evidence for boats at several points along the Pacific coast by 10,000 BP (Erlandson and Moss 1996). It is also likely that Clovis people had boats (Engelbret and Seyfert 1994); however, it is crucial (and difficult) to know the size and seaworthiness of these craft (Ames 1997). Harvesting of flatfish is quite ancient, dating from at least the Upper Paleolithic (Cleyet-Merle and Madelaine 1995), and so may not represent any special focus on marine resources. The flatfish at Chuck Lake are associated with rabbit

(Ackerman et al. 1985). The presence of nets in western North America at this time is demonstrated by net weights recovered in sites predating 7000 BP in the upper portions of the Columbia drainage; the oldest date 9800–10,800 BP at Hatwai in central Idaho (Ames et al. 1981). The recent recovery of a basket dating ca. 6000 BP in southeast Alaska (Fifield 1995) directly supports the inference for cordage and raises the strong likelihood of basket traps. Fragments of barbed artifacts occur at several sites, but none is complete. Barbed points are very rare, but occur on both sides of Beringia. Harpoon heads dating to 12,500 BP have been recovered near Lake Baikal at the site of Verkholenskaia Gora (Larichev et al. 1990; Powers 1996), and a barbed point was recovered at Lind Coulee in central Washington dating to ca. 8500 BP (Daugherty 1956). Ironically, much of the evidence for nets and barbed spears and harpoons comes not from a coastline, but from continental interiors.

Ground slate points were used historically on the coast to kill medium to large sea mammals that had been harpooned. Chipped stone points or bone points armed with microblades (similar perhaps to the one recovered at Namu; Carlson 1996) could have been used in their stead; however, the appearance of ground slate is generally seen as indicating a major technological focus on marine hunting. This is particularly interesting in the absence of clear evidence for barbed harpoon heads or any evidence for toggling harpoons on the coast at this time. Negative evidence, of course, is weak, given the very few Archaic assemblages on the coast with organic artifacts. The absence of ground slate, on the other hand, is not a function of sampling problems.

Given these data and the environmental evidence, the most parsimonious hypothesis is that the coast's earliest occupants were generalized foragers exploiting a range of habitats from terrestrial to littoral, if not marine. Such flexibility would seem necessary to cope with the dramatic and probably swift environmental changes that marked the late Pleistocene and early Holocene. Finally, arguing for a generalized coastal subsistence system does not preclude the result that most of the dietary protein might come from marine sources.

The period between 10,000 and 8000 BP was marked by increasing warmth and dryness, and strong seasonal contrasts. The effects of these trends on both terrestrial production and on the productivity of the North Pacific are doubtless crucial to understanding the evolution of maritime economies. Recent El Niño events in the eastern Pacific Ocean suggest that warming of ocean waters can have a catastrophic effect on marine productivity off the southern Northwest Coast, but

perhaps the opposite effect farther north. The greater warmth and aridity might actually have increased terrestrial production in the north. Sea level changes must also have had a profound effect in quite local marine and littoral zones. Thus, we may see temporal and spatial variation in the degree of "maritimeness" of Early Period peoples as they adjusted to the local effects of long-term trends in climate and topography. Such shifts would not reflect long-term economic trends, but local shorter-term responses within the framework of a somewhat generalized "littoral" adaptation.

Pacific Period Maritime Adaptations

Available evidence for the Early Pacific suggests an increased focus on littoral and marine resources all along the Northwest Coast, including the portion reviewed here. A range of marine habitats was exploited. Artifactual remains include both large, unilaterally barbed harpoon heads and ground slate points as well as foreshafts, indicating the presence of the basic Northwest Coast kit for hunting large and medium sea mammals. The most visible subsistence change during the Early Pacific is intensified shellfish collection, indicated by the widespread presence of dense shell middens on both the mainland and the Queen Charlotte Islands. The possible subsistence role of dogs in Prince Rupert Harbour raises some interesting questions about the local subsistence economy.

The best evidence is that for Prince Rupert 2, which shows that a maritime economy existed between ca. 3500 and 2500 BP in concert with the major social and economic changes described above (see also Ames 1985, 1994; Ames and Maschner 1999; Coupland 1998). To summarize, the evidence from the northern British Columbia mainland suggests (1) utilization of salmon and perhaps eulachon began or intensified; (2) utilization of a variety of littoral and deep water habitats began or expanded; (3) bulk transportation of salmon and eulachon occurred, implying the presence of canoes large enough to carry freight; (4) plank houses and villages were present; (5) logistical mobility strategies were extended to include maritime habitats; (6) procurement technology was clearly maritime in orientation after 3500 BP; and (7) the woodworking skills and technology to make canoes and other elements of the Northwest Coast's maritime adaptation were present by 3600 BP. Moss and her co-workers (Moss et al. 1990; Moss 1998) demonstrate the presence of large weirs in southeast Alaska by 3000 BP. There is a weir at Glenrose Cannery on the Fraser River that dates to ca. 4000 BP (Eldridge and Acheson 1992). Cybulski (1993) shows that bentwood boxes are present as coffins by 3600 BP on the northern coast. This evidence plus the indirect evidence

from Prince Rupert make a strong case for the capacity to take, process, transport, and store marine resources in bulk—the hallmark of the Northwest Coast economy—by 3000 BP.

These developments generally parallel those described by Coupland (1998) for the Gulf of Georgia area, and by Moss (1998) for southeast Alaska. Matson (1992) recently reviewed the evidence for salmon fishing and concluded that heavy reliance on *salmon fishing and storage* developed around 3500 to 3000 BP on the coast, a view with which I concur (Ames 1991, 1994). Carlson (1998) argues, based on evidence from Namu (Cannon 1991, 1998) on the central British Columbia coast, that the ethnographic economy of the Northwest Coast evolved perhaps a millennium earlier. While these different chronologies reflect important differences in assumptions (Ames 1994), they also point, I believe, to important differences in the ways in which economies developed along the coast, and to important variability through time, particularly in local subsistence patterns.

Geographic Variability

Up to this point, I have summarized the apparent temporal trends in subsistence on the northern British Columbia coast. Geographic variation is equally important, if far less well understood. Northwest Coast economies of the past two or three millennia appear to have functioned at least on two levels: (1) regional and areal interaction spheres; and (2) the locality. Resources can be thought of as regional, those upon which the regional economy depended, and local, those exploited and relied on locally. Salmon and eulachon were regional resources in this area, as were sea mammals as a class. The local resources were whatever was locally available. The fauna present in a site will reflect the interplay of these two levels or scales. The contrasts between Prince Rupert Harbour, Greenville, and Moresby Island clearly show this. Acheson's (1991) sites are on the generally exposed western side of Moresby Island, where the mammalian fauna is overwhelmingly sea mammals, including whales. Terrestrial mammals, as a group, dominate the Prince Rupert faunal assemblages. Sea mammal assemblages are usually dominated by sea otters, reflecting the apparent focus in the harbor on exploiting sheltered, shallow marine waters, kelp beds, eelgrass stands, etc. The Greenville sea mammals are also local, mirroring the sea mammals that exploited the salmon and eulachon runs. Sea mammals were everywhere crucial secondary resources, but the particular mix of sea mammals was a product of what was locally available.

Regional and local ecological histories may be as significant for understanding regional and

local patterns as economies. Cannon (1991) suggests that increased sedimentation in the Namu River estuary eventually destroyed the river's salmon runs. In the Prince Rupert region, formation of banks of Skeena River deltaic deposits probably increased the overall productivity of the area. Within the harbor itself, even minor sea level changes would significantly alter the harbor's ecology and attractiveness to humans (Ames n.d.).

Variability is also present at the local scale. In Prince Rupert Harbour, variation exists at both the inter-site and intra-site levels. Looking at inter-site variation first, there are four faunal assemblages spanning the period between ca. 2000 and 1500 BP: two from McNichol Creek and one each from Ridley Island and GbTo-31/B/AU2. This latter component is the richest and most diverse component in terms of artifacts and faunal remains in the harbor; it is also one of the smaller. It is therefore one of the most extraordinary components on the northern Northwest Coast (Ames n.d.). The materials appear to have been recovered from a series of superimposed house floors. These assemblages come from excavations of very different size: the McNichol Creek collection is from two units, one of which was only 1 x 2 m; the Ridley Island materials were recovered from 4 m³, while 31/B/AU2 is 57 m³. Despite these differences, a comparison is informative.

The fish assemblages from McNichol Creek and Ridley Island are remarkably similar, and are dominated by salmon and herring in roughly similar proportions. McNichol Creek lacks eulachon in any numbers; they are also rare at Ridley Island. May (1979) concluded that the low numbers of eulachon at Ridley resulted from a sampling problem, since she recovered them only in her bulk samples. Based on number/sampled volume in the small bulk samples, she reasoned eulachon were as numerous as salmon at Ridley Island. The similarities in salmon and herring NISP at McNichol Creek and Ridley Island probably reflect the roles of those fish in the economy of Prince Rupert Harbour as a whole at the end of Prince Rupert 2.

The mammalian assemblages strongly contrast. The Boardwalk assemblage is the classic PR2 faunal assemblage, dominated by deer and sea otters. Ridley Island is dominated by deer, dogs, and sea mammals, including sea otters, harbor seals, sea lions, and fur seals in that order. Total mammalian NISP there is 114 elements. McNichol Creek produced 124 mammalian elements: none is sea mammal. Deer and canids dominate the assemblage. This may be the result of sampling, given (a) the small size of the McNichol Creek assemblage and (b) the limited size and spatial distribution of the excavation units (e.g., Lyman 1991), but I (even more than Coupland et al. 1993) am quite startled at the lack of even one sea mam-

mal element. The harbor is small; McNichol Creek is closer to prime sea otter habitat than either Boardwalk or Ridley Island.

Intra-site variation is as strong as either inter-site variation or temporal variation (e.g., Lyman 1991). Even adjacent Boardwalk excavation areas show consistent differences in their faunal assemblages through time. Excavation Area D has much higher densities in terrestrial fauna than does Area B, which contains extremely high densities of sea otters. If they were separate sites, we would conclude that they represented two rather different strategies, perhaps reflecting local ecological variation.

Economic Change, Diet, and Social Change

The intensification of salmon fishing has played an important role as a prime mover in theories of social change on the Northwest Coast. One cannot deny its profoundly fundamental importance at the base of Northwest economies; however, I believe the intensification of salmon production, including storage, was not possible without the availability and accompanying intensified production of other "secondary" resources (Monks 1987; Ames 1994). The record reviewed here—and as it exists elsewhere on the coast—supports that view. The dietary niche is everywhere quite broad. At sites where modern recovery techniques are employed, the number of species in the resource base, particularly fish, is large.

Monks (1987) argues that intensification included manipulating resource patches so that an array of critical resources was taken. More recently, Kew (1992) suggests that intensification on the coast was as much a matter of adding new resource patches or habitats to the subsistence base as adding particular organisms. This is certainly what appears to have happened in Prince Rupert (Ames n.d.). Intensified exploitation of a patch does not mean increased exploitation of a particular resource in the patch, but of everything exploitable in that patch: sweeping up everything that comes along. Since there will be local variability in the patches available, the secondary (local) resources will vary from place to place.

Croes and Hackenberger (1988), in their simulation of economic change on the Northern Olympic Peninsula, found that salmon use would be intensified when people needed stored food to support long-term settlements. This seems clearly the case in my region. Acheson (1991) found salmon associated primarily with house floors, and salmon are temporally associated with houses in Prince Rupert Harbour. In southeast Alaska, Maschner (1992) observed intensification of salmon use associated with the appearance of houses at Tebenkof Bay. The appearance of houses

is also accompanied by intensification of other resources. On Moresby Island these included pelagic mammals, including whales. In Prince Rupert intensification included a broad array of terrestrial and marine mammals, particularly sea otters. At Tebenkof Bay, deer production was intensified.

This returns us both to McNichol Creek and to Namu. On the Northwest Coast, households (Richardson 1981) owned resource localities. Inter-house, intra-site, and inter-site differences in faunal assemblages may therefore reflect ownership of different localities (e.g., Wessen 1982; Huelsbeck 1989). Matson (1985) has strongly emphasized ownership and control of resources in his theories of the evolution of social complexity on the coast. The absence of sea otters at McNichol Creek may indicate that the social groups who lived there did not have access to sea otters; however, we cannot yet dismiss sampling as the cause of this apparent pattern. The sample used was small in both volume and area (Coupland et al. 1993). Perhaps he did not sample the areas where sea mammal bones were dumped. Ownership of resource areas cannot explain the differences in excavation areas at Boardwalk unless we accept the existence of that practice for at least 5000 years.

At a broad regional scale it appears that production of salmon and other marine resources was intensified ca. 3500 to 3000 years ago (Coupland 1998; Matson 1992; Ames 1991, 1994) as part of the development of a food storage based economy (Ames 1994; Croes and Hackenberger 1988; Matson 1992). Namu does not seem to fit this regional pattern. The Five-Mile Rapids site (Cressman et al. 1960), on the Columbia Gorge in Oregon (some 200 river miles from the Ocean) is another Early Period site with a significant salmon assemblage. I have elsewhere suggested that salmon were caught and immediately consumed at Five-Mile Rapids during periodic large aggregations of otherwise dispersed hunter-gatherers (Ames 1988). In other words, salmon played an extremely important subsistence role locally in some places before it attained its crucial regional role as a winter store. This may be the case at Namu.

Summary and Conclusions

The Prince Rupert sample was collected in the late 1960s and early 1970s. Modern samples need to be collected and analyzed. The regional data base is spatially very spotty; we know nothing about vast stretches of coastline or of crucial environments. Haggerty's discovery of a substantial undated (and distinctive) village on Zayas Island, at the northern end of the Dundas Group, is excellent evidence of significant occupations in small, seemingly marginal insular environments (Wooley and

Haggerty 1989). Most of the Queen Charlotte Islands remain archaeological *terra incognita*, as do significant portions of the mainland coast.

I have already discussed some sampling issues related to spatial variation. Sample size itself is a crucial problem. Lyman (1991), for the Oregon Coast, suggests that the minimum sampled volume from a site needs to be 100 m³ in order to get an adequate number of artifacts, fauna, and features. My analyses of materials recovered from Prince Rupert Harbour suggest a similar conclusion. These middens, as Drucker (1943) first noted, are not rich archaeological sites. Samples large enough to contain more than just the most common species or artifact types must be big. One gets large samples by excavating large volumes, which is expensive. Sample distribution is also critical. Northwest Coast sites are very heterogeneous in their contents, as noted above. One, two, or three units are insufficient to sample the potential subsurface variation in one of these sites. All of this points to the ongoing need for methodological research to develop techniques to acquire sufficient samples without expending impossibly large sums. It also points to the pressing need for large samples from many more sites.

Finally, I would raise the issue of quantification and reporting. It is rare for faunal remains to be reported consistently. NISP, even when obviously known, frequently are not included. Sometimes the basis for calculated MNI is not explained. Occasionally unusual quantification methods are employed which produce results not comparable to any publication or report in existence, and the basic data are not provided so that the reader may make them comparable. Often taxa are identified only by their English names.

The northern Northwest Coast presents us with the archaeological record of the history of the Haida, Tsimshian, and Tlingit peoples. They and their ancestors, together with the people on the central and southern Northwest Coast, created over the last 10,000 years some of the most extraordinary hunter-gatherer economies and societies in human history. Understanding that history is an important part of understanding the diversity and range of the human experience and the evolution of maritime economies on the Northern Pacific and worldwide. The archaeological record of the region is certainly more than adequate to this task. One needs only to slowly boat along Prince Rupert Harbour's waterways and watch the enormous, intact middens slide by to be overwhelmed by the possibilities. And Prince Rupert is only one small place in a vast region.

End Notes

1. After this point, discussions of Prince Rupert Harbour draw upon Ames (n.d.), unless other specific citations are given.

2. Ham (1990) does not provide genera or species names for every molluscan taxon he lists.

3. In the analysis of the Prince Rupert materials, I grouped excavation levels and excavation units into analytical units (AU) based on the stratigraphic profiles and level notes. The designation for an analytical unit includes site number, excavation area, and analytical unit. Thus, 31/B/AU2 is the second analytical unit in stratigraphic order (bottom to top) in excavation area B at GbTo-31 (Boardwalk). 31/A/AU means that I was unable to subdivide area A any further and the entire excavation area is treated as a single analytical unit (Ames n.d.).

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