

The Northwest Coast

KENNETH M. AMES

Over the past several decades, archeological research on the Northwest Coast of North America has focused on the evolution of the coast's well-known native societies. This research has two broad goals: building local and regional culture histories spanning the Holocene and answering processual questions about the evolution and persistence of cultural complexity among hunter-gatherers. Cultural complexity includes relatively dense populations, partial to full sedentism, corporate groups, some degree of occupational specialization, permanent social inequality, and control of property.¹⁻³ Recently archeologists have begun to investigate whether the coast was a possible route for the peopling of North America. Presently, the earliest known sites on the coast date to about 9,000 BC, although it is likely that the initial occupation was earlier. Some aspects of cultural complexity had developed on the coast by 2,500 BC, with permanent inequality present by 900 BC, if not earlier. Central to this development were large corporate households, intensive food production and storage, and technological innovations including water-tight wooden containers and large-capacity boats. Patterns of complexity on the coast continued to change through the arrival of Europeans in the mid-1700s.

THE NORTHWEST COAST

Region and Societies

The Northwest Coast stretches 1,800 km from Cape Mendocino, California, to Yakutat Bay, Alaska. It is usually divided into three or four sub-regions (Fig. 1), with the Oregon and northern California coasts the most ambiguous in their assignment to the Northwest Coast. In the nineteenth

century, this was linguistically one of the most diverse regions of North America, with eight language families. Nevertheless, Northwest Coast cultures shared many common cultural, social, and economic traits. It is important to stress that local expression of these traits varied, so that while the coast's cultures look similar at the areal scale (the entire coast) or the regional scale there was also considerable variability at the subregional and local scales.^{2,4}

Donald⁵ gives a useful summary of the defining characteristics of Northwest Coast culture. The key resources are cedar, primarily western red cedar (*Thuja plicata*), and salmon (five species of the genus *Oncorhynchus*). Cedar trees, which are tall and large with straight grain, were used for a startling range of purposes, from making cloth to constructing very large houses and, of course, the famous carvings. Salmon are an anadromous fish that once occurred in great abundance and were central to the coast's subsistence economy.

According to Donald,⁵ the key features of the coast's cultures are:

1. Marine/riverine orientation in subsistence, ideology, and "outlook";
2. Sophisticated, highly evolved technology for exploiting marine (neritic) and riverine resources;
3. Highly developed woodworking technology (plank houses, canoes, art objects, and watertight storage boxes), as well as a wealth of basketry items;
4. Some of the densest human populations in North America, including some in agricultural areas;
5. Emphasis on property, with control of wealth central to social importance and success;
6. Tripartite system of social stratification, including a lowest stratum of slaves;
7. True slavery;
8. No intercommunity political organization; even communities not always political units;
9. No major political offices.

I would add a tenth trait to his list:
10. The basic economic unit was large coresidential corporate households.

The corporate household, ranging in size from 15 to well over 100 individuals, was the coast's fundamental social, economic, and political unit.⁶ Households owned and controlled estates of corporeal and noncorporeal property that included rights to exploit resources in particular patches. They also had outright ownership of some patches as well as privileges such as titles, songs, and dances. These rights were conveyed through household oral traditions and represented by the supernatural beings depicted in masks and other art. Large post-and-beam houses were among the household's major possessions. These large houses sheltered people,

Kenneth M. Ames is Professor of Anthropology of the Department of Anthropology at Portland State University. He is currently conducting research on hunter-gatherer economies along the Lower Columbia River of the western United States and working on comparative analyses of long-term complex hunter-gatherer evolutionary sequences.

Key words: hunter-gatherers, archeology, complexity, social evolution

Glossary

Egalitarian—differentiation is generally based on sex, age, personal characteristics and qualities, and sometimes on kinship and family relationships. Aside from age and sex, there is equal access to status and positions of prestige. Positions of prestige are fluid, not fixed. Egalitarian societies value reciprocity and generosity. There may be strong social expectations and rules against accumulation of material goods; prestige may come by giving things away, by being generous rather than thrifty. In sum, egalitarian societies are those in which there is equal access to positions of prestige and the means of production.

Ranking—ranking societies include rank and stratified societies. Both have permanent elites but differ in fundamental ways. Basically, in rank societies there is differential access to prestige, but not the means of production. In stratified societies, there is differential access to both prestige and to the means of production. Further, stratified elites exercise power based on economy, ideology, or direct coercive force.

Task Organization—two broad categories of tasks can be distinguished: linear tasks and simultaneous tasks. Linear tasks

are those in which each step can be done sequentially, one after the other. Simultaneous tasks are those in which at least some steps can be or must be done at the same time. There are simple and complex simultaneous tasks. Simple simultaneous tasks are essentially linear tasks in which steps are done concurrently, saving time—everyone is doing the same thing at the same time. Complex simultaneous tasks are those in which the tasks are different and must be done simultaneously. Playing symphonic music is a highly complex simultaneous task. Large households arise in economies where the organization of technology and/or the spatial and temporal structure of the resource base requires complex simultaneous task organization.

Circumscription—limitations on people's options, usually mobility. These limitations may be environmental or social. Boone¹⁹ suggests that the inextricable ties of large populations, politics, and economy are another form of circumscription, restricting variation toward smaller, less complex forms of organization.

but were also the centers for food processing and storage, as well as social and ceremonial life. They represented great labor investment.⁷

Northwest Coast societies were stratified into two classes, free and slave.⁸ Free individuals were grouped into what Donald has termed “incipient classes”: a chiefly elite who controlled most of the household estate, a large group of free individuals with more limited rights in the estate, and free individuals with no rights to a house's estate. Chiefs had the power of life and death over slaves. While sometimes exercising great authority over other household members, they did not have power over them.⁹

There were no permanent polities beyond the household, although some households were as large as villages and polities elsewhere. There were no paramount chiefs who controlled multiple villages, although the influence of some chiefs extended far beyond their own house and community. Chiefs operated in regional systems of trade, exchange, marriage ties, warfare, and prestige competitions.

The Northwest Coast economy focused on producing large volumes of storable foods. Salmon were a key resource because of their abundance and storability. However, Northwest Coast peoples actually harvested a tre-

mendous array of terrestrial, riverine, and marine resources. Resources were tightly clumped in time and widely dispersed in space, requiring complex, simultaneous task organization to procure and process them. Large corporate households provided this organization.

Salmon have often been invoked as the “cause” of the evolution of Northwest Coast social ranking, their sheer abundance underwriting the wealth necessary for maintenance of the ranking system. However, while salmon were abundant, this abundance was subject to enormous variations in time and space at a variety of temporal and geographic scales.^{10–12} Household economies had to take full advantage of salmon abundance when it occurred, but also to weather fluctuations in the availability of salmon, which sometimes were extreme. Hence, a wide range of resources were harvested and stored, while labor organization and mobility patterns were attuned to temporally and spatially patchy environments.

Northwest Coast mobility patterns were complicated and may not be directly comparable to patterns among fully terrestrial hunter-gatherers or farmers. Logistical moves might involve entire villages or village segments rather than smaller specialized task groups. In the nineteenth cen-

tury, whole towns, including house planks, storage boxes, and everything else were regularly moved during an annual cycle, sometimes relatively frequently and sometimes over long distances, using large canoes and rafts. With canoes, it was also possible to haul large volumes of unprocessed resources back to village and town sites rather than field process them.¹³

Environments

There are actually two Northwest Coasts. One is the classic Northwest Coast of British Columbia and southeast Alaska, the “archipelago”⁵ coast of islands, bays, deep fiords, sheltered coves and broad, hidden passages; the other comprises the straight coasts of Washington, Oregon, northern California, and parts of Alaska, which are only sometimes broken by bays and estuaries. The Northwest Coast's social and economic systems seems best suited to the archipelago coast.

The primary environmental zones are the pelagic zone, the deep waters of the North Pacific off the continental shelf; the neritic zone, the more shallow seas of the continental shelf; the Outer Mountains; the coastal lowland or coastal trough, which, in Washington and Oregon, is generally above sea level (the Willamette-Puget Trough), but is drowned in British Columbia

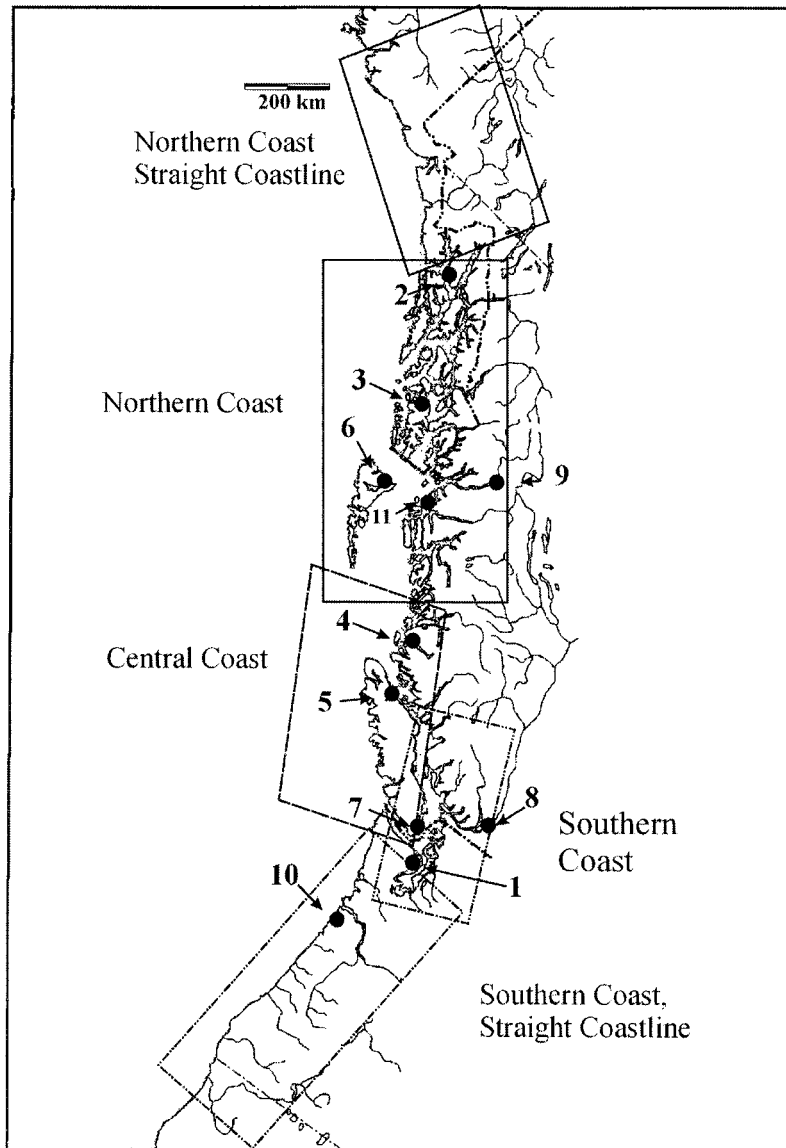


Figure 1. Map of the Northwest Coast showing its major subregions and the archeological sites mentioned in the text. The sites are numbered in the order in which they are discussed: 1) Manis site, 2) Ground Hog Bay, 3) 49-PET-408, 4) Namu, 5) Bear Cover, 6) Blue Jackets Creek, 7) Pender Canal, 8) Hatzic Rock and Maurer, 9) Paul Mason, 10) Palmrose, 11) Prince Rupert Harbor.

and southeastern Alaska; and the high inner coastal mountains that divide the Northwest Coast from the Intermontane Plateau and subarctic regions to the east.²

Northwest Coast peoples did not directly exploit the pelagic zone, but it is the zone where salmon matured and on which other marine resources depended. The neritic zone includes the littoral (or intertidal) and the sublittoral zones. These were directly exploited for marine mammals, fish,

shellfish, birds, and marine plants. The Outer Mountains are a barrier for cool, wet air masses moving east from the Pacific; their western slopes often receive the heavy rains for which the Northwest is famous and which water the coastal rainforest. The coastal lowland in Oregon and Washington supported an oak savanna in the south and forest openings to the north, both perhaps anthropic in origin, which were important sources of a range of plant foods and materials.

The drowned trough in British Columbia and Alaska was an extremely productive neritic zone, a major source of fish, marine mammals, and shellfish. The Coastal Mountains create a second barrier to air masses and a second north-south band of heavy rainfall and rainforest. The Coastal ranges are penetrated by deep fjords and spanned in only a few places by rivers such as the Stikine, Nass, Skeena, Fraser, Columbia, and Klamath.

While the primary north-south marine ecozones are the pelagic and neritic zones, a temperate rainforest is the primary terrestrial ecozone. Generally, the productivity of terrestrial ecosystems was highest in the south and declined going north. These contrasting patterns in marine and terrestrial productivity are reflected in human subsistence practices, which become increasingly oriented toward neritic environments moving north.

While the primary north-south marine ecozones are the pelagic and neritic zones, a temperate rainforest is the primary terrestrial ecozone. Generally, the productivity of terrestrial ecosystems was highest in the south and declined going north. These contrasting patterns in marine and terrestrial productivity are reflected in human subsistence practices, which become increasingly oriented toward neritic environments moving north. It seems likely that this pattern in pro-

ductivity existed throughout the Holocene.

The northern and central coasts were extensively glaciated during the last glacial advance, reaching their maximum extent between 19,000 and 17,000 years ago. In contrast, the outer coast of Washington and the coasts of Oregon and northern California were never glaciated. Until recently, researchers assumed that the last glaciation buried the entire coastline of Alaska and British Columbia and that the glaciers presented a solid unbroken front to the sea. This was not the case. Extensive areas were unglaciated, while others were only briefly glaciated. These areas, or refugia, permitted both plants and animals to persist and potentially provided habitat for humans moving along the coast. Deglaciation began as early as 16,000 calendar years ago along some portions of the coast and was well advanced by 12,000 years ago.

Sea levels along the entire coast were lowered by 100 to 150 meters, exposing the entire continental shelf at the glacial maxima. With deglaciation, sea levels rose rapidly. However, local differences in eustasy, isostasy, and tectonics make it difficult to reconstruct Holocene sea-level histories. The nature of the coastal environment and its potential to support humans and allow movement is, of course, central to recent theories about the peopling of the Americas.

In addition to sea-level rise, the postglacial was generally marked by rapid warming, punctuated around 10,800 cal BC (all dates are calendar dates based on calibrated radiocarbon dates) by the cooling of the Younger Dryas. Warm temperatures peaked around 8,000 years ago. Relatively modern temperature and moisture regimes existed by 6,000 years ago. There have been two subsequent major cooling events. Postglacial revegetation patterns were complex, with plants spreading both from below the former ice margins and from refugia. The rainforest developed within the last 4,000 years. The archeological record suggests that all of the animals that were major resources in the nineteenth century have been present on the coast throughout the Holocene, al-

though their distribution patterns may have changed markedly.^{2,4}

THE NORTHWEST COAST SEQUENCE

First Occupants (PaleoIndian, Paleoarchaic, Archaic) (>10,500 BC to 4,400 BC)

The Northwest Coast is one of the possible routes along which people from northeast Asia initially entered North America.¹⁴ The other is through an "ice-free corridor" along the Rocky

Current paleoenvironmental evidence suggests that movement along the coast was possible by 16,000 years ago. However, despite considerable effort to find it, there is at present no direct evidence of humans on the coast that early. Such evidence will be exceedingly difficult to find because most of the Late Pleistocene coast is now under deep water.

Mountain front through what is now the Yukon and Alberta, between the Cordilleran ice sheet to the west and the Laurentide sheet to the east. Until relatively recently, this route was assumed to be the only feasible way into the continent south of the glaciers.¹⁵ Current paleoenvironmental evidence suggests that movement along the coast was possible by 16,000 years ago.¹⁶ However, despite considerable effort to find it,^{17,18} there is at present no direct evidence of humans on the

coast that early.^{19,20} Such evidence will be exceedingly difficult to find because most of the Late Pleistocene coast is now under deep water. Efforts to locate relic Late Pleistocene surfaces that would have been on or near the Late Pleistocene coastline are ongoing. People certainly were on the coast by 11,000 years ago. I stress here that the archeological sample for this entire period, the Archaic, is small and geographically spotty. This is particularly problematic, given the great length of the Northwest Coast.

The coastal route would initially have been feasible only for people with a high-latitude marine adaptation. Such an adaptation would include the use of boats, the sustained ability to operate in cold-water environments, and the capability to harvest a range of resources from littoral and perhaps pelagic environments. There is presently no evidence of such an adaptation or its antecedents during the Late Pleistocene on either side of Beringia. Until recently, the Ushki Lake sites on the Kamchatka Peninsula have been thought to represent a Late Pleistocene culture in western Beringia that had these capabilities. These sites now appear to be very Late Pleistocene or earliest Holocene, and thus too young for that role.²¹ Of course the relevant evidence may be under water.

This issue is relevant not only to questions about the peopling of North America but to a very old and central question in Northwest Coast archeology: the degree to which the economies of the coast's initial inhabitants were primarily maritime, littoral, riverine, or terrestrial in orientation. Here I follow Lyman's²² distinction between maritime and littoral economies. The former employs specialized tackle, including harpoons, specialized boats, and floats to take sea mammals and other marine resources. People can navigate out of sight of land. Resource patches can include pelagic environments. Littoral economies emphasize littoral and sublittoral environments and may have boats, but lack specialized gear and tackle. Scholars have generally assumed that the earliest economies were either maritime or terrestrial in emphasis along the entire length of the coast.

With one possible exception, the oldest archeological sites on the Northwest Coast date to 9,000 BC and later. The exception is the Manis Mastodon site on the northeast corner of the Olympic Peninsula, which dates to ca. 11,875 BC² and contains the remains of a mastodon. No artifacts or features are directly associated with the elephant. Rare Clovis materials have been collected on the coast and east of the Cascades. However, no one has ever suggested that Clovis peoples moved down the coast; coastal migration is always seen as having been either pre-Clovis or in addition to Clovis. However, it is likely that people were on the coast by 11,000 BC, if not earlier. There are cultural complexes in interior Alaska and Washington State that date to 11,000 BC, and it is implausible that there were people in the interior at this time but not on the coast.

The earliest sites on the coast date to about 9,000 BC. These include Ground Hog Bay and 49-PET-408 (also known as On-Your-Knees-Cave) in southeast Alaska and Namu on the central coast of British Columbia. 49-PET-408 produced human remains dating to ca. 8,000 BC.¹⁸ These are the oldest known human remains on the Northwest Coast. Other early Archaic sites tend to be younger, some post-dating 6,500 BC. The material culture of the earliest sites on the northern coast contrasts sharply with that of sites on the central and southern coasts. North coast assemblages are dominated by microblades and micro-liths; bifaces are quite rare or absent. Central and south coast assemblages are dominated by foliate bifaces. Where preservation permits, both contain bone and antler tools. The microblades are attributable to the Paleoarctic Tradition,²³ a technological complex or tradition marked by the use of microblades that extended from Siberia and northeast Asia across Berengia into western North America. The central and south coast assemblages are broadly similar to contemporary Archaic materials east of the Cascade range in the Columbia River drainage.

Despite a general lack of evidence, some basic statements can be made about the coast's earliest inhabitants.

They had boats. The types, sizes, and seaworthiness of these boats are unknown, but the indirect evidence of their presence is clear. Insular sites in southeast Alaska contain obsidian from sources on other islands and the mainland, sometimes hundreds of kilometers distant, so boats on the northern coast were capable of lengthy trips. Sites on the southern and northern coasts have fish that could only have been taken from a boat, but none are from distant offshore environments. Minimally, Archaic-period people had hooks and lines, but they probably also had nets and basket traps. Bottom fish that require hooks and line to catch are present in sites on the southern and northern coast. A stone net weight

Despite a general lack of evidence, some basic statements can be made about the coast's earliest inhabitants. They had boats. The types, sizes, and seaworthiness of these boats are unknown, but the indirect evidence of their presence is clear.

was recovered from the Hatwai site in central Idaho in deposits dating between ca. 11,000 and 10,000 BC. If nets were present in riverine environments far in the interior, their presence on the coast seems reasonable. Basket traps dating to 6,000 BC occur in southeastern Alaska. People also used barbed points, although it is unknown whether these were fixed points or harpoons. However, there is no evidence of the highly evolved specialized tackle such as toggling harpoons or ground slate lance heads that are present during the subsequent Pacific period. Subsistence data suggest that Archaic-period people took resources from terrestrial, river-

ine, littoral, and sublittoral habitats. Faunal remains include small numbers of sea mammals. The Bear Cove site on the northeast side of Vancouver Island is the sole exception to this: Its faunal assemblage is overwhelmingly of dolphin and porpoise. These may date to the late Archaic and not be representative of earlier subsistence capabilities on the coast. However, they do clearly show that at some time during the Archaic people had the capacity, including the gear and the knowledge, to take small whales in large numbers. Finally, bone chemistry analysis of the remains from 49-PET-408 suggests that virtually all of this individual's protein came from marine sources. However, this does not tell us whether that protein came from sublittoral or more distant habitats.

Archaic peoples on the coast were most likely foragers with low population densities who were very mobile, shifting residences to available resources and not reliant on storage. Given the environmental changes of the Late Pleistocene and Early Holocene, adaptive flexibility and resilience were essential. There are no clearly residential sites nor any substantial structures. However, structures are present east of the Cascades,²⁴ and so may have been part of the repertoire. Limited structural evidence on the coast suggests that small circular huts were present. There is no evidence of storage. It seems unlikely that there was absolutely no storage or that people were ignorant of techniques for making stored foods. Boat-based mobility, perhaps over long distances, was probably the primary means of coping with resource variation. There is evidence of long-distance interaction. As noted, obsidian sometimes traveled great distances from sources, particularly on the northern and southern coasts. However, mobility and subsistence patterns may have varied along the coast. The coast's earliest inhabitants may not have been uniformly maritime, littoral, or terrestrial in economy. Fitzhugh²⁵ has recently argued that mid-Archaic hunters on Alaska's Kodiak Island were maritime foragers. His reconstruction may be applicable to southeast Alaska and adjacent Brit-

ish Columbia. The central coast may have occupied by foragers exploiting a broad array of terrestrial and littoral resources,^{26–28} while foragers along the Oregon and California coasts may have been even more heavily reliant on plants and shellfish.^{29,30} Carlson and Cannon^{31,32} have long argued that Namu on the central coast represents a sedentary community as early as 6,000 BC, if not much earlier. If that is the case, it suggests great diversity in mobility patterns on the coast during the Archaic. Carlson and Cannon argue that it indicates that sedentism was widespread on the coast by that time, but that claim is not generally accepted. The existence of possible differences in subsistence and residential patterns remains a major empirical question. If these differences prove to be real, they will have significant implications with respect to our understanding of cultural evolution on the coast, as does the relative role of boats.

Boats have implications beyond subsistence and the movement of obsidian. Archaic populations were small and thinly scattered along the coast. In a rugged terrestrial environment, equivalently small populations might have problems maintaining the mutual contacts that ensure access to mates and alternative resource locations. Boats would have facilitated that contact. Terrestrial hunter-gatherers are constrained by what they can carry on their persons. Their technology must be geared to mobility. Their decisions about hunting, butchering, gathering, and food processing are also affected by matters such as how far things have to be carried. Boats ease or eliminate these problems. Foragers with boats can take an entire carcass home; they do not have to butcher it in the field, for instance. Conversely, residential moves in boats can be of an entirely different scale than those of pedestrian people: Bulky items can be taken; everyone from infants to the elderly can ride. In short, boats can ease many of the technological and demographic constraints that mobility imposes on terrestrial foragers. Boat-borne foragers might have been demographically and organizationally different from classic terrestrial foragers. These differences may

have been most marked and important on the “archipelago” northern and central coasts, rather than on the straight southern coast.

The Pacific Period (4400 BC to AD 1775)

It was during this period that the coast’s distinctive cultures evolved into their modern forms. At its core, that usually meant the evolution of sedentism, corporate households, intensive exploitation of salmon, food storage, and permanent social inequality. Researchers are interested in the timing of these developments and their causal relationships. As in all histories, it is becoming increasingly clear that this evolution did not occur in a linear, gradual fashion, but in fits and starts. Paleoenvironmental history is also important given the theoretical stress on subsistence economies and environmental quality. The history and development of the coast’s famous art idiom³³ is also a major research issue.

The archeological sample for the Pacific period is much larger than that for the Archaic, but retains a strong geographic bias. The great bulk of excavated sites are located in southern British Columbia. Some portions of the coast still are archeologically unknown.

Early Pacific: (4400 to 1800 BC)

The climate became cooler and wetter in the late Archaic. Sea levels were close to their modern positions, leading to stabilization of the sublittoral zone and perhaps of salmon runs. The coast’s rainforests developed. Large shell middens appeared on much but not all of the coast (Fig. 2). Shell middens are present from the Archaic, but they are generally small and thin. As archeological sites, they are excellent for the preservation of organic remains. Consequently, there is better evidence for Pacific Period subsistence and technology (bone and antler tools) than there is for the Archaic. The Early Pacific period is also marked by midden burials, part of a varied mortuary program in which some but not all people were buried in the middens. It is not clear whether

these Early Pacific burials represent formal cemeteries. Multiple graves dating to ca. 3,400 BC at Namu on the central British Columbia coast raise the possibility of cemeteries, with implications for territorial social groups. By 2,500 BC, cemeteries definitely were present on the northern coast, at Blue Jackets Creek on the Queen Charlotte Islands and on the southern Coast at the Pender Canal site in the Gulf Islands. The mortuary program

Terrestrial hunter-gatherers are constrained by what they can carry on their persons. Their technology must be geared to mobility. Their decisions about hunting, butchering, gathering, and food processing are also affected by matters such as how far things have to be carried. Boats ease or eliminate these problems. Foragers with boats can take an entire carcass home; they do not have to butcher it in the field, for instance.

at both sites indicates the existence of some form of status or wealth differentiation.

Generally, the available evidence indicates a diverse resource base. There is some intensification of production, particularly in neritic environments. The shell middens themselves indicate increased collection of marine mollusks. Sea-mammal hunting was intensified. Specialized marine hunting gear is now present, including a variety of large harpoon heads and, for the first time, ground slate points



Figure 2. Pacific Period shell midden, Prince Rupert Harbor, British Columbia.

(Figs. 3 and 4). These would arm lances for killing harpooned sea mammals at sea. None of the recovered sea-mammal gear is large enough for



Figure 3. Early Pacific style harpoon head.

use against whales, but it demonstrates an increased capacity to hunt sea mammals such as seals and sea lions in open waters. This trend is not limited to the Northwest Coast, but occurred over a broader region of the



Figure 4. Ground slate point.

North Pacific. A diverse range of fish, including salmon and herring (at Namu), were taken. While salmon could be caught with a range of tackle, including fish spears, herring required small-gauge nets or herring rakes, which basically were boards with bone points driven through them so the herring could literally be raked into boats. Small-gauge nets are time-consuming to make. The herring certainly indicate boats. Terrestrial resources, no doubt including plants, were also exploited, but only the faunal record is known. Deer were the primary terrestrial mammal. Analyses of human bone chemistry suggest that people were getting more than 90% of their protein from neritic or pelagic sources.

Other innovations are adz blades (celts) of shell or ground stone and ground stone hammers. Bone and antler chisels were present in the Archaic and continued to be present. The additional equipment indicates an increase in carpentry and woodworking. One aspect of the evolution of the rainforests during this cultural period was the expansion of the range of red cedar and the growth of individual trees into useable sizes. The trees were presumably used in a variety of ways, including houses and boats.

The earliest known substantial structures on or near the coast are on the Fraser River above Vancouver, British Columbia, at the Hatzic Rock and Maurer sites.^{34,35} Each structure is rectangular with multiple posts, although the nature of the superstructures is unknown. The Hatzic Rock structure is more firmly dated than that at the Maurer site, to between 3,600 and 3,300 BC. Semi-subterranean pithouses become relatively widespread in the interior of Cascadia between 4,400 and 2,800 BC, with a peak in numbers around 3,500 BC. I have proposed elsewhere that large Early Pacific shell middens on the coast were associated with a settlement shift that included the construction of pithouses.² Some recent evidence supports that speculation. Some sites were occupied year-round or long-term by the end of the Early Pacific. The presence of adzes, chisels, and wedges certainly indicates a carpentry capable of building substantial dwellings.

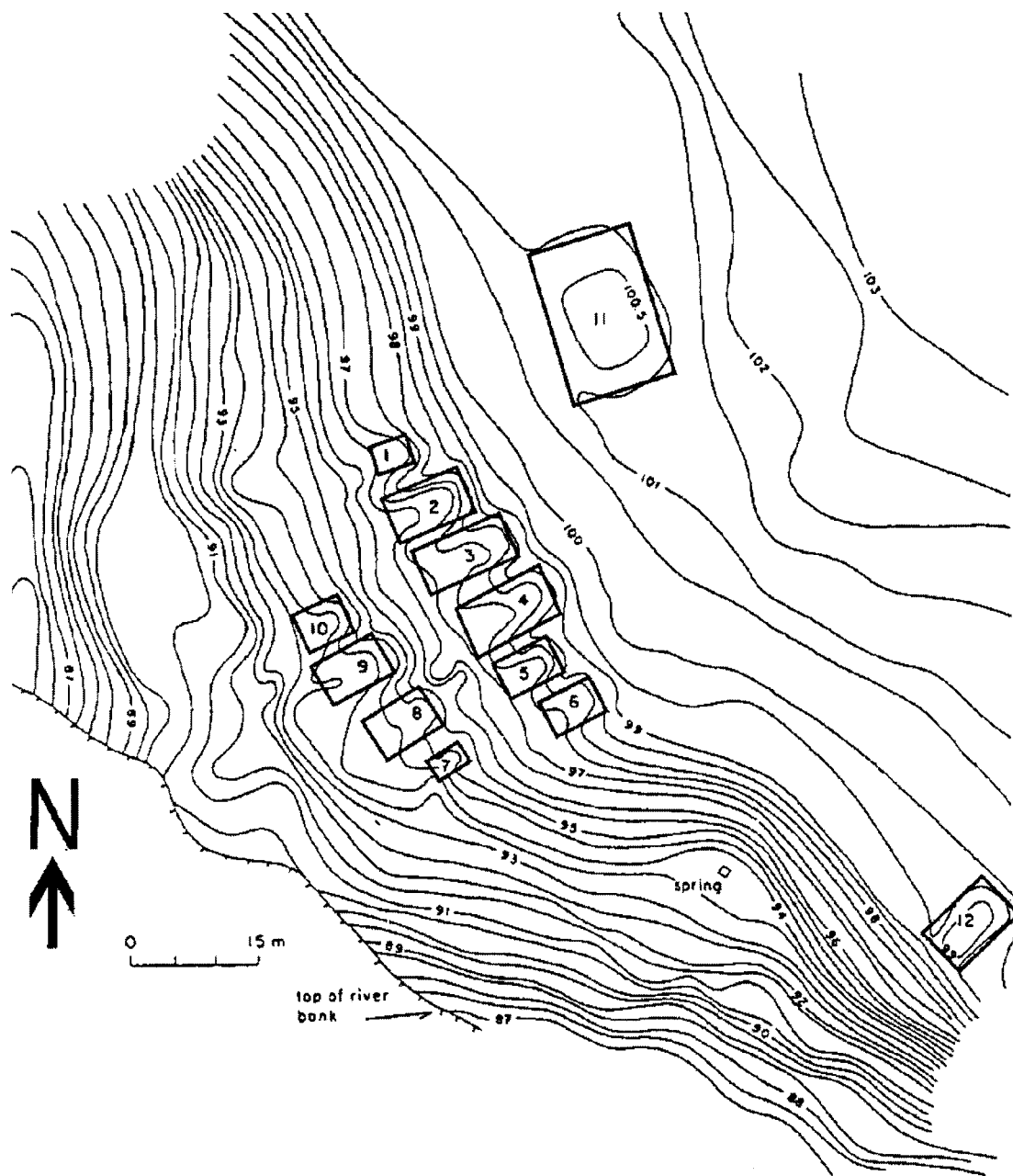


Figure 5. Map of the Paul Mason site, showing the two-row village arrangement.

By the end of the period, a few carved bone and antler objects carry motifs that can be considered ancestral to Northwest Coast art. Appropriately, one of these is an anthropomorphic handle of a carving knife.

Warfare was endemic along the entire coast. Twenty-one percent of human remains dating to this period display trauma attributable to interpersonal violence.³⁶

Middle Pacific (1,800 BC to AD 200–500)

Sea levels were generally in their modern positions and the modern climatic regime was in place. Rainforests were well developed. During the Middle Pacific there is clear evidence of sedentism, including houses, towns, and villages (Fig. 5); permanent social inequality; a storage-based economy; and intensive warfare.

There is also evidence of important technological innovations and improvements. Most of these innovations were in place by ca. 800 to 500 BC, if not well before 1,000 BC. Cumulatively, these innovations and other changes point to significant intensification of food production, including greater capacity to harvest and process foods. Intensification is also indicated by the increased labor invested in subsistence-related equip-

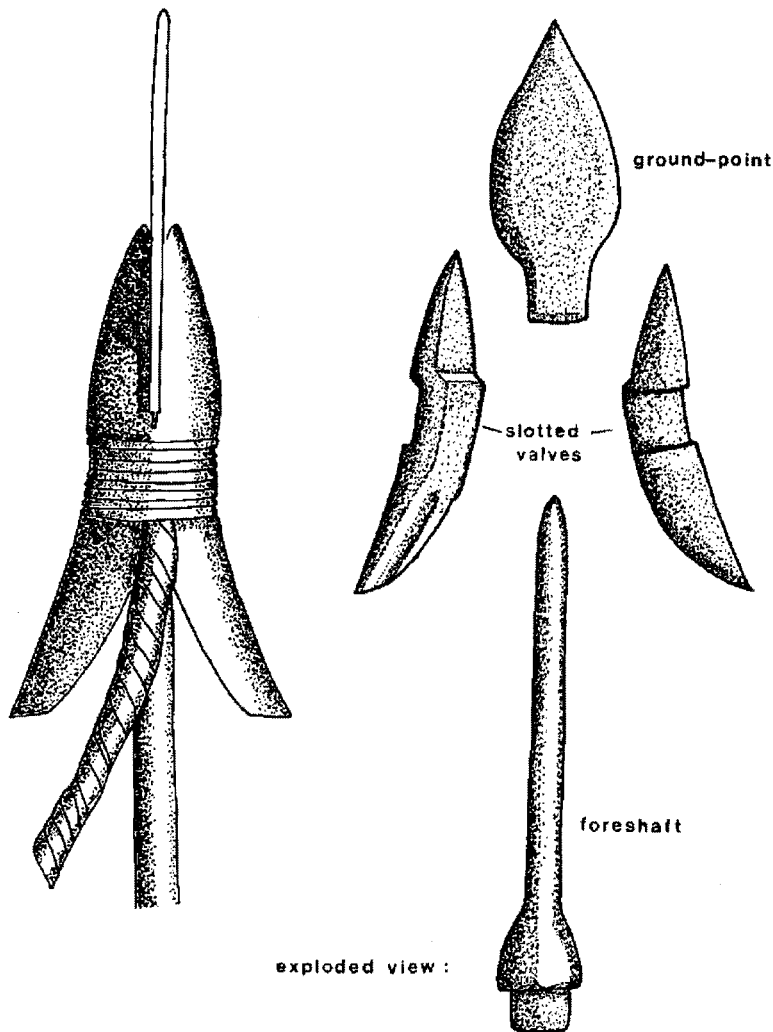


Figure 6. Composite toggling harpoon of the type that became common during the Middle Pacific.

ment (boats, boxes, subsistence tackle) and the increased array of that equipment.

Among the innovations is the widespread use of composite toggling harpoon heads (Fig. 6), watertight wooden boxes, and, perhaps, large seagoing freight canoes. Composite harpoons did not replace earlier harpoon forms, but represent tackle used for a greater variety of prey, particularly salmon, other fish, and small sea mammals in more diverse habitats. Other marine hunting tackle also diversifies; there are greater numbers of net weights, indicating expanded use of nets, and large fish weirs and traps. However, this increase may also reflect taphonomy and sampling biases.

The development of watertight

wooden boxes is analogous to the development of pottery and is as important. Historically, these boxes were used to store dried food and oil and to boil water. They were also used as coffins, which is how they are archeologically first visible. They came in many sizes and were stackable in ways that pottery is not. The presence of boxes at the beginning of the Middle Pacific indicates the capability for storage on a large scale.

Indirect evidence of large canoes includes the presence of sites on small offshore islands, which, to be habitable, would have required the transportation of drinking water and large volumes of processed foods, the latter from harvesting locales to residential sites. This is also evidence of logistical

mobility. Woodworking tools diversify and are made of more durable materials. In many areas of the coast, celts were made of nephrite, a particularly hard stone, rather than shell. Celts increase markedly in numbers, as does the range of forms and sizes of mauls or hammers.

However, the most important of these innovations is rectangular houses, presumably plank houses. The Paul Mason site in northern Brit-

The development of watertight wooden boxes is analogous to the development of pottery and is as important. Historically, these boxes were used to store dried food and oil and to boil water. They were also used as coffins, which is how they are archeologically first visible. They came in many sizes and were stackable in ways that pottery is not. The presence of boxes at the beginning of the Middle Pacific indicates the capability for storage on a large scale.

ish Columbia contains the earliest known such structures, which date to ca. 1,450 to 950 BC.³⁷ The Paul Mason site is also the earliest village site on the coast that clearly displays the layout of historic Northwest Coast villages. It was a linear village in which ten of its twelve structures were arrayed in two rows facing the Skeena River. A large rectangular house on

the Palmrose site, on the southern coast, may date to as early as 800 BC. Plank houses were certainly in widespread use along the entire coast by the end of the Middle Pacific, although there is some evidence suggesting the continued use of pit dwellings.

The presence of residential sites implies some degree of sedentism, which is also indicated by seasonality studies and other lines of evidence,³⁸ and the existence of corporate households by the middle of the Middle Pacific, if not earlier. I view these large households as a response to the increased labor demands and sequential tasks produced by intensification of food production and expanded storage. Such households, perhaps having more than fifteen members, would have had a competitive (reproductive) advantage over smaller ones because of their greater effectiveness in both scheduling and accomplishing multiple tasks, particularly when those tasks were widely separated in space.^{39,40} For example, harvesting and processing fish such as salmon cannot be separated into a linear task in which the fish are taken, then set aside for processing while more fish are taken. Drying or smoking of salmon must begin within hours of when the fish is caught if the fish is to be preserved well, if at all. Conversely, small households have an advantage when most tasks are linear.⁴⁰ For example, many plant foods, such as roots, unlike fish, need not be processed for storage immediately after harvesting. They can be set aside until the harvest is complete, then processed. A small group can accomplish all the necessary steps.

The evolving economy of the Northwest Coast probably conferred an advantage on large households through their ability to field labor. Historically, households competed for members; that is, for labor. Household size reflected economic success. Large households were successful because they could accomplish a range of tasks, and their success attracted new members. This advantage would ultimately be reflected in the differential reproductive success of individuals affiliated with big houses relative to those in smaller households. The de-

mand for labor may also have led to slave raiding by the beginning of the Middle Pacific.⁴¹

Competition for household members was probably played through and fueled by competition for prestige among household leaders. General optimization models^{42,43} predict competition among wealthy households for clients and among poor households for patrons, which historically was the case on the coast. It is theoretically possible for these large

The presence of residential sites implies some degree of sedentism, which is also indicated by seasonality studies and other lines of evidence, and the existence of corporate households by the middle of the Middle Pacific, if not earlier. I view these large households as a response to the increased labor demands and sequential tasks produced by intensification of food production and expanded storage.

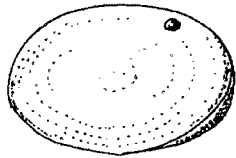
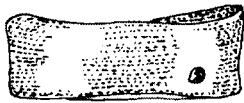
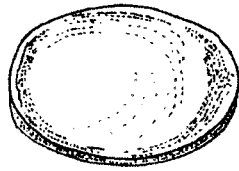
households to have persisted for a millennium.⁴⁴ Archeological evidence also indicates that such households did persist for at least 500 years and perhaps longer.^{7,44} Thus, there may have been a dual pattern in which some households persisted for very long periods while others failed and new ones formed. Expansion of Northwest Coast culture beyond the "archipelago coast" may have oc-

curred through two processes: imitation of Northwest Coast organization by ambitious individuals on the geographic margins of the region and fissioning of houses and the establishment of new ones, also in marginal areas.

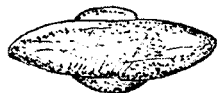
Mortuary evidence demonstrates the existence of territorial groups and ranking, at least on the north coast. Formal midden cemeteries are present, some of which may have been used for close to a millenium. Permanent status differences, or ranking, existed on the north coast in Prince Rupert Harbor by 900 BC, if not earlier. This evidence also raises the possibility that residential groups and communities were ranked, at least on the northern coast.

The evidence of status differences seems at first contradictory. The houses of the Middle Pacific, particularly on the northern coast, are all relatively small, leading some investigators to conclude that there was no permanent ranking of individuals or corporate groups at this time.⁴⁵⁻⁴⁷ Historically, the houses of high-ranking households with their high-ranking chiefs were markedly larger than those of lower-ranked households. A community might contain only one or two such structures. Communities organized this way do not appear in the record until the beginning of the Late Pacific. Consequently, some infer that ranking did not develop until then. However, the burial record is clear. What we are seeing is the continued evolution of the ranking system.

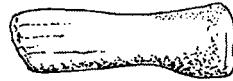
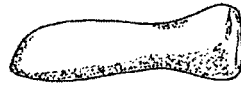
As noted earlier, some form of ranking may have been present in the late Early Pacific. One of the key archeological measures of ranking is the presence or absence of labrets (Fig. 7), which are lip or cheek plugs. Historically, labret wear was restricted to free women on the northern coast. Early Modern labrets were all lip labrets. In the late Early Pacific (after ca. 2,400 BC), both cheek and lip labrets were worn. By the early Middle Pacific, only lip labrets were worn, but by both men and women along much of the coast. However, labrets appear to have been worn by less than 10% of the population. During the Middle Pacific, labret wear was virtually restricted to males on the northern coast. On the southern coast,



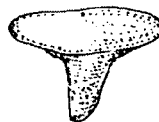
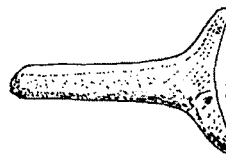
Pulley-shaped
Medial labret



"Top Hat"
Medial labret



Circular flange
Medial labret



"T" shaped
Medial labret

Figure 7. Labret types.

Island may have been a fourth such region.⁴⁸ The evidence supporting this includes patterns of obsidian distribution as well the developing Northwest Coast art style (Fig. 8). The distribution of some stylistic elements, for example, suggests the possibility of close ties between the mouth of the Columbia River and southern British Columbia. The Paul Mason and Palmrose sites indicate

The three or four interaction spheres of the historic period, the north coast, central mainland coast, and southern coast, are clearly in place by the Middle Pacific. The west coast of Vancouver Island may have been a fourth such region. The evidence supporting this includes patterns of obsidian distribution as well the developing Northwest Coast art style (Fig. 8). The distribution of some stylistic elements, for example, suggests the possibility of close ties between the mouth of the Columbia River and southern British Columbia.

it was gradually replaced by cranial deformation, which was practiced more or less equally on both sexes. These changes indicate a regional dimension to the emergence of a Northwest Coast elite. The regional patterns of labret wear, cranial deformation, and perhaps tattooing would have allowed a person to identify someone, whether male or

female, as being free or having high status and from the northern or southern coast. These changes also indicate continuing evolution of the ranking system.

The three or four interaction spheres of the historic period, the north coast, central mainland coast, and southern coast, are clearly in place by the Middle Pacific. The west coast of Vancouver

that the span of the Northwest Coast by the Middle Pacific was from the Columbia River to at least northern British Columbia. Evidence of specialization includes copper working in the north, carving and basketry in the south, and the development of the art style.

The evolution of Northwest Coast art

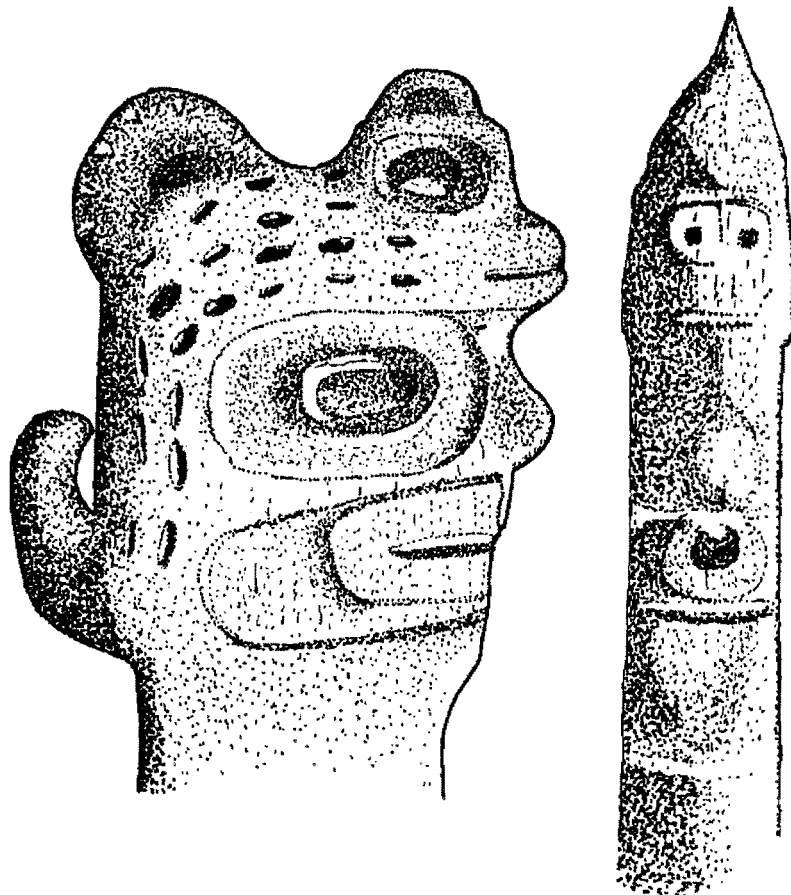


Figure 8. Whalebone club pommel from late Middle Pacific showing formal attributes of Northwest Coast art style. The humanoid has a nose ring, a marker of high status.

is traced through carved bone, antler, and wood objects. The defining elements of the historic style, including motifs, carving techniques, and organizational principles, are clearly present by the end of the Middle Pacific. However, the regional styles of the Early Modern Period were not yet fully visible. It is worth noting that in contrast to the extraordinary numbers of “art” object dating to the Early Modern period (perhaps as many as 500,000 in museums⁴⁹) such objects are exceedingly rare in archeological contexts, numbering many fewer than 500.

The level of warfare intensified on the northern coast but was much lower in the south. Much of this evidence is derived from analyses of human remains from burials. It is interesting that overall there are much higher levels of trauma from all causes in the north than in the south, pointing to interesting differences in

people’s lives. Skeletal evidence also suggests the possibility that slavery had developed, at least in the north, by the beginning of the Middle Pacific.³⁶ Although this is very difficult to quantify, populations appear to have grown during this period, reaching their peak in the subsequent Late Pacific.

Late Pacific (AD 200–500 to ca. AD 1775)

The coast’s current environment, including relative sea levels, was present by AD 1. Technological changes during the Late Pacific include the almost complete replacement of chipped stone tools on the central and southern coasts by bone and antler tools, including a diverse array of bone and antler points. This is generally thought to reflect intensification of neritic resources, particularly salmon. The new tackle appears to have been suited for taking large-

bodied fish.⁵⁰ One effect was to make Northwest Coast material culture more uniform along the entire coast. In contrast, there is great regional variation in recovered fauna, implying that while there were broad, overall economic similarities along the coast, important local differences existed as well. Perhaps the shift to bone and antler reflects a change to more flexible gear.

There is relatively widespread evidence of plank houses, multihouse communities, and one- and two-row villages. In the north there are marked

Midden burials first decline in frequency, and then cease by AD 1000. In the south, in the Late Middle and Early Late Pacific, construction of burial mounds increases, in some cases producing large well-appointed earthen tumuli. This practice appears to end by AD 1,000. In the north, the wearing of labrets shifts from being a male prerogative to a female one, as it was at contact. Labret wear in the south was replaced by cranial deformation.

differences in house sizes, mirroring the ethnographic pattern in which house size directly reflects household status and prestige. This increase in house size is paralleled by the appearance of heavy-duty woodworking tools, including large adzes, mauls, and pile drivers.

Midden burials first decline in frequency, and then cease by AD 1000. In the south, in the Late Middle and Early Late Pacific, construction of burial

mounds increases, in some cases producing large well-appointed earthen tumuli.⁵¹ This practice appears to end by AD 1,000. In the north, the wearing of labrets shifts from being a male prerogative to a female one, as it was at contact. Labret wear in the south was replaced by cranial deformation.

Warfare continues, perhaps fueled by the introduction of the bow and arrow. Fortifications become widespread along the coast,⁵² reflecting shifting strategies that now included sieges.⁵³ These tactics are fully described in oral traditions. It is during this period that Northwest Coast culture may have extended beyond southeast Alaska.

The frequency of decorated objects appears to decline in the south, which, coupled with the cessation of midden burials, has led some archeologists to suggest an overall decline in the degree of social complexity in the south relative to the north. These apparent changes may also be the consequence of sampling.

Modern period (1775–present)

This period begins with sustained contact with Europeans at ca. 1775. I distinguish between the Early Modern (1775 to 1850) and the Late Modern (1850 to present). The modern period is marked by the incorporation of the Northwest Coast into a developing world economy through the fur trade and the persistence of key cultural traits, including large corporate households. This period is, of course, the subject of a voluminous anthropological and historical literature.

SUMMARY AND CONCLUSIONS

The coast was certainly occupied by 13,000 years ago, if not earlier, although the earliest sites on the coast are 11,000 years old. Unresolved issues include whether the coast was one route or the only route by which North America, and eventually the Western Hemisphere, was initially peopled. Another important but unresolved issue is whether or not the coast's earliest inhabitants had maritime economies. The available evidence, as sparse as it is, suggests that there may have been considerable variation in Archaic subsistence practices along the coast.

The ethnographic societies of the Northwest Coast are epitomes of complex hunter-gatherers. Their archeology is a key sequence for understanding the evolution of social complexity among hunter-gatherers. Archeologists have long looked to both their ethnography and archeology to validate theories about the causes and consequences of complexity.

The sequence clearly shows that social complexity, including ranking, evolved by ca. 1,000 to 800 BC, if not

The sequence shows that aquatic and maritime economies by themselves do not lead inevitably to hunter-gatherer complexity. Neritic environments have been exploited on the coast since its initial occupation. However, there may have been considerable variation along the coast in the forms of these Archaic economies. Overall environmental productivity alone also appears insufficient to have triggered the evolution of complexity.

earlier. In addition to permanent ranking, these developments include the appearance of large corporate households; partially to fully sedentary communities; logistical mobility patterns; a complex division of labor with some level of specialization; an intensive economy based on mass harvesting, processing, and storage; extensive regional interaction; and key technological innovations and

changes. Populations may have grown rapidly during this period.

The sequence shows that aquatic and maritime economies by themselves do not lead inevitably to hunter-gatherer complexity. Neritic environments have been exploited on the coast since its initial occupation. However, there may have been considerable variation along the coast in the forms of these Archaic economies. Overall environmental productivity alone also appears insufficient to have triggered the evolution of complexity. The modern environmental regime was essentially in place by ca. 4,400 BC. However, the environment continued to be marked by what may have been extreme short- and long-term fluctuations in local and regional production.

The evolution of complexity on the coast was dependent on key technological changes. Boats were the most fundamental. They were doubtless in use along the coast from its earliest occupation and eased some of the demographic and economic constraints that affect terrestrial foragers. However, large-capacity, seagoing boats were central to the economy that developed at the beginning of the Middle Pacific. Other carpentry innovations include waterproof boxes and plank houses. Maritime hunting and fishing tackle appear to have undergone continual refinement and change during the entire Pacific period.

The historical and causal relationships relating to the evolution of inequality, storage, sedentism, and intensification of food production are not as straightforward as was once thought. The available evidence indicates that intensification of maritime resources predates the social and other economic patterns we associate with complexity by several centuries or more. In turn, labret wear suggests that some form of special status existed on the coast by 2,500 BC, predating the earliest current evidence of large corporate groups on the coast by several hundred years. (It is possible, of course, that earlier houses will be found.) This is also generally coincident with the earliest widespread evidence of mass harvesting, storage boxes, raiding, logistical mobility patterns, territoriality, and perhaps large

communities. The earliest known corporate households around 1,500 to 1,000 BC are contemporary with the earliest firm evidence of permanent ranking, heavy reliance on storage, and logistical mobility patterns. After the intensification of marine hunting, the crucial Middle Pacific developments appear to have occurred in rapid pulses involving clusters of traits that spread swiftly across great distances. These events may have been separated by several hundred years.

Once present, large corporate households persisted into the Early Modern period. During the Late Pacific, the status system continued to evolve and change. Technological changes suggest continuing intensification of food production and increasing levels of labor demand. Levels of warfare increased or remained high. Northwest Coast culture probably extended itself northward and southward and up the Skeena and Columbia Rivers sometime after 500 BC.

These changes may ultimately have been the result of the activities of what some researchers call aggrandizers or strivers, individuals who seek to maximize their own positions socially, politically, and economically. Some argue that in the right circumstances permanent inequality is the result the actions of aggrandizers. However, it is difficult to pinpoint a particular time or place for the "origin" of Northwest Coast social complexity. As noted, some changes appear to have been synchronous across vast stretches of the coast, no doubt as a consequence of the capacity to travel great distances by boat, which ensured that innovations and changes spread rapidly. In many cases, traits spread as whole packages. Given the apparent swiftness of events after ca. 2,500 BC, it is also difficult to assign labels such as "cause" and "consequence." That may depend on where one was along the coast. It is equally unproductive at present to isolate particular stresses or to claim that the environment or economy of the entire coast was low-risk. The evidence suggests otherwise. However, strivers and aggrandizers may be murkily visible from time to time, but more in terms of failures rather than successes. The

archeological record seems to contain attempts at multi-village polity formation on both the southern and northern coasts. A key question, then, is why these failed. Ancient Northwest Coast household elites were unable to expand their control over multiple households or villages.

It is postulated here that these changes were, in part at least, a consequence of the dynamics among the large corporate households once they developed. These dynamics included competition for members (that is, for labor, either through attracting members or through slave raiding) and fissioning, accompanied by movement into new areas, imitation, and extinction. The long-term persistence and success of these households on the Northwest Coast was a result of their capacity to accomplish multiple, sequential tasks and thus sustain relatively large populations. The archeology of the Northwest Coast presents us with an example of social co-evolution on a vast scale. The enormous regional scale, coupled with the sturdiness of the large corporate households in the face of dramatic environmental, social, and cultural changes may also be the reason why complexity on the coast persisted in one form or another for more than 3,500 years and why the cultures of the coast continue to flourish.

ACKNOWLEDGMENTS

I thank John Fleagle for the invitation to write this paper and for his editorial patience. This proved to be more difficult to write than I first imagined. I also express my appreciation to three anonymous reviewers and to John for taking a first, very flawed version seriously and providing very useful feedback. John Clague and Leland Donald allowed me to cite works in press. Any errors are mine.

REFERENCES

- 1 Price TD, Brown JA, editors. 1985. Prehistoric hunter-gatherers: the emergence of cultural complexity. Orlando: Academic Press.
- 2 Ames KM, Maschner HGD. 1999. Peoples of the Northwest Coast: their archeology and prehistory. London: Thames and Hudson.
- 3 Kelly RL. 1995. The foraging spectrum: diversity in hunter-gatherer lifeways. Washington, D.C.: Smithsonian Institution Press.
- 4 Matson RG, Coupland G. 1995. The prehistory of the Northwest Coast. Orlando: Academic Press.
- 5 Donald L. n.d. The Northwest Coast as a study area: natural, prehistoric and ethnographic issues. In: Matson RG, Coupland G, Mackie O, editors. Emerging from the mist: studies in Northwest Coast culture history. Vancouver: University of British Columbia Press.
- 6 Mitchell D, Donald L. 1988. Archeology and the study of Northwest Coast economies: prehistoric economies of the Northwest Coast. In Isaac B, editor. Research in economic anthropology, Suppl 3. Greenwich: JAI Press.
- 7 Ames KM. 1996. Life in the big house: household labor and dwelling size on the Northwest Coast. In: Coupland G, Banning EG, editors. People who lived in big houses: archaeological perspectives on large domestic structures. Madison: Prehistory Press. p 131-150.
- 8 Donald L. 1997. Aboriginal slavery on the Northwest Coast of North America. Berkeley: University of California Press.
- 9 Ames KM. 1995. Chiefly power and household production on the Northwest Coast. In: Price TD, Feinman GM, editors. Foundations of inequality. New York: Plenum Press. p 155-187.
- 10 Schalk RF. 1977. The structure of an anadromous fish resource. In: Binford LR, editor. For theory building in archeology. Orlando: Academic Press. p 207-249.
- 11 Tuncliffe V, O'Connell JM, McQuoid MR. 2001. A Holocene record of marine fish remains from the northeastern Pacific. *Marine Geol* 174: 197-210.
- 12 Finney BP, Gregory-Eaves I, Douglas SV, Smol JP. 2002. Fisheries productivity in the northeastern Pacific Ocean over the past 2,200 years. *Nature* 416:729-733.
- 13 Ames KM. 2002. Going by boat: the forager-collector continuum at sea. In Fitzhugh B, Habu J, editors. Beyond foraging and collecting: evolutionary change in hunter-gatherer settlement systems. New York: Kluwer/Plenum Press. p 17-50.
- 14 Fladmark KR. 1979. Routes: alternative migration corridors for early man in North America. *Am Antiquity* 44:55-69.
- 15 Meltzer DJ. 1995. Clocking the first Americans. *Ann Rev Anthropol* 24:21-45.
- 16 Clague JJ, Mathewes RW, Ager TA. n.d. Environments of northwest North America before the Last Glacial Maximum. In: Madsen D, editor. Entering America: northeast Asia and Beringia before the Last Glacial Maximum. Salt Lake City: University of Utah Press.
- 17 Fedje DW, Christensen T. 1999. Modeling paleoshorelines and locating early Holocene coastal sites in Haida Gwaii. *Am Antiquity* 64:635-652.
- 18 Dixon EJ. 1999. Bones, boats & bison: archeology and the first colonization of western North America. Albuquerque: University of New Mexico Press.
- 19 Carlson RL, Della Bona L. 1996. Early human occupation in British Columbia. Vancouver: University of British Columbia Press.
- 20 Moss ML, Erlandson JM. 1995. Reflections on North American Pacific Coast prehistory. *J World Prehist* 9:1-45.
- 21 Goebel T, Waters M, Dikova M. 2002. The Ushki sites, Kamchatka, and the Pleistocene peopling of the Americas. Paper presented at 67th Annual Meeting, Society of American Archeology, Denver, CO.
- 22 Lyman RL. 1991. Prehistory of the Oregon coast: the effects of excavation strategies and assemblage size on archaeological inquiry. Orlando: Academic Press.
- 23 Dumond DE, Bland RL. 1995. Holocene pre-

- history in the northernmost North Pacific. *J World Prehist* 9:401–445.
- 24** Connolly TJ. 1998. Newberry Crater: A 10,000 year record of human occupation and environmental change in the basin-plateau borderlands. Salt Lake City: University of Utah Press.
- 25** Fitzhugh B. n.d. The evolution of complex hunter-gatherers on the Kodiak Archipelago. In Habu J, Koyama S, editors. *Hunter-gatherers of the Pacific Rim*. SENRI Ethnological Series, National Museum of Ethnology, Osaka, Japan.
- 26** Ames KM. 2000. Economic prehistory of the northern British Columbia coast. *Arctic Anthropol* 35:68–87.
- 27** Coupland G. 2000. Maritime adaptation and evolution of the developed Northwest Coast pattern on the central Northwest Coast. *Arctic Anthropol* 35:23–35.
- 28** Moss ML. 2000. Northern Northwest Coast overview. *Arctic Anthropol* 35:88–111.
- 29** Erlandson JM. 1994. Early hunter-gatherers of the California coast. New York: Plenum Press.
- 30** Jones TL, Fitzgerald RT, Kennet DJ, Miksicek CH, Fagan JL, Sharp J, Erlandson JM. 2002. The Cross Creek Site CA-SLO-1797 and its implications for New World colonization. *Am Antiquity* 67:213–230.
- 31** Carlson RL. 1996. Early Namu. In: Carlson RL, Della Bona L, editors. *Early human occupation in British Columbia*. Vancouver: University of British Columbia Press. p 83–102.
- 32** Cannon A. 2002. Sacred power and seasonal settlement on the central Northwest Coast. In: Fitzhugh B, Habu J, editors. *Beyond foraging and collecting: evolutionary change in hunter-gatherer settlement patterns*. New York: Kluwer Academic/Plenum Publishers. p 311–338.
- 33** Holm B. 1990. Art. In: Suttles W, editor. *Handbook of North American Indians, vol. 7: the Northwest Coast*. Washington D.C.: The Smithsonian Institution. p 602–632.
- 34** Mason AR. 1994. The Hatzic Rock site: a Charles Phase settlement. MA Thesis, Vancouver, University of British Columbia.
- 35** Schaep DM. 1998. Recycling archeology: analysis of material from the 1973 excavation of an ancient house at the Maurer site. MA Thesis, Burnaby, Simon Fraser University.
- 36** Cybulski JS. 1994. Culture change, demographic history, and health and disease on the Northwest Coast. In: Miller RG, Larsen CS, editors. *In the wake of contact: biological responses to conquest*. New York: Wiley-Liss. p 75–85.
- 37** Coupland G. 1985. Household variability and status differentiation at Kitselas Canyon. *Can J Archaeol* 9:39–56.
- 38** Stewart FL, Stewart K. 1996. The Boardwalk and Grassy Bay sites: patterns of seasonality and subsistence on the northern Northwest Coast, B.C. *Can J Archaeol* 20:39–60.
- 39** Netting RM. 1982. Some home truths about household size and wealth. *Am Behav Sci* 25: 641–662.
- 40** Netting RM. 1993. Smallholders, householders: farm families and the ecology of intensive, sustainable agriculture. Palo Alto: Stanford University Press.
- 41** Ames KM. 2001. Slaves, chiefs and labor on the northern Northwest Coast. *World Archaeol* 33:1–17.
- 42** Boone JL. 1992. Competition, conflict and the development of social hierarchies. In: Smith EA, Winterhalder B. *Evolutionary ecology and human behavior*. New York: Aldine de Gruyter. p 301–337.
- 43** Diehl MW. 2000. Some thoughts on the study of hierarchies. In: Diehl MW, editor. *Hierarchies in action: cui bono?* Center for Archaeological Investigations Occ Pap 27. Carbondale: Southern Illinois University.
- 44** Ames KM. n.d. Thinking about household archeology on the Northwest Coast. In: Sobel E, Trieu A, Ames KM, editors. *Household archeology on the Northwest Coast*. Ann Arbor: International Monographs in Archeology.
- 45** Acheson SR. 1991. In the wake of the ya'áats' xaatgáay ['Iron People']: a study of changing settlement strategies among the Kunghit Haida. Ph.D. dissertation, Oxford University.
- 46** Maschner HDG. 1992. The origins of hunter-gatherer sedentism and political complexity: a case study from the northern Northwest Coast. Ph.D. dissertation, University of California Santa Barbara.
- 47** Archer DJW. 2001. Village patterns and the emergence of rank in the Prince Rupert area. In: Cybulski J, editor. *Perspectives on northern Northwest Coast prehistory*. Mercury Series, Archeology Survey of Canada Paper 160. Ottawa: Canadian Museum of Civilization. p 203–222.
- 48** McMillan AD. 1999. Since the time of the transformers: the ancient heritage of the Nuu-Chah-Nulth, Ditidaht, and Makah. Vancouver: University of British Columbia Press.
- 49** Cole D. 1985. Captured heritage: the scramble for Northwest Coast artifacts. Seattle University of Washington Press.
- 50** Berringer P. 1982. Northwest Coast traditional salmon fisheries: systems of resource utilization. MA Thesis, University of British Columbia, Vancouver.
- 51** Lepofsky D, Blake M, Brown D, Morrison S, Oakes N, Lyons N. 2000. The archeology of the Scowlitz site, SW British Columbia. *J Field Archaeol* 27:391–416.
- 52** Moss ML, Erlandson JM. 1992. Forts, refuge rocks, and defensive sites: the antiquity of warfare along the north Pacific Coast of North America. *Arctic Anthropol* 29:73–90.
- 53** Maschner HDG. 1992. The origins of hunter-gatherer sedentism and political complexity: a case study from the northern Northwest Coast. Ph.D. dissertation, University of California Santa Barbara.

