

## CHAPTER 8

### SUMMARY AND CONCLUSIONS

Prior to the mid 1990s, the history and archaeology of intertidal fishing weirs on the southern Northwest Coast were nearly unknown. My archival research has brought to light a wealth of data on fishing technologies along the Oregon Coast, documenting a considerable range of variability in this technology, particularly as depicted in oral history. Along the Oregon Coast, archaeological research has led to the identification of 72 intertidal weir sites, containing over 250 wood stake features ranging from a handful of stakes to over 8000 in a single feature. Twenty-nine lattice panels have been recorded, ranging from small fragments to large framed panels buried in mudflat paleosols. There are now 81 <sup>14</sup>C dates for estuarine weirs, representing at least 3400 years of wood stake weir building. So effective was this technology that it persisted into the 20<sup>th</sup> century in some parts of the Oregon Coast. In the last decade, University of Oregon archaeologists have literally transformed the Oregon Coast landscape from “terra incognita” regarding archaeological knowledge of fish weirs, to one of the best documented regions (along with southeast Alaska) for this key Northwest Coast technology.

The rich ethnohistoric accounts that are the foundation for my analysis of archaeological weir technology are undoubtedly more thorough because people continued to use weirs and traps during and after the Coast Reservation years. Conversely, there are relatively few accounts of stone tool manufacture and use, as this technology was largely abandoned with the introduction of forged metal tools and the disruption of long distance trade networks. Other traditional technologies or arts that persisted through the settlement era include basket making, hide working, house building and woodworking. Although some of these practices changed during and after the Reservation years with new economic conditions and limits on trade networks, the

techniques of weir use, basket making, and other traditions were well known to the Native elders interviewed by anthropologists in the early to middle 20<sup>th</sup> century.

Ultimately, the decline of Oregon Coast weir fishing technology was caused by the displacement of Native communities by American settlers and the incorporation of Oregon Coast fisheries into the global web of commercial fishing and overexploitation. Although a few settlers may have adopted tidal weir fishing to some extent, its persistence through the first decades of American settlement was largely limited to places where Native people continued to reside along estuary shores. Weirs and/or basket traps were still used in the late 19<sup>th</sup> century along the Siletz River, Alsea Bay, the Siuslaw and Umpqua rivers, and South Slough on Coos Bay. While newly introduced fishing technologies may have led some Indian people to abandon the use of weirs, traditional fishing systems remained some of the most effective techniques available. It may not have been changes in fishing technologies that ended weir use in the region, but the implementation of government regulations designed to halt dramatic declines in coastal fisheries caused by commercial overfishing by canneries and other interests bent on export. Over time, log rafting and private property ownership also increasingly limited the use of these structures, though eventually the diminished returns caused by degradation of estuary habitats by industry would have curtailed weir and trap fishing. If not for these impacts, weirs and traps might still be used today by some Native communities of the Oregon Coast. Given the emphasis on fishing and cultural heritage in today's Native communities (Ivy and Byram 2001; Brainard 2002) the day may come when these traditional fishing practices put food on the table once again.

### Re-Modeling Oregon Coast Archaeology

My archaeological and ethnohistoric analysis of tidal weir fishing and other estuary resource use on the Oregon Coast portrays a different subsistence focus for Native peoples than has often been portrayed for the region. Archaeologists often model land use and residential patterns in terms of resource use during different seasons. While the value of such generalizations is debatable, the ethnohistoric and archaeological data I have assembled warrant revision of widely cited models of Oregon Coast peoples' annual residential patterns and land use.

Several researchers have proposed land use models for portions of the Oregon Coast, particularly the portion from Coos Bay southward (Minor and Toepel 1983; Draper 1988; Tveskov 2000). Yet the most widely cited model encompassing my study area is one developed by Lyman (1991; see also Lyman and Ross 1988). As presented by Lyman (1991:82-83), this model of Native land use applies to the Oregon Coast during the "late prehistoric" period. Although he rejected the value of ethnohistoric data, Lyman's model is clearly based more on published ethnographies than archaeological data. In Lyman's scheme, villages along estuary shores were occupied by large residential groups, primarily during winter when people relied on stored food. In spring, when stores were depleted, most people left the villages along the estuary shores to go to shellfish gathering camps and sea mammal hunting camps on the outer coast, or to upriver camps. These dispersed camps were used through mid to late summer, after which people nucleated at the lowest reaches of the rivers and on the shores of estuaries, establishing fishing camps or re-occupying winter villages. Fish were caught, dried, and stored for winter use. This fishing continued as the main focus until the end of the fall runs of salmon, at which point people returned to the winter villages. According to Lyman, when population pressure became a problem along estuaries and non-tidal river mouths, villages were established on the outer coast.

Although Lyman's model recognized that estuary shores were often the settings for winter and fall residential locations and fall fishing sites, ethnohistoric and archaeological data now available show that the estuary was much more central to local economies. Ethnohistoric accounts indicate that many villages were occupied year round by at least a portion of the residential group, and these settings appear to have been the locus of food harvesting and processing activities as well as storage and consumption. Estuarine resources were available throughout the year and large fish runs occurred during all seasons. This abundance appears to have been a major reason why the largest communities were located along estuary shores. In very general terms, villages were located at points of greatest access to a reliable and diversified year-round resource base.

In terms of a "seasonal round," combined ethnohistoric and archaeological data justify a new general model. In spring, the largest coastal communities were at estuary shores, where people fished for smelt, herring, and other fishes and harvested plants and game from nearby areas. In late spring and early summer many people left estuary villages to visit upriver villages or camps for lamprey and salmon fishing at upriver weirs and falls. These fish runs lasted only a few weeks, but plant foods such as camas and wild oats were also available in many of these upstream settings at this time of year. Trade and social interaction with interior communities was also pursued during these visits. Fish were smoke-dried or sun-dried outdoors or in shelters, and along with camas they were brought back to tidewater villages for distribution among families and storage. This return may have coincided with the onset of summer runs of herring, sardine, and other fishes. Ongoing harvests of flounder and other fishes were pursued by people who had not made the trip upstream. In late summer, trips to dispersed elk hunting and berry gathering places could be taken. Many of these places could also be visited within the daily catchment radius of the village.

There are no indications that villages near estuary shores were regularly abandoned in spring or summer, and several accounts indicate people relied on estuary fishing at this time of year. Summer was also a time of visiting, and people traveled to other parts of the coast and interior to see friends and relatives, to participate in gaming and athletic contests, and to trade. In September, those who had been away returned to estuary shores, as estuary fishing was intense during this month. By mid fall, many people left the villages to go to camps and villages near the head of tide and on freshwater streams, where Chinook, coho, and chum salmon could be caught in abundance. Productive fishing also continued in the middle and lower estuary. At this time of year most of the fish were smoke-dried in plank houses near the estuary shore, often being brought back to these villages on a daily basis. Salmon fishing continued well into winter, overlapping in timing with smelt runs in the estuary. Though an indoor lifestyle may have prevailed during this season due to the weather, people still fished in estuary and upriver settings during winter. Settings such as the Coquille River Valley may have been somewhat different than the other coastal river valleys. On the Coquille, the rich resources of interior valleys sustained large residential communities year round well above tidewater, but the general model may apply for the people of the lower Coquille Estuary (cf. Tveskov 2000). Throughout the year smaller residential communities in non-estuary settings may have visited the estuary for fishing, but they probably relied more on locally available resources such as trout, salmon, and sturgeon (freshwater lakes), sea mammals and ocean fish (outer coast), and game and plant foods (interior valleys).

### Residential Sites vs. Work Stations: The Case for a Commuter Economy

Compared to most previous models of Native land use along the Oregon Coast, I see estuarine villages as the center of a relatively sedentary lifestyle, in which diverse and productive estuarine resources support large populations. One reason the mosaic of village catchment along estuary shores appears to go unrecognized by many archaeologists is the widespread assumption that most archaeological sites represent residential use, rather than work stations within the catchment of residential sites (e.g., Ross 1984; Minor 1985:10-11; Lyman 1991). Having reviewed extensive ethnographic sources and surveyed large portions of the region's estuary shores, I contend that a larger portion of the archaeological sites identified on the Oregon Coast are work stations, rather than residential sites. The assumption of hyper-mobility is a longstanding tradition in "hunter-gatherer" archaeology, stemming in part from colonial narratives that facilitated the disenfranchisement of Native peoples. There is no indication that Oregon Coast people lacked permanent, year round villages. Far from roving campers who left small shell middens, lithic scatters, or fishing structures at or near each camp they visited, Native people of the Oregon Coast more often visited various localities through the course of a week, month, or season. Their use of large, fast moving canoes transformed tidal channels into the arteries of a commuter economy in Oregon estuaries, and to a lesser extent on the outer coast and in upriver settings. As Donald Ivy (2001, personal communication) has remarked, "it takes four Coquille Indians approximately 20 minutes to paddle a Chinook style canoe two to three miles across Coos Bay." Thus, the residents of a single village at the estuary may have had daily access to numerous harvesting or processing stations, including fishing weirs, elk pits, shellfish gathering and processing sites, tobacco gardens, quarries, and many others.

On the outer coast, nonresidential “stations” may include coastal bluff sites where tool stone was heat treated and tools were made (Minor and Toepel 1983; Tveskov et al. 1996), as well as numerous shell middens located within the catchment of larger occupation sites (Moss and Erlandson 1995). Initial processing of resources at these sites would likely be aimed at reducing weight prior to transport (reducing tool stone mass, roasting or drying shellfish meat, etc.). For example, among the Tillamook it was common to dry shellfish meat with a fire on the beach before bringing the harvest back to the village (E. Jacobs 1934a[84-106]:24). To the extent that processing was done on the beach, shellfish consumed by village residents is not likely to be represented archaeologically. Similarly elk were often butchered and dried at hunting stations, with only the dried meat brought back to peoples’ homes (e.g., Harrington 1942[20]:566), and therefore elk bone in site deposits may reflect tool making more than food processing.

#### Archaeological and Ethnographic Biases in Subsistence Portrayals

Despite evidence to the contrary, published ethnographies clearly portray salmon as being more important than other fishes for Oregon Coast economies. There may be several reasons for this ethnographic misrepresentation. Researchers may have paid less attention to tidewater fishing because large groups did not generally make a residential move to do this. As they often did fieldwork during summer months, ethnographers may have observed riverine weir fishing for salmon more often than estuarine fishing in tidal slough settings. Melville Jacobs noted that tidewater fishing was considered so basic or fundamental by the people he interviewed that it was not brought up in the interviews; people preferred to tell him of their annual salmon fishing trips and elk hunts. A similar disparity between the food getting practices described in ethnographic interviews and the actual foods consumed has been noted by Moss (1993) for shellfish gathering

among the Tlingit of southeast Alaska. Assumptions on the part of ethnographers involving gender roles may also have been a factor. Whether the source of this misrepresentation on the Oregon Coast is due to methodology or historical circumstances, there are now abundant data that warrant a new perspective on traditional fishing and land use in this region.

The apparent lack of attention to key subsistence practices also seen in numerous archaeological studies may stem from archaeological methods in addition to ethnographic analogy. For example, Lyman's (1991) volume has been criticized for its lack of emphasis on the full range of faunal remains recovered with fine-grained techniques from residential sites (Moss 1994; Erlandson et al. 1998). The absence of many fish bone analyses is particularly telling. Lyman's focus on salmon, to the virtual exclusion of any other fish, demonstrates a lack of attention to the full faunal record (see Greenspan 1996; Losey 1996; Tveskov 2000), possibly resulting from relatively coarse sampling of faunal remains. Our work at the Philpott site (35-CS-1) illustrates this disparity; extensive excavations by Ross et al. (Draper 1982) recovered only one fish bone, whereas limited sampling using fine mesh screens recovered over 7000 fish bones, most from small species such as herring (Byram et al. 1997; Tveskov 2000:208).

Additionally, a large portion of the anadromous fish harvests in the region is not well-represented in published ethnographies nor in archaeological reports. Ethnohistoric research indicates Pacific lamprey (eel) was an extremely important resource for many Native people. Its value in late spring and early summer appears to have exceeded spring Chinook salmon in many rivers in the study area. Lamprey is also oilier than salmon, and if smoked it may store for over a year. As the lamprey is cartilagenous, only its teeth are likely to be represented archaeologically (Virginia Butler, 1996, personal communication), and this part of the fish may or may not have been deposited near sites where dried stores were prepared and consumed.

Salmon and lamprey together were clearly valued by many communities, but the use of salmon may have required much more labor than the processing of the smaller marine fishes such as herring, sardine, and smelt. Nearly every variety of fish could be smoked, dried, and stored through the year, but larger fishes such as salmon must first be butchered. Furthermore, salmon and lamprey harvests often required a residential move away from permanent villages during part of the year. When upriver fishing was combined with family visiting, trading, plant harvesting and hunting, the seasonal residential move away from the estuary may have been worthwhile, though estuary resources remained productive during seasons of upriver salmon and lamprey availability.

Along the Oregon Coast, there are no indications – ethnohistoric or archaeological – that estuarine weirs were specifically designed to harvest salmonids during runs. Instead, there are numerous indications that a diversity of fishes was harvested with each tidal weir type. Small gauge lattice is far more common than the large gauge lattice more likely to be associated with the exclusive fishing of salmon or other large fishes. Salmon were certainly among the fish caught in these tidal weirs, but several other fishes appear to have been as well.

#### Fishing and the Development of Nonegalitarian Societies

Recent research on the Oregon Coast has direct relevance for models that posit fishing strategies as the foundation for the development of nonegalitarian societies on the Northwest Coast. As outlined in Chapter 1, several researchers see weirs as an indicator of intensive salmon fishing and associated socio-economic developments that led to ranking and wealth differentials. Both group management models and resource control models account for the proposed role of weir fishing in these developments. My research on the southern Northwest Coast suggests that

wealth and social ranking may have developed with a reliance on much more diversified harvest of a variety of fish and other resources. Tidal weirs served a critical role in Oregon Coast Native economies, and riverine weirs were important in this region as well.

Group management models (Johnson and Earle 2000:137, 211) where wealth and ranking facilitate management of activities such as intensive weir harvests and fish processing, are perhaps more applicable to riverine groups that did not rely on estuarine weir use. In contrast to riverine weir use, the operation of one tidal weir did not preclude the use of another, and multiple weirs could have been used simultaneously even by one individual. No tidal weirs identified on the Oregon Coast to date appear to have required large-scale annual rebuilding, and many likely remained standing not only through multiple seasons, but through multiple years. Furthermore, diverse estuarine fishes were important subsistence resources, spawning runs occurred during all seasons, and day-to-day harvests outside times of spawning runs may have also provided a substantial portion of annual weir harvests. Therefore intensive processing for long-term storage may not have been necessary to sustain relatively large and sedentary populations in Oregon Coast settings. As Melville Jacobs (1934[96-22]:11-16) observed, the key subsistence pursuit in at least some Oregon estuaries was largely communal, and the abundance of marine fish was so great that there were more limitations involving processing than in harvesting.

Resource control models (Coupland 1985:223; 1998:48; Matson 1992:373; Hayden 1995:37) are not supported by the Oregon Coast data either. Because tidal weirs were numerous and widely dispersed, control of access to weirs through nearby residence was likely impractical in many localities. Due to the ubiquitous use of the canoe in tidewater areas, people may have harvested at weirs located kilometers from their homes (though people often did live near productive fisheries). In addition, the widespread occupation of plank houses in estuary villages meant that the community's processing facilities were readily available and unlikely to have been

controlled by a few individuals. Thus, although the resource abundance and economic structure necessary to sustain social ranking and wealth appears to have been present in estuary-oriented communities on the Oregon Coast, the social mechanisms which led to nonegalitarian society remain in question.

Neither managerial efficiency nor control of localized resources appear to explain the development of complexity among groups residing near Oregon Coast estuaries, where fish resources were apparently diverse, abundant, and widely available both spatially and temporally. The apparent conflation of ethnographically well-documented riverine weir use with less understood estuarine fishing strategies seems to account for this discrepancy. Although I have only addressed this problem for the Oregon Coast, it seems likely that diversified estuarine fishing may be under-emphasized in other parts of the region as well.

Other researchers have reached similar conclusions. For example, Stevenson (1998:227) argues that tidal traps should not be seen as indicators of large group effort comparable to that seen in large riverine weir building. Wet site archaeologist Kathryn Bernick has summarized the relationship of archaeological fishing materials to theorizing based on this evidence,

Wet-site archaeology on the Northwest Coast today is dominated by fishing sites and the interpretation of fishing-related features and artefacts. The central role of fishing on the Northwest Coast means that direct evidence of fishing technologies merits attention. Yet, archaeologists have been in the habit of reconstructing methods of fishing to fit their theories. Those who work with wet-site data are calling for reassessment. Three-thousand-year-old netting consistent with salmon gill-nets challenges assumptions that gill netting is a modern technique introduced by Europeans; relatively simple tidal weirs question the notion that all weirs document ... mass harvesting of salmon (Bernick 2001:222).

Moss and Erlandson (1998:193-4) suggest that while some tidal weir/trap sites required more massive construction efforts, "there is a variety of types of weirs and traps across the Northwest Coast; some of these may have been the products of small task groups."

On the Oregon Coast, the densest communities were those on estuary shores, who relied heavily on the abundance of the estuary harvested with tidal weirs and other techniques. While the abundance necessary to sustain nonegalitarian social organization appears to have been present in the estuary environment, the factors that brought about these developments remain in question. Thus, it appears that general models relating social developments to fishing practices on the Northwest Coast are in need of major refinements that take into account regional variation. These models may be applicable in some contexts but certainly not all.

#### Future Research Directions

My study shows that the variability in the weir fishing strategies used by Native peoples of the southern Northwest Coast can be effectively studied through a combination of archaeological and archival research. Although the oral histories of Oregon Coast tribes have sometimes been characterized as either limited or severely biased, in archival sources I have found a rich source of data on the history relevant to the archaeology of the Oregon Coast. Continued investigation of variability in fishing sites on the Oregon Coast and elsewhere will ultimately lead to a better understanding of the importance of estuarine fishing technologies in the development of maritime societies of the Northwest Coast, the Pacific Coast of the Americas, and around the world.

Some of the more compelling avenues for future research involve the search for earlier intertidal fishing sites, including underwater survey of subtidal channel banks, more dating of known features and comparative analysis of regional chronologies, and further investigation of the geological processes and cultural factors relating to the spatial and temporal distribution of weir sites. In particular, investigation of areas where sites are few or yet unknown holds promise,

such as the northern Oregon Coast. Numerous weirs reportedly exist in Willapa Bay, and study of these sites will shed more light on this fundamental subsistence technology on the southern Northwest Coast. Similarly, large gaps remain in survey coverage in British Columbia and northern California (Moss and Erlandson 1998).

Future research involving weir sites on the Oregon Coast and elsewhere on the Northwest Coast may lead in many new directions. Particularly promising are studies focusing on the paleoecology and topography of buried intertidal surfaces. Analysis of these paleo-surfaces, as well as subsurface characterization of weir features, will provide a clearer picture of the configuration of weirs relative to the settings in which they were used.

Several aspects of technology may be explored through the study of intertidal weir site assemblages. Differences in lattice technology may be furthered explored, focusing on temporal and geographic variation. This research could focus on the specific taxa harvested with various weir and trap types, the seasonality of weir building and the relative permanence or frequency of maintenance. Weir stake manufacture may also vary over time and geographically. Replication and experimentation could also be conducted to elucidate many aspects of weir and trap use. A focus on woodworking technology and the study of “wood scatters” across estuary paleosurfaces could be developed along the lines of lithic scatter and potsherd surface site studies.

The immense research potential of intertidal weir site studies reflects the prominent role of tidal weir fishing in traditional Native economies on the Oregon Coast. Although largely overlooked until now in ethnographic and archaeological research, tidal weirs and related traps were key fishing systems in the commutator economy that sustained the region’s largest populations throughout the year. Aspects of these fishing practices that are only now clear are the great diversity of fish species harvested, the abundance of these fishes during all seasons, and the high efficiency and accessibility of harvests through the use of weirs, traps, and related

techniques. Because of these findings, research on Native cultural history on the Oregon Coast must now hold as a premise that the mass harvest of fishes in estuaries was at the core of the region's economy historically, and may have been so for thousands of years.