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Pre-Littoral or Early Archaic? Conceptualizing Early Adaptations on the Southern Northwest Coast

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It is gratifying to see that R. Lee Lyman (1997: 260) is in "general agreement" with the conclusion that "no securely dated evidence currently exists for a 'pre-littoral' cultural adaptation along the southern Northwest Coast" (Minor 1995: 271). That was the point of my article (Minor 1995). The reassessment of early radiocarbon dates from the southern Northwest Coast was prompted by the fact that the pre-littoral stage as defined by Lyman and Ross (1988) and Lyman (1991a) is not consistent with the archaeological evidence.

Marine resources were a focus of prehistoric subsistence activities along the southern Northwest Coast much earlier than acknowledged by Lyman and Ross.¹ The pre-littoral stage, even as a hypothetical construct, is not a useful way of conceptualizing occupation in this region between ca. 8,500 and 5,500 B.P. Available information about cultural adaptations on the southern Northwest Coast during this time span is more appropriately considered in terms of the Archaic stage concept (Wiley and Phillips 1958).

ONE MORE LOOK AT THE DEFINITION OF THE PRE-LITTORAL STAGE

Lyman (1997:260) commented that the littoral adaptational model, of which the pre-littoral is the first stage, was adapted "from one originally proposed by Ross in the mid-1980s (Ross 1984, 1990)." As Lyman noted, Ross (1984, 1990) had previously used the terms "pre-marine" and "marine" to refer to adaptational stages in Oregon coast prehistory. It is instructive to briefly examine how these terms were used by Ross.

Ross (1984) first used these terms in his discussion of "bluff sites" along the southern Oregon coast. Bluff sites, now more commonly referred to as lithic sites, are a distinctive site type in which stone tools, debitage, and fire-cracked rock are typically the only cultural remains present. Molluscan and vertebrate faunal remains are characteristically absent.²

Although Ross (1984:248) initially thought that these localities might represent "pre-marine oriented sites," he revised his interpretation after obtaining a radiocarbon date of $2,750 \pm 55$ RCYBP from Blacklock Point (35CU75). Since this date was not any older than those available from coastal shell middens, Ross (1984:250) suggested instead that Blacklock Point and other similar localities were occupied by people from the interior with a terrestrial orientation who arrived on the coast ca. 2,750 to 3,000 B.P. This "terrestrial orientation" was seen to contrast with the "marine orientation" in evidence in coastal shell middens.

In referring to the occupants of these "terrestrial oriented sites," Ross (1984:250) stated that "after their arrival on the coast, they gradually made the transition from *exclusively exploiting terrestrial resources* to adding those resources unique to a coastal environment" (emphasis added). Ross (1990:554) used similar language under the heading "Pre-Marine Cultures," when he postulated that "several sites on the southern [Oregon] coast containing 'early' projectile point

styles are sites that were used by interior or terrestrially oriented . . . peoples." Ross (1990:558) added that "this [Pre-Marine] period is characterized by people inhabiting the coast line, river valleys, and western foothills but not using the marine resources to any great extent *if at all*" (emphasis added). Ross, then, was quite clear in his language and intent when he used the term "pre-marine" to contrast with the marine-oriented adaptation in evidence at coastal shell middens.

Unfortunately, Lyman's substitution of the terms "pre-littoral" and "littoral" for "pre-marine" and "marine" has confused matters. As described by Lyman and Ross (1988:98), a pre-littoral adaptation was characterized by people who "probably were generalist foragers, exploiting a broad range of resources available in coastal environments. A focus on riverine and upland resources may have been the major subsistence orientation." Since no mention was made of marine resources, it seemed reasonable to infer that Lyman and Ross's "pre-littoral" was intended to mean more or less the same as Ross's "pre-marine." Lyman (1991a:80) later modified this characterization slightly by stating that pre-littoral peoples were "generalist foragers who exploited the broad range of resources available in and adjacent to (landward of) coastal environments, including riverine and upland resources." Again, no specific mention was made of marine resources.

In this issue, Lyman (1997:261) now states that "pre-littoral peoples were *explicitly* conceived as having exploited littoral—Minor's 'marine'—resources but not as having focused their subsistence pursuits on such resources; they were conceived to be generalists" (original emphasis). In view of the fact that riverine and upland resources were identified as important aspects of a pre-littoral adaptation, but marine resources were never specifically mentioned, it is difficult to see how Lyman can argue that exploitation of marine resources was *explicitly* encompassed

within the definition of the pre-littoral stage. Particularly when viewed in the context of earlier statements by Ross, the concept of a pre-littoral stage clearly conveys the impression of terrestrially oriented cultures that made little or no use of marine resources.³ As previously pointed out (Minor 1995), this interpretation is not consistent with archaeological evidence from the southern Northwest Coast.

THE EARLY RADIOCARBON DATE FROM THE NEPTUNE SITE

Lyman and Ross (1988:98) and Lyman (1991a:79) stated unambiguously that "the earliest evidence for this [pre-littoral] stage is a date of 8300 B.P. derived from organic-rich sediment beneath the shell midden deposit at LA3" (the Neptune site). In my reassessment, the unusual history of this date was outlined from the information then available (Minor 1995:267-269). As Lyman (1997:264) noted, although the 8,310 B.P. date was "over two and a half times greater than the oldest date with solid archaeological implications then available," Ross did not choose to publish this date for 12 years. From this, one could infer that Ross was uncertain about the association of the very sparse cultural materials and the dated sample. It was only after the radiocarbon dates of 7,960 RCYBP and 6,880 RCYBP from Tahkenitch Landing were obtained that Lyman and Ross (1988) decided that the 8,310 RCYBP date from the Neptune site might be worth reporting after all.

Although Lyman (1977:265) referred to the "tantalizing but inconclusive" data from the Neptune site (Lyman and Ross 1988:98; Lyman 1991a:79), neither Lyman nor Ross adequately conveyed the tenuous nature of the relationship between the cultural materials and the radiocarbon date. Lyman's attempt to clarify the information available about this date and its association casts even more doubt on its validity. Although the artifacts and the date were apparently from the same stratum, the fact remains that

there was "no well established association" between the date and the artifacts (Ross 1990:555). In other words, there is no compelling reason to believe that the 8,310 RCYBP date from the Neptune site reflects human occupation during the time span of the hypothesized pre-littoral stage.

EARLY MARINE RESOURCE USE AT TAHKENITCH LANDING

Evidence of coastal occupation during the time span of the hypothesized pre-littoral stage (ca. 8,500 to 5,500 B.P.) is available from Tahkenitch Landing (35DO130), where radiocarbon dates of 6,880 RCYBP and 7,960 RCYBP were obtained from charcoal recovered in the lowest cultural stratum underlying a shell midden (Minor and Toepel 1986). Lyman (1991a:79) listed the artifacts associated with these dates, and he also noted that "one land mammal bone and one pinniped bone were recovered from this stratum," but he neglected to mention the marine fish and bird remains, which together dominate the Component I faunal assemblage.

Tahkenitch Landing is the only site occupied during the pre-littoral time span that has produced faunal evidence from which inferences about adaptations could be made. As such, it probably should have been considered the "type site" for defining the pre-littoral stage. If, as Lyman (1997) now insists, marine fish and birds were among the resources exploited by pre-littoral stage peoples, then the failure to mention these marine resources represents a rather significant omission.

As previously pointed out, the extensive list of marine fish and birds associated with Component I at Tahkenitch Landing indicates that the inhabitants of this site focused on marine resources (Minor 1995:271). In questioning this interpretation, Lyman (1997:261) asserted that faunal scales are lacking for "measuring subsistence intensity and degree of focus" for non-mammalian remains such as fish and birds. It is

true that comparative data for assessing the relative importance of non-mammalian remains such as fish and birds are lacking for the sites that Lyman and Ross investigated.⁴ However, information regarding the relative importance of various classes of fauna is available from the Oregon coast sites excavated by Heritage Research Associates, as Greenspan's (1986; also see Greenspan and Wigen 1987, 1989) faunal analyses have included the entire range of fauna represented.

Lyman (1991a:297) used simple percentages for "measuring subsistence intensity and degree of focus" at sites occupied during the early and late littoral stages (also see Lyman 1989). Following this approach, vertebrate faunal data from assemblages analyzed by Greenspan (1986) and Greenspan and Wigen (1987, 1989) before 1990 are summarized in Table 1. For the purposes of this discussion, the data have been simplified into four broad categories: terrestrial mammals, marine mammals, fish (including saltwater and anadromous species), and birds (including seabirds, shorebirds, and waterfowl). In addition to data from Component I at Tahkenitch Landing (35DO130/1), this table includes data from the first field season at Yaquina Head (35LNC62), where occupation occurred between approximately 4,100 and 2,000 B.P. (Minor et al. 1987; Minor 1991), as well as from three sites with occupations spanning the interval from ca. 1,500 B.P. to just before historic contact, two (35LNC55 and 35LNC56) at Cape Perpetua (Minor et al. 1985) and one (35LNC50) on North Yaquina Head (Minor 1989). All of the data in Table 1 were available at the time Lyman was writing *Prehistory of the Oregon Coast*.

It is readily apparent that the percentage of fish relative to other taxa is higher from Component I at Tahkenitch Landing than from any of the other sites. The data on the relative proportions of mammals, fish, and birds at these five sites support the interpretation that marine fish and birds were, in fact, a focus of subsistence-related activities during the occupation of Com-

ponent I. This situation is especially noteworthy since, according to Lyman (1991a:290, 292), fishing did not become important on the Oregon coast until the late littoral stage (beginning ca. 2,000 RCYBP).⁵

Lyman (1997:261) also commented that "Simply listing how many specimens of several species of birds and fish were found does not demonstrate a focus on or intensive exploitation of a habitat, especially when some of those species are found to occur naturally in two or more of the distinct offshore or marine, littoral, and interior (in or on rivers) contexts." This comment is not particularly relevant in assessing the importance of marine resources at Tahkenitch Landing. Anadromous fish and sturgeon, which might suggest "interior contexts," were only minimally represented (together comprising 1.7% of the identified fish). The possibility that some of the marine fish and birds might have been taken from "distant offshore marine contexts" is intriguing, but according to Lyman's definition (1991a:76) people with a littoral adaptation (and presumably this would hold true for a pre-littoral adaptation as well) did not "go to sea." Clearly, the closest context in which the great majority of the fish, and probably most of the birds as well, would be found is the estuary that existed adjacent to the site until ca. 3,000 B.P.

Tahkenitch Landing is clearly an example of native peoples living adjacent to an estuary and making full use of that rich environment in their subsistence pursuits. It is apparent that the prehistoric inhabitants of this region had the knowledge, technology, and inclination to exploit saltwater fish, marine mammals, seabirds, and waterfowl long before the time of the early littoral stage proposed by Lyman and Ross. It is equally clear that, at least while occupying Tahkenitch Landing, these peoples exploited marine resources far more intensively than terrestrial resources.

The faunal remains and associated radiocarbon dates from the earliest components at Tahke-

Table 1
SUMMARY OF VERTEBRATE FAUNA (NISP^a) FROM SELECTED OREGON COAST SITES

Site	Terrestrial Mammals	Marine Mammals	Fish ^b	Birds ^c	Reference
Tahkenitch Landing (35DO130/1)	1 (0.2%)	1 (0.2%)	415 (87.2%)	59 (12.4%)	Greenspan 1986
North Yaquina Head (35LNC50)	9 (7.3%)	107 (86.3%)	8 (6.4%)	0 (0%)	Greenspan and Wigen 1989
Cape Perpetua (35LNC55)	65 (46.4%)	5 (3.6%)	69 (49.3%)	1 (0.7%)	Minor et al. 1985
Cape Perpetua (35LNC56)	77 (49.0%)	16 (10.2%)	45 (28.7%)	19 (12.1%)	Minor et al. 1985
Yaquina Head (35LNC62)	95 (6.6%)	62 (4.3%)	980 (68.1%)	303 (21.0%)	Greenspan and Wigen 1987

^a Number of identified specimens.

^b Includes saltwater and anadromous fish.

^c Includes seabirds, shorebirds, and waterfowl.

nitch Landing are consistent with what is known about the environmental history of estuaries along the Oregon coast. As described above, the Stratum 4A faunal assemblage was dominated by marine fish and birds. Although some marine shell was present, exploitation of molluscan resources does not appear to have been a major activity during the interval that Stratum 4A was deposited. In comparison, the overlying Stratum 4B, from which a radiocarbon date of 5,100 ± 70 RCYBP was obtained, contained generally similar, but much more abundant, vertebrate faunal remains within the matrix of a marine shell midden (Minor and Toepel 1986:104-105). The dramatic increase in molluscan remains from Stratum 4A to Stratum 4B is interpreted to represent an intensification in shellfish exploitation by the inhabitants of the site as the adjacent marine environment changed from a deep-water to a shallow-water estuary with more suitable habitat for marine shellfish (Minor and Toepel 1986:105). This interpretation is consistent with the results of a geological study of Alsea Bay 70 km. to the north, which also underwent a transition from a deep-water to a shallow-water estuarine environment about 5,500 B.P. (Peterson et al. 1984).

EARLY USE OF MARINE SHELLFISH AT INDIAN SANDS

Evidence of coastal occupation during the pre-littoral time span has recently been documented by radiocarbon dates of 8,250 ± 80 RCYBP, 8,150 ± 120 RCYBP, and 7,790 ± 70 RCYBP from a small, deflated shell scatter at Indian Sands (35CU67) (Moss and Erlandson 1994: 103, 1995:15). Lyman (1997:265) was critical of my statement that "this shell scatter represents the earliest evidence of molluscan resource exploitation so far identified on the Oregon coast" (Minor 1995:271), asking how a "deflated" site could have produced such evidence. In this particular case, the radiocarbon dates were derived directly from marine shell, providing a direct indication of the age of these remains. The shell fragments occur along with stone tools on a marine terrace 25 to 50 m. above the ocean (Moss and Erlandson 1994:58). Whether the stone tools and the shell scatter are associated remains unclear.

During my visit to Indian Sands in 1985 (Minor 1986:116-117), I observed the deflated shell scatter (but lacked the foresight to collect samples for radiocarbon dating), and I do not

question the cultural origin of the marine shell at this site. I see no reason to revise my earlier statement, except perhaps to point out that with a weighted average of $8,440 \pm 60$ RCYBP (Moss and Erlandson 1994:103), the radiocarbon dates from the shell scatter at Indian Sands represent, to my knowledge, the earliest evidence of marine resource exploitation so far identified not only on the Oregon coast, but also on the entire southern Northwest Coast.

TERMINOLOGICAL HINDSIGHT REVISITED

Under the heading "Terminological Hindsight," Lyman (1997:263) attempted to justify "ignoring the fish and shellfish remains" in *Prehistory of the Oregon Coast* by drawing a parallel with what he refers to as the Grayson-Madsen debate in Great Basin archaeology. Grayson (1991) used faunal assemblages from high-altitude sites in the White Mountains of eastern California to develop tests of Bettinger and Baumhoff's (1982) model for the replacement of travellers by processors in the Great Basin about 1,000 years ago. Madsen (1993) questioned the validity of these tests on several grounds, one of which was the fact that the tests were based solely on the analysis of mammalian faunal remains, without regard for other archaeological evidence. Broughton and Grayson (1993) replied that Grayson's tests were valid because his interpretation of Bettinger and Baumhoff's model differed from Madsen's (especially in regard to issues related to the diet breadth approach and foraging theory).

I do not find Lyman's attempt to draw a parallel between his focus on mammalian remains (to the virtual exclusion of other faunal classes) in *Prehistory of the Oregon Coast* and Grayson's study of mammalian remains from the White Mountains of eastern California very convincing. I recognize that Grayson's study was designed to test only "certain implications" of the Bettinger and Baumhoff model (e.g., those related to ex-

ploitation of mammals). I suspect, however, that Grayson would have informed his readers if any of the faunal assemblages from sites in the White Mountains were dominated by fish or bird instead of mammalian remains. I also agree with Madsen's point that adequate tests of region-wide changes in prehistoric cultural adaptations must be based on more than just mammalian faunal data and that, particularly in the Great Basin, such tests should include data related to plant and seed processing. Likewise, in coastal contexts, adequate tests of region-wide adaptive changes must take into consideration evidence from shellfish, birds, and fish when data on these faunal classes are available.

Frankly, I consider Lyman's (1997:261) discourse on "critical terms" (e.g., focus, intensity, faunal scales, straw men) little more than an attempt to obfuscate the fact that he failed to consider other available faunal data in his interpretations. Certainly, it seems to me that the full range of faunal evidence available, not just those classes of interest to the author, should have been considered in a book entitled *Prehistory of the Oregon Coast*. Unfortunately, available faunal data were not the only source of information Lyman failed to adequately consider in his interpretation of Oregon coast prehistory.

LITTORAL OR MARITIME?

Lyman (1997:261) maintained that he chose to use the term "littoral" instead of the more commonly accepted "maritime" to describe southern Northwest Coast adaptations because he "wanted to use a term that distinguished those cultures found on the coast that did not go to sea [littoral] from those that did [maritime]." According to Lyman (1991a:76), the principal difference between maritime and littoral cultures is that maritime cultures have seaworthy boats and "attendant technologies [that] are specifically applicable and adapted for exploiting sea resources," while littoral cultures do not.

Lyman's conclusion that southern Northwest

Coast peoples were littoral rather than maritime cultures is based in large measure on his interpretation of marine mammal assemblages from archaeological sites on the Oregon coast. Lyman's analyses led him to conclude that marine mammal exploitation on the southern Northwest Coast primarily took place at rookeries on land (including exposed rocks and islands) rather than on the open water (Lyman 1991a:92; also see Lyman 1989, 1991b, 1995). In Lyman's view, specialized technology for exploitation of marine resources, a prerequisite for a maritime adaptation, did not develop on the southern Northwest Coast because such technology was not required for a littoral adaptation (Lyman 1991a:90). In other words, while Lyman (1997:263) recognized that marine mammal exploitation "could and perhaps sometimes did result in technological innovations and concomitant social change (e.g., Hildebrandt and Jones 1992; Jones and Hildebrandt 1995)," he apparently denied that these developments took place to any significant extent on the southern Northwest Coast.

A major flaw in Lyman and Ross's (1988) littoral adaptational model is that it is completely inconsistent with available information about the ethnographic peoples of the southern Northwest Coast. A reading of the ethnographic literature indicates that, even according to Lyman's own definitions, the ethnographic (and by extension late prehistoric) peoples of the southern Northwest Coast were not simply littoral cultures, but were, in fact, maritime hunter-gatherers (*sensu* Yesner 1980).

In asserting that the native peoples of the southern Northwest Coast (south of the Makah and Quileute) were littoral rather than maritime cultures, Lyman was apparently unaware of the literature regarding use of the Nootka canoe, generally recognized as an oceangoing vessel, along the northern two-thirds of this region (Olson 1927). The only references to canoes in *Prehistory of the Oregon Coast* pertain to use of shovel-nose canoes along the coast of northern

California and southern Oregon. Lyman (1991a: 89) approvingly cited Hudson's (1981) study which concluded that, based on nautical engineering principles, these shovel-nose canoes were not seaworthy. Whether these canoes were seaworthy according to the standards of late twentieth century Americans, their use by native peoples at substantial distances offshore is clearly indicated in the ethnographic record.

The ethnographic literature contains references to activities carried out in the offshore marine environment by every native group on the southern Northwest Coast.⁶ Offshore activities ranged from resource procurement, including the hunting of sea mammals, shellfish gathering on distant offshore rocks, and fishing, to sea travel for visiting, trade, and warfare, to individual quests for power on distant offshore rocks. Significantly, references to these offshore activities are embedded in the oral literature, indicating that use of the offshore marine environment was not simply a postcontact development, but instead had substantial time depth on the southern Northwest Coast.

LITTORAL OR ARCHAIC?

The earliest evidence of the exploitation of marine resources on the southern Northwest Coast is associated with Archaic cultures, characterized by broadly based hunting-gathering-fishing economies (Willey and Phillips 1958: 107). In coastal environments, Archaic lifeways are often reflected in sites with substantial accumulations of marine shell (Willey and Phillips 1958: 104). The Archaic concept, like Lyman and Ross's pre-littoral and early littoral stages, refers to peoples with generalized adaptations. Unlike the pre-littoral and early littoral stages, however, the Archaic concept does not place limits on where subsistence activities were conducted or on the intensity with which resources were exploited. Thus, at Tahkenitch Landing, early prehistoric peoples who practiced Archaic lifeways focused on a variety of resources avail-

able in the estuary adjacent to the site. Whether these same peoples occupied other sites in upland or outer coastal environments, from which they would presumably have exploited other resources, is unknown and perhaps unknowable.

Lyman (1997:263) associated the pre-littoral with the Archaic stage of Willey and Phillips (1958), but added that "Such a continent-wide stage does not, however, capture some of the significant things that seem to have been happening in coastal contexts."⁷ He added that "In my view, the exploitation of marine mammals, seals and sea lions in particular, was different" (Lyman 1997:263). In making these statements, Lyman appears to be unfamiliar with Archaic manifestations in other coastal regions of North America where exploitation of marine mammals was an important aspect of Archaic lifeways (e.g., the Maritime Archaic of the northeast [Tuck 1978:32-34]).

On the southern Northwest Coast, as elsewhere, Archaic lifeways persisted for thousands of years. Current information suggests that the long Archaic interval can be divided into Early (10,000 to 5,500 B.P.), Middle (5,500 to 2,000 B.P.), and Late (2,000 to 500 B.P.) substages (Minor 1997). The transition from Archaic lifeways to the Formative-level ethnographic cultures (Willey and Phillips 1958:145) is first in evidence around 2,000 B.P., along the Lower Columbia River and adjacent northern Oregon coast. Current evidence indicates that Formative cultures did not appear farther south along the Pacific coast of Oregon and northern California until very late in prehistory (Minor 1997). The transition from Archaic to Formative lifeways provides a model for the emergence of ethnographic cultures along the southern Northwest Coast. The littoral adaptational model is not reconcilable with the ethnographic record, and as a result contributes to an underestimation of cultural complexity on the southern Northwest Coast.

TIME DEPTH OF MARITIME ADAPTATIONS ON THE SOUTHERN NORTHWEST COAST

Because of the paucity of evidence for early occupation, it has been suggested that the southern Northwest Coast may have been among the last regions of the Pacific coast to be settled (Gould 1972:43) or was only sparsely populated until late in prehistory (Hildebrandt 1981:191). As a corollary to this notion, it has also been suggested that prehistoric peoples on the southern Northwest Coast never became as closely adapted to the marine environment as groups to the north in British Columbia and Alaska and to the south in southern California. For example, in the littoral adaptational model proposed by Lyman and Ross (1988), southern Northwest Coast groups are viewed as littoral peoples who never adapted sufficiently to the marine environment to become maritime hunter-gatherers like peoples to the north and south along the Pacific coast. The idea of southern Northwest Coast peoples as littoral cultures has been uncritically accepted by Lightfoot (1993:176-177), who suggested that the "foundation for later, full-blown maritime economies" was absent in this region.

This dearth of evidence for early occupation along the southern Northwest Coast has generally been attributed to coastal erosion and inundation from eustatic sea level rise due to the melting of continental glaciers. This explanation has never been entirely satisfactory, however, as it has not been made clear why the archaeological record along the southern Northwest Coast was more severely affected by the postglacial sea level rise than adjacent sections of the Pacific coast to the north and south. In this respect, Lightfoot (1993:174), in considering the question of early occupation on the southern Northwest Coast, commented that "archaeologists tend to lean upon transformations in the post-Pleistocene landscape as a crutch to explain any situation in

which coastal sites cannot be found.”

However, the scarcity of early sites on the southern Northwest Coast is not just apparent, it is real. This situation is not due to a lack of efforts to find early sites (although more efforts obviously need to be made), nor is it due to archaeological practices.⁸ Instead, the explanation for the scarcity of early sites apparently lies, at least in part, in the tectonic history of the southern Northwest Coast.

The results of recent paleoseismic research suggest that subsidence of the coastline, in conjunction with earthquakes along the Cascadia subduction zone, has been an important factor in the erosion of the archaeological record along the southern Northwest Coast (see Minor and Grant [1996] and references therein). The Cascadia subduction zone, which extends offshore along the Pacific coast of Washington, Oregon, and northern California, has produced great earthquakes (magnitude 8 to 9 and greater) at least 13 times over the last 7,000 years. Subsidence of the coastal margin by 0.5 to 2.0 m. is estimated to have occurred in conjunction with each of these events. Coseismic subsidence associated with the last great earthquake along the Cascadia subduction zone approximately 300 years ago is known to have resulted in the submergence and burial of late prehistoric archaeological sites. Over the long term, then, the cumulative effects of repeated episodes of coseismic subsidence events, along with eustatic sea level rise, probably account in large measure for the scarcity of Early and Mid-Holocene archaeological sites along the southern Northwest Coast.

Lightfoot (1993:175) suggested that “the initial formation of maritime cultures along the Pacific coast has relatively great antiquity that extends back 10,000 years or more.” This suggestion may ultimately be proven correct, but the idea that the “initial formation of maritime cultures” could have occurred along the Pacific coast to the north and to the south, but not on the southern Northwest Coast, is incongruous. Ma-

rine mammals, fish, and birds must have been highly abundant during the Early Holocene, and it seems inconceivable that southern Northwest Coast peoples virtually ignored these resources for thousands of years while coastal inhabitants to the north and south were already marine oriented.

It seems more likely that “the initial formation of maritime cultures” Lightfoot (1993:175) that took place elsewhere along the Pacific coast during the Early Holocene also occurred along the southern Northwest Coast at that time. In this region, however, it appears that evidence of these early coastal cultures has been removed from the archaeological record, *for the most part*, by the cumulative processes of eustatic sea level rise and earthquake-induced subsidence, and the related process of coastal erosion. Considered in this light, the occupations at Indian Sands and Tahkenitch Landing, where early use of marine resources is in evidence, can be interpreted as remnants of the settlement pattern of early marine-oriented peoples along the southern Northwest Coast.

CONCLUDING REMARKS

The concept of a pre-littoral stage to refer to the period from ca. 8,500 to 5,500 B.P. on the southern Northwest Coast has two critical shortcomings. First, the prefix “pre” in pre-littoral, meaning before the (significant) exploitation of littoral/marine resources, is inappropriate, as the exploitation of marine resources in Component I at Tahkenitch Landing, and possibly the use of marine shellfish at Indian Sands as well, were considerably more important than indicated (implicitly or explicitly) in the definition of the pre-littoral stage. Second, the term “littoral” in pre-littoral does not accurately convey the importance of the marine environment in the adaptations of southern Northwest Coast cultures. The ethnographic literature indicates that the “life-ways and philosophy” of the native peoples of the southern Northwest Coast were in fact “oriented

towards the sea" (see Lyman 1991a:76).

Because the Late Pleistocene shoreline of the southern Northwest Coast is now submerged, it will be difficult to determine whether the earliest inhabitants were terrestrial-oriented peoples who entered the region from the interior or were marine-oriented peoples who migrated southward down the Pacific coast. Current evidence indicates that, within the context of an Archaic adaptation, marine resources were in use by ca. 8,400 B.P. at Indian Sands and were a focus of prehistoric subsistence pursuits by 7,000 to 8,000 B.P. at Tahkenitch Landing. Recognition that marine resources were exploited during the Early Archaic (10,000 to 5,500 B.P.) brings the southern Northwest Coast more closely in line with the appearance of early marine-oriented cultures elsewhere on the Pacific coast.

NOTES

1. As used here, the term "marine resources" refers to resources found in saltwater contexts, including the lower reaches of estuaries, and intertidal, near-shore, and offshore habitats.

2. It is likely that the lack of vertebrate faunal remains at most lithic sites is due to the "absence of shell deposits which normally provide an alkaline pH more conducive to organic preservation" (Ross 1984:250).

3. This is clearly the impression that Lyman conveyed to one of his own students. In summarizing the pre-littoral stage, Bennett (1988:6) wrote that "there is little or no exploitation of marine resources during this stage which is analogous to Ross' (1983, 1984) description of the Pre-Marine period."

4. In discussing the results of excavations at the Umpqua/Eden (35DO83), Seal Rock (35LNC14), and Whale Cove (35LNC60) sites, Lyman (1991a:288) noted that "our data recovery strategies were *not* well-designed" to collect information from nonmammalian faunal remains (original emphasis). Even the molluscan, fish, and bird remains that were recovered were not analyzed, for which Lyman (1991a:4-5) offered the "weak apology" that he "lacked the time, expertise, and requisite resources for their detailed study."

5. Lyman's underestimation of the early importance of fishing was carried through into his discussion of the early littoral stage (ca. 5,500 to 2,000 B.P.). Although Lyman (1991a:290) was correct in

noting the "paucity of artifacts potentially associated with fishing," he overlooked the faunal evidence. Fish remains in the later components at Tahkenitch Landing were so overwhelming that only a very small sample of the total faunal collection could be identified. Within the analyzed sample, fish remains (presented as NISP) comprised 96.7% of the faunal remains from Component II (n = 26,567), and 98.3% of the faunal remains from Component III (n = 748) (Greenspan 1986:70, Table 7-5). Although direct evidence of fishing technology was not found, the quantities of fish remains, as well as the range of sizes and heavy emphasis on small fish, suggest an indiscriminate fishing technique, such as small-gauge nets, weirs, or stone tidal traps (Greenspan 1986:71).

6. The "offshore marine environment," as the phrase is used here, refers to the portion of the coastal zone "beyond the normal range of swimmers (greater than 500 meters out)" (Jobson and Hildebrandt 1980:169).

7. Lyman's introduction of the term "Archaic" into the discussion came only after he had seen an earlier draft of this paper. If the index is any indication, the term "Archaic" is not used in *Prehistory of the Oregon Coast*.

8. Lyman (1991a:313-314) suggested that one reason for the paucity of evidence for early occupation is that archaeologists may not have always dug deep enough to sample cultural deposits that may exist below shell middens. Lyman (1991a:314) admitted that in the single shell midden excavation for which he was responsible in 1985, he "rather naively had excavations at LNC60 cease once the bottom of the shell midden deposits (bottom of WCI) had been reached." While limiting excavations to dense shell deposits may have been characteristic of earlier research, sampling of the entire range of time represented, including excavation until the presence of culturally sterile deposits is firmly established, has been standard practice for most archaeological investigations on the Oregon coast since the early 1980s.

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