5-2011

Seasonality on the Oregon Coast: Avian Faunal Remains from Whale Cove (35-LNC-60)

Jessica Watson
University of Rhode Island, jessicawatson2011@gmail.com

Seasonality on the Oregon Coast: Avian Faunal Remains from Whale Cove (35-LNC-60)

Jessica Watson

I compared an assemblage of bird bone fragments from the 1985 excavation of Whale Cove (35-LNC-60) by Bennett-Rogers with modern avian skeletons to learn more about bird use through hunting and processing, help determine seasonality of human occupation, and examine sedentism at the site. Although the assemblage is small, consisting of 106 identifiable bones, at least 16 taxa have been identified within seven taxonomic orders, including albatross, diving ducks, shearwaters, murres, puffins, cormorants, and loons. An additional 45 specimens were identified to element but taxonomically only to unidentified bird, "aves." Descriptive, quantitative, and taphonomic summaries are used to describe the available evidence. This set of archaeological data is compared to ethnographic accounts of historic and prehistoric peoples and offshore hunting. The assemblage is notable for the relatively low percentage of terrestrial bird bones compared to water birds.

BACKGROUND OF SITE

The northwest coast of the United States was one of the first regions to receive *Homo sapiens* immigrants in the Western hemisphere and is rich in archaeological sites. In Oregon alone, at least twelve sites have been identified, well-studied, and documented in numerous print sources; many others have been less-thoroughly examined. Some of these include Indian Sands, Blacklock Point Site, and Devils Kitchen Site, all famous for their lithic artifacts; Whale Cove Site, Yaquina Head Site, Seal Rock Site, and Cape Blanco Site, noted for their faunal remains of many different indigenous animal species; and Palmrose Site, Par-Tee Site, and Nah-so-mah Village Site, each recognized for their evidence of tectonic upheaval (Davis 2009). Although not as spectacular as more famous sites in the midlands, such as Cahokia, these sites each host a variety of artifacts to evidence prehistoric human lifestyles in the region. Shell midden sites like Whale Cove are known for their excellent preservation because of the calcium carbonate in the shells which neutralize soil acidity (Stein 2000).

Whale Cove is located near Depoe Bay in northern Oregon and consists primarily of a shell midden located on top of a bluff (Bennett & Lyman 1991; Skinner & Bennett-Rogers 1997). The excavation was conducted by Bennett-Rogers through an Oregon State University field school and consisted of 63.5 m^3 of material (Skinner & Bennett-Rogers 1997). The earliest stratum from the Whale Cove shell midden, Whale Cove I (WCI), was occupied approximately 3,010-2,830 years ago based on radiocarbon dating (Davis 2009; Bennett & Lyman 1991) and is composed of a thick shell level. Whale Cove II (WCII) has been radiocarbon dated to approximately 610 years ago and is made up of a dark, silty loam. Both the bird bone assemblage studied in this article and Bennett-Rogers and Lyman's initial artifact groups show that the level was much less dense with artifacts than its surrounding shell layers. The third, most recent level was Whale Cove III (WCIII), another thick shell layer from approximately 330 years ago. A fourth stratum, Whale Cove IV (WCIV), was identified in the excavation records and used during this analysis to represent artifacts found on the surface, from wall scrapings, or any other instances of missing provenience.

The site is found in between the territories of the Siletz, a tribe that lived along the northwestern Oregon coast, and the Yaquina, whose territory ran along the central Oregon coast

(Ruby & Brown 1986). The site is also located between the boundaries of two language groups that were recorded in the past century: the Tillamook, a dialect of which was spoken by the Siletz, and Alseans, which is purportedly associated with the Yaquina tribe (Seaburg & Miller 1990; Zenk 1990).

The Whale Cove site was initially analyzed by Bennett-Rogers (1988) and later summarized in conjunction with Lyman in their book *Prehistory of the Oregon Coast: The Effects of Excavation Strategies and Assembling Size on Archaeological Theory* (1991). Their findings included an introductory analysis of lithic, bone, antler, and shell artifacts and general inventory of all pieces examined. While their analyses were extensive for artifact types such as projective points and wedges/chisels, Bennett-Rogers and Lyman did not analyze bird bones except for 7 modified specimens (1991). Bennett-Rogers found preliminary evidence for changes in vegetation and shellfish taxa at the Whale Cove site over time through pollen analysis and has hypothesized that these changes were due to a tsunami event (personal communication). There has been a lot of recent archaeological interest in investigating the impact of earthquakes along the Cascadia Subduction Zone, including their effect on fauna along the Oregon Coast (e.g. Losey 2005). Lyman also suggested that the increase in lithic debitage and possible house structure in WCII or WCIII in Whale Cove strata show increased sedentism (1991).

Davis (2009) noted that while "changing patterns of artifact and faunal qualities and quantities" are assumed to show an increasingly sedentary lifestyle at Whale Cove over time, this pattern may also "reflect a shift from a generalized lifestyle broadly emphasizing a wide range of resources…to a specialized lifeway" (196). In order to examine this suggestion and help fill in the gap in the study of Whale Cove bird bone specimens, I collaborated with Dr. Kristine Bovy at the University of Rhode Island to identify and catalogue the remaining assemblage of bird bone fragments. After identifying taxonomic and taphonomic markers, I used the presence of seasonal and juvenile birds to further test the hypothesis that native peoples living at the Whale Cove site became more sedentary through time.

GOALS OF ANALYSIS

Analysis of the bird bones in this assemblage was conducted in order to study seasonality of human occupation, processing and hunting techniques, and possible changes in sedentism at the site. I first focused on identifying the specimens' taxa, then taphonomy, then finally creating an organized catalogue. The project was undertaken as the capstone project to complete my honors degree as an undergraduate at the University of Rhode Island and was sponsored by Dr. Kristine Bovy.

METHODOLOGY

The bird bone fragments discussed in this article were recovered by Bennett-Rogers during the 1985 excavation from 10 units: 98N/94W, 98N/96W, 98N/100W, 98N/101W, 100N/104W, 100N/106W, 102N/108W, 102N/110W, 102N/112W, and 104N/99W (shown in Figure 1). Most of these units were located inside of the main shell midden area of the site. The bone fragments were primarily processed using ¼" screens, which may have resulted in the loss of some small bird bones. I will discuss all identifiable bird bones in this report.

Taxonomic identifications were made using comparative skeletal remains from the Burke Museum of Natural History and Culture (Seattle, WA), the Museum of Comparative Zoology at Harvard (Cambridge, MA), and the private collection in the Archaeology Lab at the University of Rhode Island, as well as criteria discussed by Bovy (2005) and other published sources

(Broughten 2004; Howard 1929; Siegel-Causey 1988; Woolfenden 1961). Taphonomic modifications were recorded on all bones, regardless of taxonomic specificity, and include both cultural and natural marks. Bones were quantified by Number of Identified Specimens (NISP).

RESULTS

Results from analysis of the bird bone assemblage are presented in the following pages through descriptive, quantitative, and taphonomic summaries. The descriptive summary lists each specimen by taxa and element. The quantitative summary discusses the relative abundance of the taxa as represented by the specimens. The taphonomic summary examines cultural and natural modifications. Each section is intended to highlight different aspects of the assemblage and to show its relevance to the previously-studied artifacts.

Descriptive Summary

In this section I present descriptive information for the 151 identifiable bird bones. Taxonomic identifications were made to the most detailed level possible. The taxonomic names are based on the Seventh Edition of the American Ornithologist's Union check-list (1998) and recent supplements. Discussion is primarily focused on diagnostic traits seen through osteology and comparisons between specimens. Table 1 lists the total number of identifiable avian specimens from the assemblage by unit, scientific, and common names (listed in taxonomic order).

Class Aves (Birds)
Aves, unidentified

Material: 1 skull fragment, 3 mandible fragments, 3 synsacrum fragments, 1 vertebrae, 1 scapula shaft, 5 ribs (2 shafts, 3 unidentified), 6 humeri (2 distal, 4 shafts), 6 ulnae (1 distal, 4 proximal, 1 unidentified), 6 radii shafts, 2 carpometacarpi (1 distal, 1 shaft), 1 femoral shaft, 2 tibiotarsi shafts, 4 phalanges (1 proximal, 1 distal, 2 shafts), 2 limb bones, 2 indeterminate fragments.
Total: 45 specimens
Remarks: The majority of the unidentified bird bones were fragmentary and difficult to identify even to element. The greatest numbers of these bones were wing bones, including the humerus, ulna, and radius. No attempt was made to identify vertebrae or ribs to taxon.

Order Anseriformes (Ducks, Geese, Swans)
Family Anatidae (Ducks, Geese, Swans)
Subfamily Anserinae (Geese, Swans)
Tribe Anserini (Geese)
Anserini (small) (Geese)

Material: 1 proximal coracoid.
Total: 1 specimen
Remarks The Brant (*Branta bernicla*) and the newly recognized Cackling Goose (*Branta hutchinsii*), once thought to be a subspecies of Canada Goose (*Branta canadensis*), are the most common small geese in the region (Banks et al. 2004). Ross's Goose (*Chen rossii*) are also occasionally found in the area.

Anserini (medium) (Geese)

Material: 2 radii (1 proximal, 1 shaft), 1 distal tibiotarsus.
Total: 3 specimens

Remarks: Possible medium geese species include Greater White-fronted Goose (*Anser albifrons*), Emperor Goose (*Chen canagica*), Snow Goose (*Chen caerulescens*), and smaller subspecies of Canada Goose (*Branta canadensis*). The two radii shaft fragments potentially refit along the old break.

Subfamily Anatinae (Ducks)

Material:

Anatinae, Unidentified: 3 synsacrum fragments, 6 ulnae shafts, 4 tibiotarsi shafts, 1 phalanx: 14 total specimens.

Mergini, Unidentified (Sea Ducks): 1 proximal tibiotarsus: 1 total specimen.

Mergini, Unidentified (large): 1 humerus shaft, 1 distal radius, 3 proximal femora, 1 distal tibiotarsus: 6 total specimens.

Melanitta sp. (Scoters): 1 distal humerus: 1 total specimen.

cf. *Melanitta*:1 distal tibiotarsus: 1 total specimen.

Melanitta sp. (small) (Surf or Black Scoter): 1 coracoid: 1 total specimen.

cf. *Melanitta* sp. (small): 1 proximal carpometacarpus: 1 total specimen.

Melanitta sp. (large) (White-winged or Black Scoter): 2 scapula, 2 coracoids, 2 humeri (1 proximal, 1 shaft), 1 distal ulna, 3 radii (2 proximal, 1 distal): 10 total specimens.

cf. *Melanitta* sp. (large): 2 furculae, 1 ulna shaft: 3 total specimens.

Melanitta fusca (White-winged Scoter): 1 ulna: 1 total specimen.

Melanitta cf. *fusca*: 3 proximal carpometacarpi: 3 total specimens.

Total: 42 specimens

Remarks: All specimens were consistent with scoters. Size classes were assigned for ducks when possible, but could not be done consistently due to limited comparative specimens. Identification reflects varying levels of certainty depending on element and fragment present. However, there is evidence that multiple individuals of large and small scoters are present in the assemblage. These include the White-winged Scoter (*Melanitta fusca*) and very likely the Surf Scoter (*Melanitta perspicillata*), which is much more common than the Black Scoter (*Melanitta nigra*). Scoters are most common in the region in the fall and winter.

Twelve specimens from catalog number 85-555 were identified to differing taxonomic levels but appear to belong to one complete scoter. These specimens include left and right scapulae, one left furcula, left and right coracoids, left and right humeri, one right ulna, left and right tibiotarsi, and left and right femora. All of these specimens were found in WCIII and many showed signs of discoloration and gnawing.

Order Gaviiformes (Loons)

Family Gaviidae (Loons)

Gavia sp. (large) (Common or Yellow-billed Loon)

Material: 1 distal humerus, 1 proximal carpometacarpus.

Total: 2 specimens

Remarks: Both the Common Loon (*Gavia inmer*) and Yellow-billed Loon (*Gavia adamsii*) may be found in Oregon, but the Common Loon is much more abundant.

Order Procellariiformes (Albatrosses, Shearwaters, Petrels)

Family Diomedeidae (Albatrosses)

Material:

Phoebastria sp. (Albatross): 1 skull fragment, 1 scapula, 3 humeri (1 proximal, 1 distal, 1 shaft), 1 distal ulna, 2 carpometacarpi (1 proximal, 1 shaft), 1 distal tarsometatarsus: 9 total specimens.

cf. *Phoebastria* sp.: 2 humeri (1 distal, 1 shaft), 1 distal tarsometatarsus, 3 proximal phalanges: 6 total specimens.

Total: 15 total specimens.

Remarks: Three species of albatross are found along the Oregon coast: Laysan Albatross (*Phoebastria immutabilis*), Black-footed Albatross (*Phoebastria nigripes*), and Short-tailed Albatross (*Phoebastria albatrus*). Although they can be distinguished by size, the Museum of Comparative did not have any Short-tailed Albatross comparative specimens, the largest species, so identification to species level was not possible. Multiple sizes present in the assemblage may represent different species, individuals, or sexes. Albatross are pelagic species and present in the summer on the Pacific coast.

Family Procellariidae (Shearwaters, Petrels)

Genus *Fulmarus* (Fulmars)

Material:

Fulmarus glacialis (Northern Fulmar): 1 proximal radius, 1 phalanx: 2 total specimens.

cf. *Fulmarus glacialis*: 1 radius shaft: 1 total specimen.

Total: 3 specimens

Remarks: The species breeds in Alaska and British Columbia and winters along the southern Pacific coast.

Genus *Puffinus* (Shearwater)

Material:

Puffinus sp. (Shearwater): 1 carpometacarpus, 1 distal tibiotarsus: 2 total specimens.

cf. *Puffinus* sp.: 1 humerus shaft: 1 total specimen.

Remarks: Both specimens are most likely the Sooty Shearwater (*Puffinus griseus*) because of their abundance on the northwest coast of the United States, but may potentially be one of a number of shearwater species in the region. No attempt was made to distinguish between them. Several species, such as the Sooty Shearwater, are much more common inland in summer and are not as pelagic as Fulmars.

Order Pelecaniformes (Pelicans, Cormorants)

Family Phalacrocoracidae (Cormorants)

Material:

Phalacrocorax sp. (Cormorant): 3 ulnae (1 proximal, 2 shafts): 3 total specimens.

Phalacrocorax auritus (Double-crested Cormorant): 1 proximal coracoid: 1 total specimen.

Phalacrocorax pelagicus (Pelagic Cormorant): 1 proximal coracoid, 1 proximal humerus, 1 distal radius: 3 total specimens.

cf. *Phalacorcorax pelagicus*: 1 mandible fragment: 1 total specimen.

Total: 8 specimens

Remarks: At least two species of cormorants are present, the Double-crested Cormorant (*Phalacrocorax auritus*) and the Pelagic Cormorant (*Phalacrocorax pelagicus*). The Pelagic Cormorant is smaller but both breed and are present year-round in the region. One of the ulna specimens was refitted from 2 fragments but was unable to be identified more specifically than

Phalacrocorax sp. because the specimen was a juvenile. Lindsay (1995) noted that several Oregon coast tribes collected and used cormorant eggs ethnographically (203).

Order Charadriiformes (Shorebirds, Gulls, Alcids)
Family Laridae (Gulls, Terns)

Material:

Laridae (Gulls, Terns): 1 synsacrum, 1 coracoid, 1 distal humerus, 4 ulnae (1 proximal, 3 shafts), 1 proximal radius: 8 total specimens.

Laridae (large): 2 humeri (1 distal, 1 shaft): 2 total specimens.

cf. Laridae: 2 radii shafts: 2 total specimens.

Total: 12 specimens

Remarks: There are numerous species of gulls in the region; no attempt was made to identify to size, class, or species due to lack of comparative specimens.

Family Alcidae (Auks, Murres, Puffins)

Material:

Alcidae (large) (Auks, Murres, Puffins): 1 ulna shaft: 1 total specimen.

Alcidae sp. (medium): 1 furculum fragment: 1 total specimen.

Uria aalge (Common Murre): 4 humeri (1 proximal, 3 shafts), 1 ulna, 1 proximal radius, 1 distal femur, 1 tibiotarsus: 8 total specimens.

cf. *Cerorhinca monocerata* (Rhinoceros Auklet): 1 ulna, 1 carpometacarpus: 2 total specimens.

Fratercula (=Lunda) cirrhata (Tufted Puffin): 1 proximal coracoid, 1 distal radius, 1 tibiotarsus: 3 total specimens.

Total: 15 specimens

Remarks: At least three species of alcids are represented, the Common Murre (*Uria aalge*), the Rhinoceros Auklet (*Cerorhinca monocerata*), and the Tufted Puffin (*Fratercula cirrhata*). The Common Murre and Tufted Puffin represent larger species of alcids, while the Rhinoceros Auklet, Pigeon Guillemot (*Cepphus Columba*), and some Tufted Puffins are medium-sized alcids. Puffins are most commonly seen in the region in the summer when they are breeding.

Order Piciformes (Woodpeckers)
Family Picidae (Woodpeckers)
Picidae, Unidentified

Material: 1 ulna.

Total: 1 specimen

Remarks: This complete ulna was easily identifiable to the family level, but no attempt was made to narrow identification further. Lindsay (1995) noted ethnographic accounts of collection of the scalps of Pileated Woodpecker or Red-breasted Sapsucker by native groups (203); this information may potentially match the species of bird present in this specimen.

Order Passeriformes (Perching Birds)
Passeriformes, Unidentified

Material: 1 ulna.

Total: 1 specimen

Remarks: No attempt was made to narrow the identification for this complete ulna, given the plethora of Passerine species. However, the species is smaller than a crow (*Corvus brachyrhynchos*).

Quantitative Summary

Bennett-Rogers and Lyman (1991) conducted preliminary analysis of seven avian artifacts recovered at Whale Cove. These artifacts included two whistles from WCI ("long bone shafts with a single perforation"), two tube beads from WCIV, on incomplete tube from WCI, and two bones with "transverse circumference sawing" from WCI (Bennett & Lyman 1991: 263). Their findings were included in their report about modified bird, whale, mammal, and other bone artifacts, as well as lithic debitage. Our sample was not studied during this period.

There were 232 total bird bone specimens included in this assemblage, which were recovered from 10 units (Figure 1). Of these, 151 (65%) were identified to element and 106 (46%) were taxonomically identified at or below the order level. Table 1 lists the taxa recovered by excavation unit, scientific, and common names. The most abundant taxa from the 106 specimens identified to taxon were ducks and geese (n=46; 43%), puffins and murres (n=27; 25%), albatrosses and shearwaters (n=21; 20%), and cormorants (n=8; 7%). The remaining taxa were only marginally present with fewer than 5 specimens each (loons, woodpeckers, and perching birds). See Table 2 for a consolidated view of the NISP by order.

Taphonomic Summary

Cultural Modifications

Approximately 7% (n=10) of the 151 bones identified to element from the assemblage were culturally modified. Modifications included burning (n=3), cutmarks (n=5), and disarticulation (n=2). Burning was seen primarily through blackening and charring and occurred on one cormorant (blackened proximal coracoid), one albatross (white charring on the right quadrant), and one duck (blackened proximal femoral head). Cutmarks occurred on one Common Murre (along the proximal shaft), one Tufted Puffin (six cuts along the distal shaft), and two albatrosses (scapular neck; inside of metacarpal I on carpometacarpus). One proximal gull bone was observed to have "groove-and-snap" marks which likely indicate it was a discarded end from tool/ornament manufacture (Bovy 2005). Finally, disarticulation, or dismemberment of bones, is seen through damaged olecranon processes of ulnae and perforations in the olecranon fossa of humeri (Serjeantson 2009: 144-145). This process was noted on multiple ulnae as a roughened edge, but only the reciprocal holes left in two distal humeri were recorded, one in a duck and one in a gull.

Other Modifications

Fourteen specimens were noted for other modifications (9%). Two bones had old or unnatural breaks, two specimens were gnawed/chewed, one specimen was discolored, three specimens exhibited scratches or etching, potentially from plant root wear, one specimen was gnawed, discolored, and scratched, and three specimens were heavily weathered. One bone was discolored and cracked and one specimen was scratched and had cracks. Finally, one specimen which had chew marks may have also been chopped.

DISCUSSION & CONCLUSION

No definite conclusion about the change through time of Whale Cove can be suggested based on the small size of this assemblage, especially given that the majority of the bones were from WCI, but the faunal remains present show more evidence of year-long occupation than a marked seasonal use of the site. The presence of bird bones from summer birds like the Albatross and Puffin in conjunction with fall and winter birds such as the Scoter and Northern Fulmar show that bird bones were collected year-round. The one juvenile bone, a cormorant, also gives evidence for spring occupation.

To explore the hypothesis that Whale Cove shows seasonality and later increasing sedentism, researchers may use this data to try to meet three criteria recommended by Lyman (1991a). These are "show[ing] the most intense occupation during the fall and winter months," "maximizing procurement potentials by seasonally scheduling the types of resources exploited and varying the loci where those resources were exploited," and "[seeing] the human population…most nucleated and sedentary in fall and winter months, and most dispersed in spring and summer" (102-103). Rather than suggesting a marked change in seasonality, these criteria may support Davis' idea that an increase in marine mammal and avifauna hunting at Whale Cove may have been instead a result of the change to a more specialized lifestyle (2009: 196). The small sample size of this assemblage prevents more detailed interpretations.

Additionally, bird bones may tell scholars something about the hunting strategies used by the native peoples. The inclusion of at least three pelagic taxa (albatross, fulmar, and shearwater) in this assemblage potentially supports the hypothesis that tribes in this region actively hunted offshore marine fauna (Minor 2001). Lyman has argued (Lyman 1988; Lyman 1989) that the presence of pinniped bones, harpoon tips, and other projectile points does not intrinsically imply an increase in canoe use and thus offshore hunting. His subsistence strategy hypothesis instead maximizes terrestrial and inshore species, utilizing foraging skills in a collector-forager society (Lyman 1991b). Indeed, Bovy (2005) notes that both pelagic and inshore birds may be collected when beached, alleviating offshore hunting needs yet supplying pelagic birds as resources for bone and feathers.

Alternatively, evidence for intentional and prolonged offshore hunting strategies can be found in oral documentation. Minor (2001) claims that "references to offshore activities contained in the oral literature clearly document that the Native peoples of the northern California-southern Oregon coast made regular and significant use of the offshore marine environment," including members of the Coquille tribe, a group which lived south of Whale Cove (36). Myths, stories, and teaching devices emphasize targeting pelagic fauna, which would have presumably extended to avian species. These ethnographic accounts may support the WCII and WCIII levels, but subsistence strategies for the earliest strata, WCI, must be gleaned from archaeological evidence. Lindsay (1995) reminds scholars that "very little is recorded about *prehistoric* use of birds by Oregon coast people" (203; emphasis added).

The data gathered from the Whale Cove bird bone assemblage supplements these discussions because of the presence of pelagic bird bone specimens in combination with inshore waterfowl. The inhabitants of this site seemed to have achieved a sophisticated balance with their environment, manipulating the available fauna to be able to live in the region year-round.

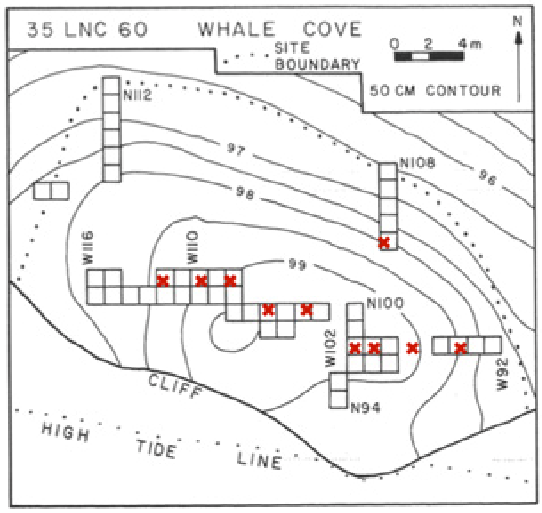
Table 1: Total number of specimens identified by unit, scientific, and common names (listed in taxonomic order).

Scientific Name	Common Name	Stratum				Total
		WCI	WCII	WCIII	WCIV	
Anserini (small)	Brant, Goose	1				1
Anserini (medium)	Goose	3				3
Anatinae	Duck, Goose, Swan	11	1	2		14
Mergini	Sea Duck	1				1
Mergini (large)	Sea Duck	2		3	1	6
cf. *Melanitta*	Scoter	1				1
Melanitta sp.	Scoter	1				1
Melanitta sp. (small)	Surf or Black Scoter	1				1
cf. *Melanitta* sp. (small)	Surf or Black Scoter	1				1
Melanitta sp. (large)	White-winged or Black Scoter	3		6	1	10
cf. *Melanitta* sp. (large)	White-winged or Black Scoter	2		1		3
Melanitta fusca	White-winged Scoter	1				1
Melanitta cf. *fusca*	White-winged Scoter	3				3
Gavia sp. (large)	Common or Yellow-Billed Loon	1	1			2
Phoebastria sp.	Albatross	8	1			9
cf. *Phoebastria* sp.	Albatross	4			2	6
Fulmarus glacialis	Northern Fulmar	2				2
cf. *Fulmarus glacialis*		1				1
Puffinus sp.	Shearwater	1			1	2
cf. *Puffinus* sp.	Shearwater	1				1
Phalacrocorax sp.	Cormorant	3				3
Phalacrocorax auritus	Double-Crested Cormorant	1				1
Phalacrocorax pelagicus	Pelagic Cormorant	1	1		1	3
cf. *Phalacrocorax pelagicus*	Pelagic Cormorant				1	1
Laridae	Gull	7			1	8
Laridae (large)	Gull (large)	2				2
cf. Laridae	Gull	2				2
Alcidae (large)	Murres	1				1
Uria aalge	Common Murre	4		1	3	8
Alcidae (medium)	Auklet or Puffin	1				1
cf. *Cerorhinca monocerata*	Rhinoceros Auklet	2				2
Fratercula cirrhata	Tufted Puffin	3				3
Picidae	Woodpecker and Allies	1				1
Passeriformes	Perching Bird				1	1
Unidentified Bird	Bird	33	3	1	8	45
Total		110	7	14	20	151

Table 2: Total Number of Identified Specimens by Order.

Scientific Name	Common Name	WCI	WCII	WCIII	WCIV	Total
Anseriformes	Duck, Goose, Swan	31	1	12	2	46
Gaviiformes	Loon	1	1			2
Procellariiformes	Albatross, Shearwater, Petrel	17	1		3	21
Pelecaniformes	Pelican, Cormorant	5	1		2	8
Charadriiformes	Gull, Murre, Puffin	22		1	4	27
Piciformes	Woodpecker and Allies	1				1
Passeriformes	Perching Bird				1	1
Unidentified Bird	Bird	33	3	1	8	45
Total		110	7	14	20	151

Figure 1: Topographical unit map of 35-LNC-60 (10 units containing avian faunal remains marked by X). Adapted from Bennett & Lyman (1991).



REFERENCES

American Ornithologist's Union. (1998). *Check-list of North American Birds* (7th ed.). Washington: American Ornithologist's Union.

Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, & D. F. Stotz. (2004). Forty-Fifth Supplement to the American Ornithologists' Union Check-list of North American Birds. *The Auk 121*: 985-995.

Bennett, A. C. (1988). *Whale Cove (35LNC60): An Archaeological Investigation on the Central Oregon Coast*. Unpublished master's thesis, Oregon State University.

Bennett, A.C. & R. L. Lyman. (1991). Archaeology of Whale Cove (35LNC60). In R. L. Lyman (Ed.), *Prehistory of the Oregon Coast: The Effects of Excavation Strategies and Assemblage Size on Archaeological Inquiry*, (pp. 241-277). San Diego: Academic Press.

Bovy, K. (2005). *Effects of Prehistoric Cultural and Natural Processes on Waterbirds in the Northwest Coast*. Unpublished doctoral dissertation, University of Washington.

Broughten, J. M. (2004). Prehistoric Human Impacts on California Birds: Evidence from the Emeryville Shellmound Avifauna. *Ornithological Monographs No. 56*. Washington: The American Ornithologists' Union.

Davis, L. G. (2009). Indian Sands, Umpqua-Eden, Blacklock Point, Whale Cove, and Other Sites. In F. P. McManamon, L.S. Cordell, K. G. Lightfoot, & G. R. Milner (Eds.), *Archaeology in America: An Encyclopedia*, (pp. 195-199). Westport: Greenwood Press.

Howard, H. (1929). The Avifauna of Emeryville Shellmound. *California University Publications in Zoology, 32*. Berkeley: University of California.

Lindsay, L. W. Jr. (1995). Native Use of Resources on the Oregon Coast. In R. Hall (Ed.), *People of the Coquille Estuary: Native Use of Resources on the Oregon Coast* (pp. 191-210). Corvallis, OR: Words & Pictures Unlimited.

Losey, R. J. (2002). *Communities and Catastrophe: Tillamook Response to the AD 1700 Earthquake and Tsunami, Northern Oregon Coast*. Unpublished doctoral dissertation, University of Oregon.

Losey, R. J. (2005). Earthquakes and tsunami as elements of environmental disturbance on the Northwest Coast of North America. *Journal of Anthropological Archaeology*, *24*: 101-116.

Lyman, R. L., L. A. Clark, & R. E. Ross. (1988). Harpoon Stone Tips and Sea Mammal Hunting on the Oregon and Northern California Coasts. *Journal of California and Great Basin Anthropology, 24* (1): 73-87.

Lyman, R. L. (1989). Seal and Sea Lion Hunting: A Zooarchaeological Study from the Southern Northwest Coast of North America. *Journal of Anthropological Archaeology, 8*: 68-99.

Lyman, R. L. (1991a). Archaeology of Umpqua/Eden (35DO83). In R. L. Lyman (Ed.), *Prehistory of the Oregon Coast: The Effects of Excavation Strategies and Assemblage Size on Archaeological Inquiry*, (pp. 102-174). San Diego: Academic Press.

Lyman, R. L. (1991b). Subsistence Change and Pinniped Hunting. In M. C. Stiner (Ed.), *Human Predators & Prey Mortality*, (pp. 187-199). Boulder, CO: Westview.

Minor, R. (2001). Beyond Stones and Bones: What the People Say About Use of the Offshore Environment on the Southernmost Northwest Coast. In J. Younker, M. A. Tveskov, & D. G. Lewis (Eds.), *Changing Landscapes: "Telling Our Stories" Proceedings of the Fourth*

Annual Coquille Cultural Preservation Conference, 2000 (pp. 25-41). North Bend, OR: Coquille Indian Tribe.

Ross, R. E. (1990). Prehistory of the Oregon Coast. In W. C. Sturtevant & W. Suttles (Eds.), *Handbook of North American Indians*, (pp. 554-559). Washington: Smithsonian.

Ruby, R. H. & J. A. Brown. (1986). *A Guide to the Indian Tribes of the Pacific Northwest*. Norman, OK: University of Oklahoma.

Seaburg, W. R. & J. Miller. (1990). Tillamook. In W. C. Sturtevant & W. Suttles (Eds.), *Handbook of North American Indians*, (pp. 560-567). Washington: Smithsonian.

Serjeantson, D. (2009). *Birds*. New York: Cambridge University.

Siegel-Causey, D. (1988). Phylogeny of the Phalacrocoridae. *The Condor, 90*: 885-905.

Skinner, C. E. & A. C. Bennett-Rogers. (1997). The Geologic Source of an Obsidian Wealth Blade from the Whale Cove Site (35-LNC-60), Central Oregon Coast: Results of X-Ray Fluorescence Trace Element Analysis. *Current Archaeological Happenings in Oregon, 22* (3): 8-10.

Stein, J. K. (2000). *Exploring Coast Salish Prehistory: The Archaeology of San Juan Island*. Seattle, WA: University of Washington.

Tveskov, M. A. (2000). *The Coos and Coquille: A Northwest Coast Historical Anthropology*. Unpublished doctoral dissertation, Southern Oregon University.

Woolfenden, G. E. (1961). Postcranial Osteology of the Waterfowl. *Bulletin of the Florida State Museum: Biological Sciences, 6*: 1-129.

Zenk, H. B. (1990). Alseans. In W. C. Sturtevant & W. Suttles (Eds.), *Handbook of North American Indians*, (pp. 568-571). Washington: Smithsonian.