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Author: MOSS, MADONNA L.

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HAIDA AND TLINGIT USE OF SEABIRDS FROM THE FORRESTER ISLANDS, SOUTHEAST ALASKA

MADONNA L. MOSS

Department of Anthropology, University of Oregon, Eugene, OR 97403-1218

ABSTRACT.—This paper presents the results of recent archaeological survey and zooarchaeological studies of five sites located on the Forrester Islands of southeast Alaska, part of the Alaska Maritime National Wildlife Refuge managed by the U.S. Fish and Wildlife Service. Even though many Alaska Natives have a long history of hunting migratory birds—including seabirds—use of these resources is not well-documented, at least partly because harvest during the spring and summer was illegal for much of the 20th century. Ethnographic and biological data are employed to help interpret the zooarchaeological results. This study documents use of 11 seabird taxa, with Tufted Puffins, Common Murres, Rhinoceros Auklets, and Cassin’s Auklets as the most heavily used species. The bird assemblages from the Forrester Islands demonstrate that the Haida, Tlingit, and their ancestors have been using seabirds from the Forrester Islands for over a thousand years.

Key words: Alaska Natives, zooarchaeology, faunal analysis, migratory birds, subsistence, Alaska Maritime National Wildlife Refuge.

RESUMEN.—Este artículo presenta los resultados de la investigación arqueológica y arqueozoológica de cinco yacimientos de las islas Forrester en el suroeste de Alaska. Estas islas pertenecen al Refugio Natural Marítimo de Alaska que gestiona el Servicio de Pesca y Fauna de los EE.UU. Aunque muchos indígenas de Alaska han cazado aves migratorias—incluidas marinas—desde tiempo inmemorial, el uso de estos recursos no está bien documentado, ya que la caza durante la primavera y el verano fue ilegal durante la mayor parte del siglo veinte. Se emplean datos etnográficos y biológicos para interpretar los resultados arqueozoológicos. Este estudio documenta el aprovechamiento de 11 taxa de aves marinas. Las especies más utilizadas son los frailecillos coletudos, arasos comunes, alcas rinoceronte y alcas de Cassin. El elenco de aves de las islas Forrester demuestra que los Haida, los Tlingit, y sus antepasados han utilizado aves marinas desde hace más de mil años.

RESUME.—Ce article décrit les résultats d’une enquête archéologique récente ainsi que ceux tirés d’études zoo-archéologiques de cinq sites situés sur les Îles Forrester au sud-est de l’Alaska. Les Îles Forrester font maintenant partie du Alaska Maritime National Wildlife Refuge géré par le U.S. Fish and Wildlife Service. Bien que de nombreux habitants originaires de l’Alaska chassent depuis longtemps les oiseaux migratoires, y compris les oiseaux de mer, l’utilisation de ces ressources est mal documentée, en partie parce que la chasse était illégale au printemps et en hiver pendant la majeure partie du vingtième siècle. Les données ethnographiques et biologiques sont utilisées pour mieux interpréter les résultats

zoo-archéologiques. Cette étude documente l'utilisation de onze taxons d'oiseaux marins. Parmi les espèces les plus utilisées, on dénombre les Macareux huppés, les Marmettes communes, les Alques à bec cornu et les Algues de Cassin. Les collections d'ossements d'oiseaux des Îles Forrester démontrent que les Haïdas, les Tlingits et leurs ancêtres utilisent les oiseaux marins depuis plus de mille ans.

INTRODUCTION

*Puffin, puffin, flew in from the sea
Puffin, puffin, flew in from the sea
Make yourself meaty, puffin!*

Forrester Island Bird Song by Jessie Natkong. Recorded in 1985 in Hydaburg, Alaska, by John Enrico (Enrico and Bross Stuart 1996:195–196).

Hunn et al. (2003) recently demonstrated the cultural importance of gull egg collecting by the Huna Tlingit in Glacier Bay National Park, located near Juneau, Alaska. Their compelling study showed the efficacy of Tlingit traditional environmental knowledge in promoting long-term sustainable use of gull eggs. Other than this single study, however, little is known about Tlingit or Haida use of seabirds in southeast Alaska. In other sources, the importance of birds has been minimized based on the dietary contribution of birds over the course of the year relative to that of other foods (e.g., Fladmark 1975:51; Jacobs and Jacobs 1982:123; de Laguna 1972:395). Yet seabirds are important, not just as food sources, but because their skins can be made into clothing and bags, beaks and feathers are used to ornament regalia, and bones can be fashioned into needles, tubes, whistles, and other objects. Beyond such uses, Hunn et al. reveal the cultural significance of gull egg collecting as both a celebration of seasonal change and a time for families to enjoy an excursion to offshore islands. The Marble Islands studied by Hunn et al. are one of the few known locations of Tlingit seabird use; St. Lazaria Island near Sitka is another. Although biologists have identified at least 91 seabird colonies in southeast Alaska (Nelson and Lehnhausen 1983), Native use of most of these has not been documented.

The Forrester Islands lie beyond the Prince of Wales Archipelago in the eastern Gulf of Alaska (Figure 1). These islands are part of the Alaska Maritime National Wildlife Refuge managed by the U.S. Fish and Wildlife Service, headquartered in Anchorage. The Forrester Islands' importance as wildlife habitat was officially recognized in 1912, when President William Howard Taft signed Executive Order 1458, making it illegal to hunt, capture, or disturb any bird or their eggs on the islands. This action set aside the Forrester Islands as a bird sanctuary ("reservation"). Not only do the Forrester Islands provide steep cliffs for bird colonies, three of these islands support spruce forests that have loose soils that burrowing seabirds require for nest-building. The islands are positioned close to the continental shelf where upwelling provides birds abundant food relatively close to shore. The absence of terrestrial mammalian predators is an additional reason that the Forrester Islands comprise the largest seabird colony in the eastern Gulf of Alaska, providing nesting grounds for over one million birds.

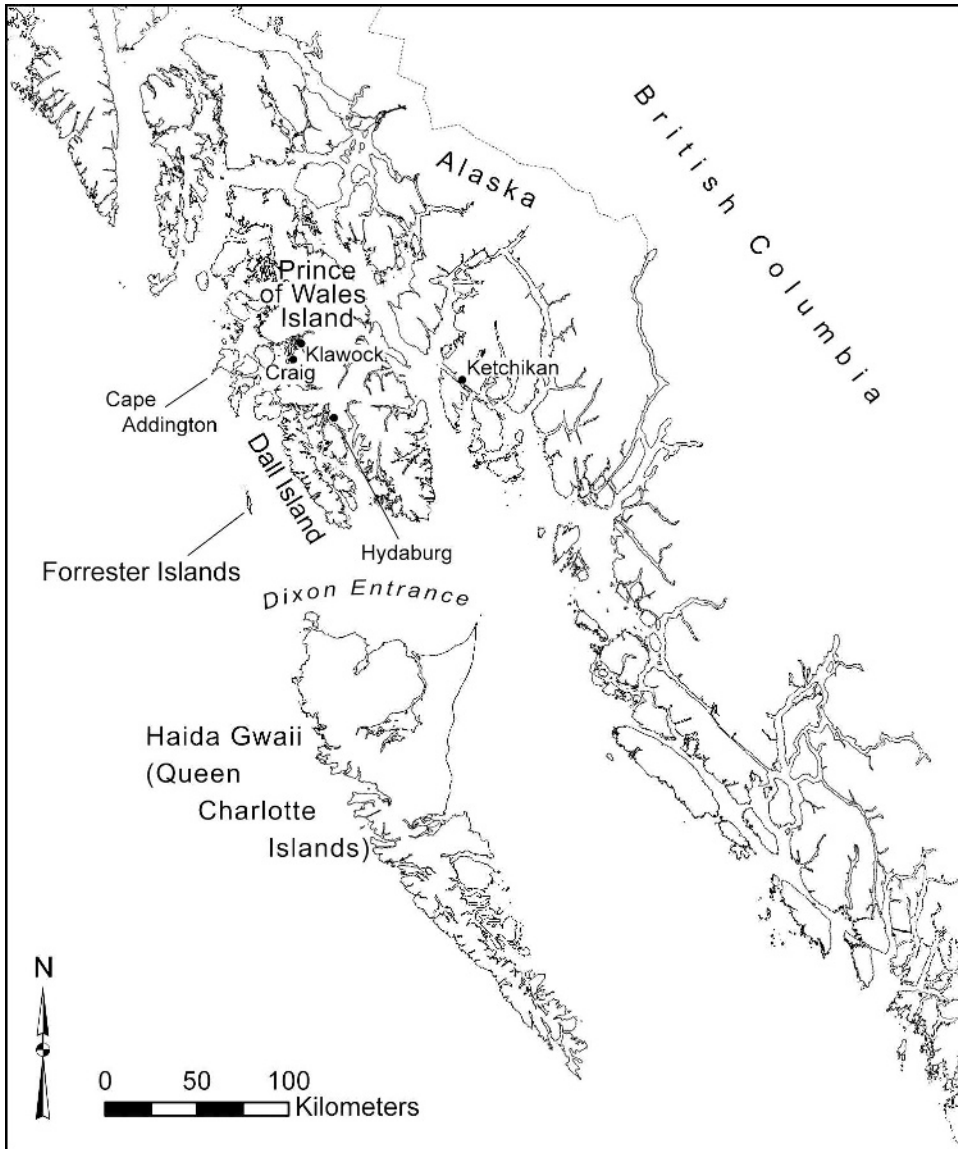


FIGURE 1.—Location of the Forrester Islands (prepared by Jacob Bartruff, Department of Geography, University of Oregon).

The results of archaeological investigations in 2004 and 2005 demonstrate that sites on the Forrester Islands have significant potential to yield important new information on the Native use of seabirds. Five sites, four located on Forrester Island itself and one site on nearby Lowrie Island, contain abundant faunal remains of seabirds, demonstrating Native use of seabirds during the pre-contact period, as many as 1,600 years ago. Zooarchaeological data are reported here along with ethnographic information that indicate the range of important species and suggest various ways the birds were obtained. The reports of early

field naturalists, particularly those of Harold Heath and George Willett, provide key biological information in addition to previously unknown ethnographic details. This archaeological and historical information provides crucial documentation of Alaska Native use of seabirds from the Forrester Islands. I suspect that some of the oral history of seabird hunting and egging has been repressed over the years, since seabird use was made illegal by federal law and international treaties in the early 20th century. Archaeological data show that Native use of seabirds has a long history on the Forrester Islands, despite the relative inaccessibility of the islands.

THE FORRESTER ISLANDS

The Forrester Islands are situated in a remote part of southeast Alaska, approximately 35 km offshore Dall Island in the Prince of Wales Archipelago and 135 km west-southwest of Ketchikan. What was once known as the Forrester Island National Wildlife Refuge is now part of the Alaska Maritime National Wildlife Refuge. From north to south, the Forresters include: North Rocks, Lowrie Island, Cape Horn Rocks, Sea Lion Rock, Forrester Island, Petrel Island, and South Rock.

Forrester Island was named by Captain George Dixon in 1787 for his steward, George Forrester (Orth 1971 [1967]:346). It was called Santa Christina Island in 1774 by Juan Perez, San Carlos Island in 1775 by Maurelle, and Douglas Island by William Douglas in 1788. Lowrie Island was named in 1879 by William Dall of the U.S. Coast and Geodetic Survey for Captain Lowrie, one of Cook's men, who in 1786, may have been the first English-speaking navigator to visit the Queen Charlotte Islands, and "possibly the first who saw this [Lowrie] island" (Orth 1971 [1967]:602). The name of Petrel Island was not published until 1917 (Orth 1971 [1967]:752), presumably for the storm-petrels who nest there.

The Forrester Islands were set aside as a bird sanctuary in 1912. Harold Heath of Stanford University conducted an initial study of birds on Forrester, Lowrie, and Petrel Islands in 1913 (Heath 1915), sponsored by the U.S. Fish Commission and the National Association of Audubon Societies. George Willett of the U.S. Biological Survey worked on the Forresters in 1914, 1915, 1916, 1917, and 1919 (Willett 1915, 1917, 1920). In 1927, Willett became affiliated with the Los Angeles County Museum. These early efforts highlight the national significance of the Forrester Islands as bird habitat. Although many seabirds require steep, rocky cliffs for nesting, other species require heavy, protective vegetation that supports loose soils in which they can build their burrows. The Forrester Islands provide both types of seabird nesting sites (U.S. Fish and Wildlife Service 1966).

At least two of the islands (Lowrie and Forrester) are substantial enough in size to have supported human occupation during the pre-contact period, and Petrel Island may also have been occupied. Ethnographic use of the islands is indicated by Niblack (1890:278), Swanton (1905:235), Heath (1915), Garfield and Forrest (1948:122–124), Langdon (1977:94), Emmons (1991:6), and Thornton (1995:303). Part of the reason the Forresters have not been surveyed for archaeological sites before is because they are administered by the U.S. Fish and Wildlife Service to protect marine mammals and migratory seabirds; the

wildlife refuge has been spared the commercial and industrial land use that often threatens archaeological sites in Alaska. The Alaska Department of Fish and Game (ADF&G) established a research camp on Lowrie Island in 1992, and every year since, biologists have lived on the island seasonally.

Both Forrester and Lowrie islands are densely vegetated, but on Lowrie, the ADF&G biologists' trail system facilitates overland foot travel. Lowrie Island is composed of a series of rocky sea stacks that have been uplifted over the course of a few to several millennia. No foot trails cut across the thick vegetation of Forrester Island. The sheer cliffs along much of the shoreline of both islands preclude easy access to the beach. Between the sheer cliffs are short segments of boulder beaches, often with large piles of drift logs.

ARCHAEOLOGICAL INVESTIGATION OF THE FORRESTER ISLANDS

The 2004 Lowrie Island project and the 2005 Forrester Island survey represent the only archaeological work conducted on the islands. Lowrie and Forrester islands provide an interesting set of contrasts. Forrester Island may be 20 times larger than Lowrie, and while the highest peak on Forrester reaches 408 m, the high point of Lowrie Island is less than 61 m. Lowrie Island is the haulout locale for approximately 7,000 Steller Sea Lions today. Although numerous sea lions are found in the waters between the two islands, Forrester Island itself is not a major haulout. On Lowrie Island, the ADF&G biologists' trail system allows one to walk through the interior, while Forrester Island has no extant trails. In 2004, I surveyed Lowrie Island on foot from the ADF&G base camp on a project sponsored by ADF&G and the University of Oregon. I also conducted a test excavation of Elderberry Cave, collecting a series of samples from seven arbitrary levels, each 10 cm thick. The 2005 project began with interviews of Haida elders in Hydaburg, led by University of Alaska Anchorage anthropologist Stephen Langdon, and Hydaburg Cooperative Association environmental planner Anthony Christianson. Then U.S. Fish and Wildlife Service archaeologist Debra Corbett and I conducted archaeological survey from a boat. From Forrester Island, samples for radiocarbon dating and faunal analysis were recovered from surface or shallow contexts.

Of eight archaeological sites identified during these two projects, five sites have yielded good samples of seabird remains. These include four sites on Forrester Island: Waterfall Cave (49-DIX-54), Red Lichen Cave (49-DIX-62), Soft Shell Cave (49-DIX-63) and the Saddle Site (49-DIX-55), and one site on Lowrie Island, Elderberry Cave (49-DIX-53). The radiocarbon dates from these five sites are presented in Table 1. All seven dates were run by Beta-Analytic (Coral Gables, Florida) on *Mytilus californianus* shells. As shown, $^{13}\text{C}/^{12}\text{C}$ ratios were measured on all samples to correct for isotopic fractionation, and this has been incorporated into the adjusted ages. These adjustments average 402 years, with a standard deviation of 10.9 years. The calendar ages are derived from the CALIB Radiocarbon Calibration Program Revision 5.0.1 (© 1986–2005, M. Stuiver and P. J. Reimer; Hughen et al. 2004; Stuiver and Reimer 1993; Stuiver et al. 1998a, 1998b), with dates presented as a range at one sigma. The calendar age range incorporates the estimated correction for the local oceanic reservoir effect of -280

TABLE 1.—Radiocarbon ages from five sites with seabird remains, Forrester Islands, Alaska.

Site 49-DIX-	Lab #, Beta-	Uncorrected ¹⁴ C Age	Adjusted ¹³ C/ ¹² C Age	Estimated Calendar Age Range (AD)	Provenience
53 Elderberry Cave	194561	520 ± 70	900 ± 70	AD 1590–1810	Unit 1: 0–10 cm
53 Elderberry Cave	194562	1810 ± 60	2210 ± 60	AD 390–570	Unit 1: 70 cm
54 Waterfall Cave	208745	550 ± 70	950 ± 70	AD 1520–1710	surface
54 Waterfall Cave	208746	660 ± 50	1070 ± 50	AD 1460–1590	0–20 cm
55 Saddle Site	208747	450 ± 50	860 ± 50	AD 1660–1830	probe: 0–20 cm
62 Red Lichen Cave	208749	1810 ± 70	2220 ± 70	AD 360–570	surface
63 Soft Shell Cave	208750	1800 ± 60	2190 ± 60	AD 410–590	surface

± 50 years (Moss et al. 1989). The end points of the age ranges have been rounded to the nearest ten years. Along with the historic occupation at another Forrester Island site, Eagle Harbor (49-DIX-061), these sites represent occupation ranging between AD 360 and the World War II era.

The time depth of human occupation on both Lowrie and Forrester islands is comparable to that of Cape Addington, 49-CRG-188 (Moss 2004). The 2004 test excavation at Elderberry Cave (49-DIX-53) revealed that the lowest level of the deposit represents occupation dated to AD 390–570, and the uppermost level is dated to AD 1590–1810. No break in occupational debris was identified during the excavation of Elderberry Cave, indicating long term use of that cave. The oldest date from Forrester Island itself is from Red Lichen Cave; but use of nearby Soft Shell Cave is nearly as old, and both overlap with the earliest occupation of Elderberry Cave. People used these three caves on the west coast of the Forrester Islands circa 1,600 years ago.

Although the sequence of dates from the Forrester Islands is not continuous, the gaps between AD 600 and 830 and between AD 1000 and 1450 are likely more apparent than real, probably resulting from limited radiocarbon sampling. These apparent gaps do not show up in the Cape Addington Rockshelter sequence (Moss 2004:60), indicating that people were using Noyes Island during these times. All of the dates from Forrester Island come from surface or shallow contexts, and I do not claim that they bracket the entire duration of human occupation. The oral historical information we gathered in Hyدابург testifies to use of the Forrester Islands into the 19th and 20th centuries.

SITES WITH SEABIRD REMAINS

In the following abbreviated site descriptions, specific locational information has been omitted to protect the confidentiality of site locations. More detailed site descriptions are recorded on the Alaska Heritage Resource Survey filed with the Alaska State Office of History and Archaeology and with the U.S. Fish and Wildlife Service in Anchorage. I identified the vertebrate remains from the Forrester Island sites by direct comparison with specimens in the North Pacific comparative

collection of reference faunal specimens at the Department of Anthropology, University of Oregon (see <http://darkwing.uoregon.edu/~mmoss/Zooarchaeology-at-Oregon/>). In addition, specimens representing two storm-petrel species were loaned from the Burke Museum of Natural History and Culture, University of Washington. I identified the eggshells from one site using collections of the University of Oregon Museum of Natural and Cultural History.

Waterfall Cave.—49-DIX-54 is the only archaeological sea cave thus far identified on the east side of Forrester Island, where the island is more protected than the surf-beaten west side. Near the center of the 25 m x 15 m cave, we found a hearth containing charcoal, ash, unburned wood, mussel shells, and bones, and an associated cobble tool. The site was occupied between AD 1460 and 1710. The recovered faunal sample came from 0–15 cm below the surface, and contained mussel and barnacle shells, fish and bird bone. Of 93 bones, 73 were identified to at least the family level. Both Pacific Halibut (*Hippoglossus stenolepis*) and lingcod (*Ophiodon elongatus*) are represented, but most were bird bones (Table 2). Of those identified to family, 49 (73%) are Rhinoceros Auklet (*Cerorhinca monocerata*), and Cassin's Auklet (*Ptychoramphus aleuticus*), Tufted Puffin (*Lunda cirrhata*), and Leach's Storm-petrel (*Oceanodroma leucorhoa*) were also identified. While the site occupants fished the nearby waters for halibut and lingcod, Rhinoceros Auklets and other alcids apparently were a primary target of their subsistence efforts, and the subsurface hearth indicates that people cooked and camped in the cave.

Saddle Site.—49-DIX-55 is also located on the east side of Forrester Island, where a low-lying saddle crosses the island from east to west. Shell midden was found in a 25 m x 5 m area vegetated with widely spaced spruce trees and a groundcover of thick grasses. Blackened soil, charcoal, fragmented mussel shell, and numerous bird bones were found to a depth of 20 cm and dated to AD 1660–1830. The shell midden was not particularly shell-rich, and the bones were more heavily fragmented than those recovered from the floors of the cave sites on Forrester Island. Of 198 bones, 154 were identified to at least the family level (Table 2). Most common were Cassin's Auklet (NISP = 70, 45%) and Rhinoceros Auklet (NISP = 69, 45%), and Tufted Puffin, Pelagic Cormorant (*Phalacrocorax pelagicus*), Common Murre (*Uria aalge*), gull (*Larus* spp.), and Leach's Storm-petrel were also identified. The site lies within an area Mr. Robert Sanderson of Hydaburg identified as a place the Kaigani Haida went to collect seabird eggs in the 20th century. Clearly people were obtaining not just eggs, but the birds themselves.

Red Lichen Cave.—49-DIX-62 is a sea cave located along the steep rocky shoreline of the west side of Forrester Island. The site was named for the pincushion orange lichen that grows on the rock surfaces surrounding the cave entrance. The 58 m x 10 m cave is 10.6 m above high tide. Two samples recovered from the cave floor were rich in bird bone, but also contained lingcod bones, mussel and limpet shells, and bird egg shells. Many of the bones are relatively large fragments, but show extensive surface weathering, including staining with organic growth, acid-etching, and exfoliation. All but five of the 105 bones were identified to at least the family level. The bones of a large lingcod were found

(NISP = 7), but all others are from birds (Table 2). Most are Tufted Puffin (NISP = 37, 40%) and Common Murres (NISP = 36, 39%), but shearwater (*Puffinus* spp.), adult and juvenile gull, juvenile cormorant, Rhinoceros Auklet and Cassin's Auklet are also present. Eggshells from the site were identified as Common Murre. The site falls within the general area Mr. Robert Sanderson identified as a place for gathering gull eggs.

Soft Shell Cave.—49-DIX-63 is another sea cave (52 m x 10 m), located close to Red Lichen Cave, and adjacent to a colony of Glaucous-winged Gulls on the west side of Forrester Island, about 9 m above high tide. In addition to bird bone, the faunal sample contained mussel shell, Black Katy Chiton (*Katharina tunicata*) shell, and lingcod bone, and was dated to AD 410–590. Of 149 bones, 135 were identified to at least the family level. Most of the bones (NISP = 87, 67%) are Common Murre, with Tufted Puffin (NISP = 19, 15%), Cassin's Auklet, gull, cormorant, shearwater, and Ancient Murrelet (*Synthliboramphus antiquus*) also present. Some of the gull and cormorant bones are from juvenile birds. The most striking aspect of these results is that the Common Murre is the most abundant species among the faunal remains, whereas the site is immediately adjacent to a Glaucous-winged Gull (*Larus glaucescens*) colony.

Elderberry Cave.—49-DIX-53 is a former sea cave (12 m x 5 m) occurring well within the forest fringe on the west side of Lowrie Island, 12–15 m above high tide. A single 0.5 m x 1.0 m test pit was excavated at the center of the cave entrance just inside the dripline to a depth of 70 cm. The lowest level of the deposit is dated to AD 390–570, and the uppermost level is dated to AD 1590–1810. All bone, whole shell valves, and artifacts retained in the ¼ inch (0.64 cm) mesh screen were recovered. Three bone artifacts were found: a bone point and two pieces of worked bone. California mussel was the most common shellfish, but littorines (*Littorina sitkana*) and limpets (*Lottia digitalis*, *Tectura persona*) were also abundant. Fish and mammals included rockfish (*Sebastes* spp.), prickleback (stichaeid), lingcod, halibut, salmon (salmonid), Harbor Seal (*Phoca vitulina*) and Steller Sea Lion (*Eumetopias jubatus*). The bird remains from seven levels have been combined in Table 2. Of those identified to family, Tufted Puffins are most abundant (NISP = 71, 40%). All but one of the 49 specimens identified to the alcid category are ribs that may likely belong to these puffins, but ribs are elements zooarchaeologists do not generally assign to bird species. Next in abundance are Cassin's Auklet (NISP = 34, 19%) and Pelagic Cormorant (NISP = 13, 7%). Bald Eagle (*Haliaeetus leucocephalus*), Fork-tailed Storm-petrel (*O. furcata*), Ancient Murrelet, and Marbled Murrelet (*Brachyramphus marmoratus*) were also identified.

ZOOARCHAEOLOGICAL RESULTS IN ETHNOGRAPHIC AND BIOLOGICAL CONTEXT

In this section, I aim to integrate the zooarchaeological data with ethnographic information, biological background, and field observations to better understand how Native people used the birds of the Forrester Islands. In

TABLE 2.—Bird remains from five archaeological sites on the Forrester Islands, Alaska.

TAXON	49-DIX-54		49-DIX-55		49-DIX-62		49-DIX-63		49-DIX-53		Total	
	NISP	g	NISP	g	NISP	g	NISP	g	NISP	g	NISP	g
Alcidae	7	0.9	3	0.3	3	0.8	7	2.1	49	2.9	69	7.0
<i>Brachyramphus marmoratus</i>									1	0.1	1	0.1
<i>Cerorhinca monocerata</i>												
<i>Haliaeetus leucocephalus</i>	49	29.5	69	12.4	1	1.9			5	7.8	119	43.8
<i>Larus</i> spp.			1	0.2	5	4.2	5	5.2			5	7.8
<i>Lunda cirrhata</i>	2	2.2	5	1.1	37	24.1	19	12.9	71	22.6	134	62.9
<i>Oceanodroma</i> spp.	1	0.1	1	0.1					3	.2	5	0.4
<i>Phalacrocorax pelagicus</i>			3	1.8	4	3.8	4	5.8	13	17.8	24	29.2
<i>Ptychoramphus aleuticus</i>	8	1.6	70	7.6	1	0.2	6	0.9	34	5.5	119	15.8
<i>Puffinus</i> spp.					6	8.8	1	0.9			7	9.7
<i>Synthliboramphus antiquus</i>							1	0.1	3	0.8	4	0.9
<i>Uria aalge</i>			2	0.6	36	38.9	87	75.4			125	114.9
Aves unidentified	20	0.7	44	1.3	5	1.1	14	3.0	40	3.3	123	9.4
TOTAL AVES	87	35.0	198	25.4	98	83.8	144	106.3	219	60.8	746	311.3

Note: Weights have been rounded to the nearest 0.1 gram.

a few instances, the archaeological data provide some indication of changes in seabird species availability or abundance that suggest habitat change over time. I start by addressing the apparent discrepancy between the archaeological findings at Soft Shell Cave with the contemporary abundance of gulls adjacent to that site, and then discuss key species at other sites.

Glaucous-winged Gulls lay their eggs during the first week of June, and Hydaburg elders told us they aim for June 8th as the best date to collect gull eggs. Gulls are indeterminate layers, so if one or two eggs are removed from a nest, a gull will lay a few more to replace those lost (Ehrlich et al. 1988:165). I observed a few gull nests just within the entrance to Soft Shell Cave, but they did not contain eggs. This could be because the eggs had hatched and gulls are known to remove eggshells from their nests as a defense against predators (Ehrlich et al. 1988:167). Eggs hatch by the first week in July, but the chicks require another month to eight weeks to fly. My visit to Soft Shell Cave occurred on August 10th, when some, but not all young were fledged. I was able to approach two gull chicks within a meter, showing how vulnerable the young birds are at this time of year. Birds such as these could be easily chased into the cave where they could be killed.

Despite the proximity of the gull colony, 67% of the bird bones from the Soft Shell Cave sample were Common Murres. Next in abundance were Tufted Puffins (15%), but only a few gulls were present, including one juvenile. Apparently gulls were not the main species targeted by the people who used Soft Shell Cave. Murres do not build nests; the female lays a single egg on bare rock. Some seacliff rookeries accommodate multiple seabird species, stratified by elevation and available habitat (Ehrlich et al. 1988:197). Murres usually are positioned below gulls at such sites, although I did not see any murres. The gull nesting site adjacent to Soft Shell Cave has bare rock ledges where murres could lay their eggs, and Willett (1915:299) stated that the principal murre rookeries were "on the west side of Forrester Island," Cape Horn Rocks, and on Petrel Island. Willett stated that murres begin egg-laying on July 20 and that the earliest young murre he saw was on August 13th. Therefore, if murres were using the rookery, I should have seen murres tending their eggs on August 10th.

One explanation for this discrepancy is that the rookery adjacent to Soft Shell Cave accommodated murre breeding in the past, but not now. As a sea cave, Soft Shell Cave has been formed by wave action. The drift logs found within the cave indicate this process, but now the cave entrance is just above the reach of the waves, as the land in this area is still undergoing isostatic rebound. The large boulders that litter the shoreline in front of the cave have broken off the cliff side, and the gull nesting site is at the base of what appears to be a landslide track. One possibility is that at some point in the past, the cliffs dropped directly into the sea, before the fringe of fallen boulders developed at the base of the cliffs. When murres learn to fly, the parents stand between their chick and the cliff edge to prevent the chick from jumping off before it should (Bennett 2001; Lichen 2001:38). The murre chick's first attempt at flight involves stepping off the cliff edge and fluttering 244–457 m down to the sea. Today, at the rookery adjacent to Soft Shell Cave, there is enough of a boulder perimeter in front of the cliffs that if a murre chick stepped off a ledge, it would tumble onto rock. The cliffs in this

area may have been a murre rookery before the boulder fringe developed; the radiocarbon date suggests that murrees were the focus of use at this site about 1500 years ago. With the break down of cliffs and the emergence of a beach of massive boulders, today's cliffs no longer would seem to suit the needs of murrees.

Red Lichen Cave is located only 40 m south of and at an elevation 1.6 m higher than Soft Shell Cave. Its entrance is heavily vegetated, demonstrating that it formed earlier than did Soft Shell Cave. Its dated occupation is just slightly older than that of Soft Shell Cave. At Red Lichen Cave, the percentages of murrees and puffins are each about 40%. Clearly, Red Lichen Cave was also occupied during a time when murrees were locally abundant, i.e., breeding in the site vicinity. Puffins are relatively abundant in the samples taken from both sites. In stratified seacliff colonies, puffins typically nest above both murrees and gulls, using their claws to dig burrows into loose soil atop or alongside cliffs. I could not see puffin nest sites above Soft Shell Cave; one would need ropes to climb the cliffs in this area to observe suitable nesting habitat.

In both Soft Shell and Red Lichen samples, gulls and cormorants were represented by juveniles as well as adults, indicating mid-summer use. Juveniles were apparently not the primary target of subsistence, however, since they make up only small proportions of both assemblages. Although bird egg shells were present in both caves, the only eggshell samples are from Red Lichen Cave, and these have been identified as Common Murre. Hence the evidence indicates that murrees and their eggs were targeted by the people using these caves 1,600 to 1,400 years ago. The evidence may also suggest that a rookery that accommodated murrees in the past shifted to one dominated by gulls in the last 1,000 years or so.

Although not numerous, smaller alcids and shearwaters were found at both west coast caves. This is the first case of the genus *Puffinus* to be identified in an archaeological site in southeast Alaska. Shearwaters were not represented among the 33 species inventoried by Heath (1915), although Willett (1915:300) stated that the sooty shearwater was "seen occasionally throughout the summer, generally a half mile or more off shore, but on one occasion between Forrester and Lowrie islands." In 1917, Willett collected a "slender-billed" shearwater (now known as the Short-tailed Shearwater) floating dead a few hundred yards off the north end of Forrester Island (Willett 1920:138). Pelagic shearwaters may have been deliberately hunted by Kaigani Haida or Tlingit, or stranded birds could have been collected.

On the east side of Forrester Island, the use of birds differed from that of the west side. At the Saddle Site, the most abundant species were Cassin's Auklet and Rhinoceros Auklet, each at 45%. Tufted Puffin, Pelagic Cormorant, Common Murre, gull, and Leach's Storm-petrel were also identified. From Waterfall Cave, most of the remains were Rhinoceros Auklet (73%), and Cassin's Auklet, Tufted Puffin, and Leach's Storm-petrel were also identified.

Heath (1915:30-33) devoted considerable space to describing Rhinoceros Auklets and their extensive burrows, built in spruce forests "where the shadows are of such depth that ferns and underbrush find but scanty foothold.... In such localities over four hundred burrows have been counted in an area six hundred

feet square....” (Heath 1915:31). Heath measured such burrows and found them to be at least 8 ft (2.4 m) long, and as many as 20 ft (6 m) long. Both Cassin’s Auklets and Ancient Murrelets also occupy some of these burrows. Rhinoceros Auklets lay their eggs during the first half of June, then incubate them for three weeks. Heath (1915:32) wrote that “the natives are unanimous in declaring that they now know of no other nesting site of the Rhinoceros Auklet in southeastern Alaska.” During his fieldwork, Heath (1915:23) was assisted by “Captain John,” “an unusually keen and accurate naturalist of the Haidah tribe,” and I assume when Heath refers to “Natives,” he means Haida. Heath (1915:33) reported that according to the Natives, Rhinoceros Auklets were far more numerous in the past than at the time of his 1913 visit:

In those earlier times the sky was literally darkened as they [Rhinoceros Auklets] put out to sea, and the sound of their cries was a veritable babel. The diminution might naturally be ascribed to the activity of the natives, who relish this species above all others, but the natives themselves meet such a claim with the evidence of many scores of years when, with a much larger tribe than at present, they gathered eggs and birds in vastly greater numbers without any appreciable decline in the bird colony. Their explanation rests solely upon the belief that the decrease is due entirely to the rank growth of underbrush and ferns which form a tangled mat too dense to permit of ready flight to and from the burrows. In former times, even within the memory of the some of the older men of the tribe, the country was much more open; and it is certainly a readily observed fact that this species avoids the thickets and seeks out more open ground. Occasional nests are found in salmon berry patches, but well worn runways invariably lead into the open (Heath 1915:33).

Willet (1915:297) explained that all Rhinoceros Auklet nesting colonies are located on the east side of Forrester Island, and that burrows can occur just above the beach to 500 ft (152 m) up the hillsides. Auklets use their bills to break up the soil and their feet to move it out of the way. At the entrance to their burrows, they leave mounds of grass, moss, leaves, and earth from their digging. Willett reported that egg-laying begins during the last week of May. Rhinoceros Auklets are rarely seen during the day; they fly to the more protected waters around Dall, Prince of Wales, and Suemez islands to feed. The mating pair take turns incubating the eggs; one mate sits on the eggs from 2 a.m. or so until 11 p.m.; while the other takes the 11 p.m. to 2 a.m. shift. During the middle of the night, when the birds were changing positions, the Haida built bonfires amidst their burrows to confuse the birds. Willett (1915:297) reported that auklets were then easily dispatched with spruce boughs.

In the Saddle Site environs, former sea stacks are now stranded in the forest, and the ground is pocketed with bird burrows, most likely those of Rhinoceros Auklets. Saddle Site residents were probably gathering both Rhinoceros and Cassin’s Auklets from their burrows in the immediate vicinity of the site. I was unable to survey the cliffs around Waterfall Cave for comparison.

The tiny Cassin's Auklet (19 cm long, compared to a Rhinoceros Auklet at 38 cm long [Armstrong 1995:182, 185]) was surprisingly abundant in the Saddle Site sample. Cassin's Auklets build their burrows on Petrel and Forrester islands. They, too, are attracted to firelight, and the Haida reportedly captured them much like they did Rhinoceros Auklets. Heath (1915:34) wrote that Cassin's Auklets "figure largely in the native's bill of fare, and large numbers were annually taken by means of snares or were attracted by bonfires and subsequently knocked down." On Lowrie Island, Cassin's Auklet carcasses are frequently found on the trails. Most of these adult birds seemed to have died at night by colliding with trees. The birds arrive on the Forrester Islands at the beginning of March and reportedly spend two months digging their burrows (Ehrlich et al. 1988:206; Heath 1915:34). The females incubate the eggs and are fed at night when the males return from foraging. Heath (1915:34) wrote that fishermen reported to him that "in the early morning these birds had struck their tents, and in a stunned condition were readily taken." Like Rhinoceros Auklets, Cassin's Auklets would appear to need some clearings to make night-flying less hazardous.

The question Heath raised with his Haida contacts about the reason for the decrease in the number of Rhinoceros Auklets by 1913 might be answered archaeologically. With large enough samples from enough well-dated assemblages, perhaps we could identify whether or not the abundance of Rhinoceros Auklets appeared stable or changed during pre-contact times. Provisionally, information from the Haida suggests another example of habitat change.

Tufted Puffins are present in assemblages from both east and west sides of Forrester Island, and are the most abundant bird recovered from Elderberry Cave on Lowrie Island. Both Heath (1915:29) and Willett (1915:296) considered Tufted Puffins to be the most abundant alcid on the Forrester Islands. They described puffins as skilled bait thieves, easily taken by hook and line or gaff hook. Willett (1915:296) wrote about the attitude of those commercial fishermen hand-trolling for salmon during the summer of 1914:

The fishermen detest these birds because of their penchant for stealing the herring that is used as bait in trolling for salmon. After the fisherman has placed a fresh herring on the hook and lets the line out to trolling distance, the puffin will dive and neatly remove the bait from the hook. I have seen this done when the bird was forced to go down at least fifteen fathoms. Apparently a puffin will attach itself to a particular trolling boat and will follow it for hours. The fishermen attribute to the bird a surprising amount of cunning. One Norwegian assured me solemnly that the parrot would rise up on the crest of a wave and look into the boat in order to count the herring therein.... Frequently the puffins will get all the herring the fisherman has and he will be obliged to cease fishing....
...this habit of stealing bait is confined to this species....

It seems likely that pre-contact Native fishermen would have caught such a puffin long before the bird had stolen all their bait. Moreover, the Haida and Tlingit probably "fished" for puffins and other seabirds in the waters around the Forrester Islands prior to the birds' legal protection.

In discussions of the Forrester Islands, contemporary Haida elders emphasized egg collecting. Hunn et al. (2003) have shown that gull egg collecting by the Huna Tlingit in Glacier Bay is important, not only to provide a subsistence resource, but to mark springtime as a time of renewal when the Huna re-assert their claim to a special place. Certainly, the Forrester Islands were and are a special place to the Haida and Tlingit. Camped on Dall or other islands in late April, when they saw flocks of returning Rhinoceros Auklets, they knew that seabird nesting on the Forrester Islands was about to begin. These groups had to await good weather to canoe across to the Forresters. As Heath (1915:30) wrote, "they repaired to this summer resort for their annual egg and bird collecting holiday." Fine weather signaled the richness of the food gathering season to come.

Ethnographically, the Tlingit shot birds with bows and arrows, snared them, and fished for gulls using baited double-pointed bone gorges (Emmons 1991:138). Yet bird hunting (as opposed to egg collecting) was not described by the elders in Hydaburg. Since migratory birds on the Forresters have been protected by law for almost 100 years, perhaps this is not something that people discuss openly. Taft's Executive Order of 1912 made it illegal to hunt, capture, or disturb any bird or their eggs on the Forrester Islands (King 2005:1–2). Heath (1915:36) witnessed evidence of gull egg "poaching" in 1913, but the extent of aboriginal use of Forrester Islands seabirds after refuge designation is unknown. Nonetheless the observations by early 20th century naturalists, along with the archaeological evidence, testify to significant Native use of seabirds, particularly Tufted Puffins, Common Murres, Rhinoceros Auklets, Cassin's Auklets, cormorants, and gulls. Further study of the archaeological sites on the Forrester Islands can reveal more about the sustained Native use of these birds over the centuries.

THE ILLEGALITY OF MIGRATORY BIRD HUNTING

When the Forrester Islands were designated a bird sanctuary in 1912, the taking of birds from the islands—during any season—was outlawed. More broadly, between 1916 and 2003, the hunting of migratory birds during the spring and summer by Alaska Natives was illegal, even though Tlingit and Haida bird hunting and egg collecting are traditional subsistence activities. The 1916 Migratory Bird Treaty with Canada was the first of several international treaties aimed at curbing the massive decline of bird populations due to commercial hunting in the late 19th and early 20th centuries. The Act did not prohibit bird hunting during autumn—primarily for ducks and geese—an activity in which both Native and non-Native hunters participated. While the intent was to protect migratory birds and allow for variable levels of fall sports hunting, the treaties ignored the customary use of birds by Alaska Natives and other indigenous northern peoples during spring and summer (Moss and Bowers 2007).

The 1956 Fish and Wildlife Act designated the Department of Interior as the key agency for managing migratory birds in the United States. The Migratory Bird Treaty Act Protocol Amendment of 1995 aimed to redress long-term

discrimination against Alaska Natives by providing for “customary and traditional use of migratory birds and their eggs for subsistence use by indigenous inhabitants of Alaska,” but states that “it is not the intent of the Amendment to cause significant increases in the take of species of migratory birds relative to their continental population sizes” (U.S. Fish and Wildlife Service 2003:1). This placed the management agencies involved, the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game, in the awkward position of having to document harvests that had been technically illegal.

Nevertheless, the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game surveyed subsistence harvest, and in 2000, the Alaska Migratory Bird Co-Management Council was established with representatives from both agencies in addition to Native organizations. In 2003, the Council issued its first annual harvest regulations for the spring and summer of 2003. The 2004 harvest regulations identified Hoonah as the only southeast Alaskan community eligible for spring and summer migratory bird harvest. Huna people were permitted to collect Glaucous-winged Gull eggs on national forest lands along Icy Strait and Cross Sound, but not in their traditional territory in Glacier Bay National Park. Starting in 2005, harvest regulations have identified both Hydaburg and Craig, located in southern southeast Alaska, as eligible communities. They were permitted to collect gull eggs from “small islands and adjacent shoreline of western Prince of Wales Island from Point Baker to Cape Chacon, but also including Coronation and Warren islands” (Department of Interior 2005:18250, 2006a:10410). The Forrester Islands were excluded from the harvest area in 2005 and 2006, and are not mentioned in the proposed regulations for 2007 (Department of Interior 2006b).

IMPLICATIONS FOR THE FUTURE: WILDLIFE USE AND MANAGEMENT

This study is not the first to identify evidence of seabird use in southern southeast Alaska. From Cape Addington Rockshelter (49-CRG-188) on Noyes Island in Tlingit territory, the bones of 11 seabird taxa were identified: Short-tailed Albatross (*Phoebastria albatrus*), Northern Fulmar (*Fulmaris glacialis*), Storm-petrel (*O. furcata*), cormorant, gull, Pigeon Guillemot (*Cephus columba*), Rhinoceros Auklet, Tufted Puffin, Cassin’s Auklet, Marbled Murrelet, and Common Murre (Moss 2004). The wide range of taxa represented at this site suggested offshore hunting of seabirds, although not all of these were taken at colonies (e.g., albatross). While working on that study, I wrote that the location, scale, and frequency of Tlingit seabird use across southeast Alaska were poorly known (Moss 2003:97).

The purpose of this paper has been to document the long-term use of migratory birds on the Forrester Islands by the indigenous people of southeast Alaska. Investigations of five archaeological sites have yielded good samples of seabird remains. The presence of immature gulls and cormorants and murre eggshells at two of the sites clearly shows summer harvest of seabirds. The ethnographic and historical information discussed above in relation to the other three sites also indicates spring and summer use of seabirds. Taken together, the data from Cape Addington and the Forrester Islands sites have shown that the

Kaigani Haida, the Tlingit, and their ancestors have been harvesting seabirds during the spring and summer over the last 1,600 years, and perhaps longer. These results provide longitudinal support for the rights of southeast Alaska Natives to harvest seabirds. I hope that the data described herein will be useful to wildlife managers, particularly to the U.S. Fish and Wildlife Service and the Alaska Migratory Bird Co-Management Council, who may benefit from understanding that Alaska Natives of southeast Alaska have been relying on seabirds for a minimum of 16 centuries.

Further study, including the identification of additional sites, systematic collection of larger samples, additional radiocarbon dating of samples, and more faunal analyses will be necessary to address some of the research questions that emerged in this study. For example, the study of Soft Shell and Red Lichen caves suggests that Common Murres were more numerous in the site vicinity than they are today, and more research is necessary to confirm and explain this pattern. The suggestion by Heath (derived from his discussions with Haida men) that the population of Rhinoceros Auklets had decreased by the early 20th century is another inference that may find support or refutation through more in-depth archaeological study. These are two of many examples where the study of the archaeological record can help us understand patterns of wildlife abundance that evolved with the history of Native use of the Forrester Islands.

The data presented here provide support for the rights of southeast Alaska Natives to harvest seabirds, particularly the communities on the west side of Prince of Wales Island, including Hydaburg, Craig, and Klawock. Zooarchaeological results from this study of five Forrester Island sites indicate aboriginal use of 11 seabird taxa, including (in order of abundance): Tufted Puffin (*Lunda cirrhata*), Common Murre (*Uria aalge*), Rhinoceros Auklet (*Cerorhinca monocerata*), Cassin's Auklet (*Ptychoramphus aleuticus*), Pelagic Cormorant (*Phalacrocorax pelagicus*), gull (*Larus* spp.), shearwater (*Puffinus* spp.), storm-petrel (*O. leucorhoa*, *O. furcata*), Ancient Murrelet (*Synthliboramphus antiquus*), and Marbled Murrelet (*Brachyramphus marmoratus*). As indicated in the epigraph to this paper, the "meaty puffin" and other seabirds were highly valued as resources and messengers of the harvest season.

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