THE *AWA'UQ* (REFUGE ROCK) FISH REMAINS: EVIDENCE OF A LATE PREHISTORIC SPRING HERRING FISHERY FROM THE KODIAK ARCHIPELAGO

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ABSTRACT

The late prehistoric/early historic *Awa'uq* or Refuge Rock (KOD-450) site, located on Sitkalidak Island, was excavated in 1992, with faunal samples recovered but not analyzed at that time. Complementing recent faunal analyses by Michael Etnier, a sample of 9,339 fish remains was analyzed from the ⅛" fraction of four bulk samples. These samples are associated with a radiocarbon date of 140 ± 30 BP. The 4,227 identified fish remains are dominated by Pacific herring, which compose 60% of bone specimens and 49% of the estimated number of individual fish. There are moderate numbers of Irish lords and Pacific cod and much smaller numbers of other fish taxa. The large amounts of herring suggest the possibility of a spring occupation during herring spawning season, supporting Etnier's earlier inference of a spring focus on migrating Northern fur seals. The abundance of herring is unique among reported Kodiak Archipelago fish assemblages, in which herring otherwise occur in trace amounts (< 2% of specimens identified to order level or better in fifteen assemblages). The *Awa'uq* fish remains add to the picture of late prehistoric/early historic Koniag Tradition subsistence in the Kodiak Archipelago where elsewhere cod and salmon appear to have been the main fisheries.

INTRODUCTION

To characterize the prehistoric economy of a particular region and time period, faunal samples from a variety of site types are necessary (Cannon 1996; Cannon et al. 2011). Diverse faunal sample sets are also necessary to account for differences in faunal assemblages due simply to differences in local abundance and availability (Moss 2012). Thus far, most reported fish assemblages from Kodiak Archipelago archaeological sites have been dominated by cod (family Gadidae) and salmon (family Salmonidae) remains (Crowell 1997; Kopperl 2003; Partlow 2006; West 2009; Yesner 1989). The distinctive fish assemblage from the *Awa'uq* site demonstrates some of the variety previously unrecognized in late prehistoric subsistence in the archipelago.

The *Awa'uq* or Refuge Rock (KOD-450) archaeological site is located on a small island in Partition Cove, along the southeastern coast of Sitkalidak Island in the Kodiak Archipelago (Fig. 1). It is known primarily as the location of Shelikhov's horrific massacre of hundreds of Alutiiq people in August 1784 (Black 2004; Knecht et al. 2002). Survey and excavations in the early 1990s exposed a minimum of twenty-eight multiroom house depressions and a well-preserved faunal midden (Knecht et al. 2002). In 1992, one house was completely excavated and another

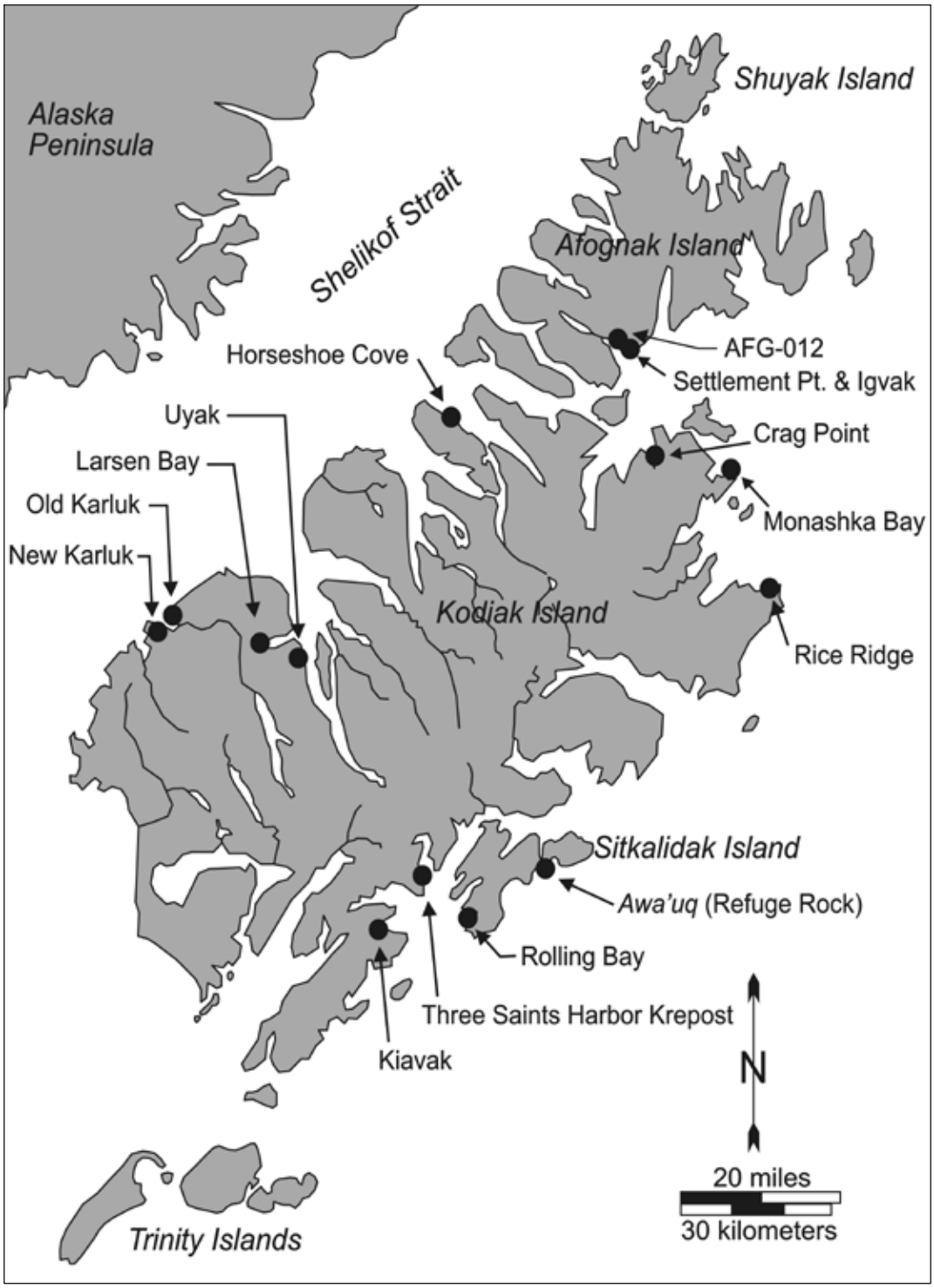

Figure 1. Archaeological sites in Kodiak Archipelago with fish assemblages.

was partially excavated, revealing late prehistoric Koniag tradition artifacts and a few Russian trade goods including wound beads and iron (Knecht et al. 2002). During the excavations, a 2 x 2 x 0.54 m unit (Test Pit #1) was dug into the shell midden, the matrix screened through ½" (1.27 cm) mesh, and four bulk samples obtained (Knecht n.d.; Knecht et al. 2002). Faunal samples were not analyzed at that time. Almost twenty years after the excavations, Michael Etnier sorted faunal material from Test Pit #1 and undertook analysis of the mammal and bird remains. Based on his analyses, Etnier (2011) argued that subsistence at the site was focused on hunting Northern fur seals (*Callorhinus ursinus*) during their spring migration. Etnier (2011:58) noted large Pacific cod (*Gadus macrocephalus*) and halibut (*Hippoglossus stenolepis*) bones during his initial sorting of the ½" screened faunal material, but detailed analysis of the fish remains was not undertaken until the study reported in this paper.

In 2014, a conventional radiocarbon date of 140 ± 30 ^{14}C yrs BP (Beta-381846) was obtained by Madonna Moss (2014, pers. comm.) on charcoal from the midden, related to her study of Alaska herring (Moss et al. 2015). This date corresponds with a maximum two sigma age range of AD 1669 to 1944 when calibrated with CALIB 7.0.2 (Stuiver and Reimer 1993; Stuiver et al. 2014) using the IntCal13 dataset (Reimer et al. 2013). This age range places the midden within the late Koniag or Developed Koniag Phase (post-AD 1400) of the Koniag Tradition (see Clark 1997; Fitzhugh 2003; Jordan and Knecht 1988; West 2011) and/or the historic period after AD 1763. The date makes the midden roughly contemporaneous with House Floor 1 at the New Karluk site (see West 2011:table 3).

METHODS

The fish remains described here came from the four bulk samples recovered from Test Pit #1 at the *Awa'uq* site. This is a partial sample of the fish assemblage recovered during the 1992 excavations (Knecht et al. 2002). The remaining fish remains not in the bulk samples were not chosen for analysis because they were recovered from ½" (1.27 cm) screens, which are completely unsuitable for recovering small fish, including salmon and herring (see Hanson 1991; Maschner 1997; Moss et al. 2011:285; Partlow 2006). Etnier screened the four bulk samples through ⅛" (3.2 mm) mesh and shipped the fish remains recovered from the ⅛" (3.2 mm) and larger fractions to the author for identification and analysis.

Each specimen was examined and identified to taxon, element, and side as possible. Element names follow the conventions of Wheeler and Jones (1989). No attempt was made to identify ribs, fin rays and spines, and most hypurals to taxon. These were enumerated as unidentified fish. Taxonomic identification was attempted for all other elements. Cannon's (1987) reference manual was used to determine element side. Identified fish bones were assigned to the order, family, genus and species level by direct comparison with modern osteological specimens at the Central Washington University Zooarchaeology Laboratory, and for a few additional specimens, at the Burke Museum of Natural History and Culture. All fish with current distributions in the Aleutian Islands and the Gulf of Alaska (Mecklenburg et al. 2002) were considered as possibilities in the analysis.

Taxonomic abundance was measured using both number of identified specimens (NISP; Payne 1975) and minimum number of individuals (MNI; White 1953) counts. One diagnostic portion of each element was used to calculate the minimum number of elements (MNE; Bunn 1982). MNI estimates were calculated by taking the highest count of left or right MNE for each taxon. A minimum distinction approach was taken where size and visual comparisons were not used for minimum number estimates (cf. Orchard 2003).

To evaluate skeletal part abundance, minimum animal units (MAU; Binford 1984) were calculated by dividing the minimum number of elements (lefts and rights together) by the expected number of each element within an individual fish. Two body portions were defined: trunks consisting of vertebrae, tail, pectoral, and pelvic girdle elements; and heads, consisting of the remaining elements, after Hoffman et al. (2000:table 1). The average expected number of vertebrae per taxon used in this study were derived from Mecklenburg et al. (2002) as follows: 54 for

Pacific herring, 52 for Pacific cod, 38 for yellow Irish lord, and 50 for Pacific halibut.

In addition to identifying bones to taxon and element, measurements were taken for estimates of fish length from selected elements identified as Pacific cod (*Gadus macrocephalus)* and Irish lord (*Hemilepidotus* sp.), following Orchard (2003). When more than one measurement was possible on a particular bone, the measurement that was the most complete and corresponded with Orchard's highest r^2 value was used to estimate live length. Length was then estimated using Orchard's (2003) regression formulae. It should be noted that Orchard chose not to use his Irish lord length regressions on Aleutian archaeological remains since the majority of the archaeological specimens exceeded the size of his comparative skeletons. This was not a concern for the *Awa'uq* remains. Orchard's regressions provided good length estimates for the larger comparative specimens housed at Central Washington University (up to 45 cm in total length), and all of the *Awa'uq* length estimates fall within this expanded comparative size range.

RESULTS

A total of 9,339 fish remains was analyzed from four bulk samples (bags T, U, V, and W) recovered from Test Pit #1

Table 1. Awa'uq (KOD-450) Fish remains from test pit #1 (⅛" screening of bulk samples T, U, V, W)

Taxon	NISP	% of ID	MNI	% of ID
Order Clupeiformes	—	—	—	—
Family Clupeidae (herrings)	—	—	—	—
Clupea pallasii (Pacific herring)	2,538	60	30	49
Order Salmoniformes	—	—	—	—
Family Salmonidae (salmonids)	—	—	—	—
Oncorhynchus sp.	119	3	2	3
Order Gadiformes	—	—	—	—
Family Gadidae (codfishes)	165	4	—	—
Gadus macrocephalus (Pacific cod)	298	7	7	11
Total Gadiformes	**463**	**11**	**7**	**11**
Order Scorpaeniformes	293	—	—	—
Family Scorpaenidae (rockfishes)	—	—	—	—
Sebastes sp.	17	< 1	1	2
Family Hexagrammidae (greenlings)	—	—	—	—
Hexagrammos sp.	7	< 1	1	2
Superfamily Cottoidea (sculpins)	3	—	—	—
Hemilepidotus sp. (unknown Irish lord)	175	—	—	—
Hemilepidotus jordani (yellow Irish lord)	482	11	16	26
Myoxocephalus sp.	2	< 1	1	2
Total Scorpaeniformes	**979**	**23**	**19**	**32**
Order Pleuronectiformes	4	—	—	—
Family Pleuronectidae (righteye flounders)	—	—	—	—
Hippoglossus stenolepis (Pacific halibut)	124	3	3	5
Total Pleuronectiformes	**128**	**3**	**3**	**5**
Total Identified Fish	4,227	100	61	100
Unidentified Fish (NID)	5,112	—	—	—
Total Fish	9,339	100	61	100

of the *Awa'uq* Site. Of these, 45% (4,227 NISP) was identified to taxon (Table 1). Identified taxa include Pacific herring (*Clupea pallasii*), salmon (*Oncorhynchus* sp.), Pacific cod (*Gadus macrocephalus)*, rockfish (*Sebastes* spp.), greenling (*Hexagrammos* spp.), yellow Irish lord (*Hemilepidotus jordani*), other sculpins (*Myoxocephalus* spp.), and Pacific halibut (*Hippoglossus stenolepis*).

Pacific herring make up the majority (60% of NISP and 49% of MNI) of the fish remains identified to taxon (order, family, genus, or species). A minimum of thirty individual herring are represented by left epihyals and left ceratohyals. A number of separate scales and clumps of scales were recovered, some stuck together with herring vertebrae, and these are not part of the NISP count. The skeletal part distribution for herring shows head and trunk portions are equally represented, with vertebrae composing twenty-six trunk MAU compared to the twenty-eight MAU from head.

After herring, scorpaeniforms are the next most abundant at 23% of the fish remains identified. These include rockfish (*Sebastes* spp.), greenling (*Hexagrammos* spp.), yellow Irish lord (*Hemilepidotus jordani*), other sculpins (superfamily Cottoidea). Yellow Irish lords are by far the most abundant of the order Scorpaeniformes. They make up 11% of the fish remains identified. A minimum of sixteen individual yellow Irish lords are represented by left ceratohyals. In order to estimate fish size, measurements were taken on yellow Irish lord specimens using the size regression formulae provided by Orchard (2003). The largest measurement sample (#3 measurement on 16 quadrates) provided total length estimates from 30 cm to 41 cm. These bones are probably from mature fish by comparison to modern yellow Irish lord growth patterns, in which mature individuals tend to measure 30 cm or more in fork length (Reuter and TenBrink 2008).

Other scorpaeniforms (rockfish, greenling, and sculpins other than Irish Lords) are uncommon, making up less than 1% of NISP. The seventeen rockfish bones are from one or more species of the genus *Sebastes*. The seven greenling bones compare well with either kelp greenling (*Hexagrammos decagrammus*) or white-spotted greenling (*H. stelleri*). Two specimens were identified as belonging to the sculpin genus *Myoxocephalus*: a basipterygium and a coracoid. Large sculpins in this genus include plain sculpin, great sculpin, shorthead sculpin, and frog sculpin. The skeletal part distribution for order Scorpaeniformes shows an underrepresentation of trunk portions compared to heads, with vertebrae composing only 6.9 trunk MAU compared to the 11.5 MAU from head elements.

After herring and Irish lords, cod remains (Pacific cod head elements and vertebrae identified to the cod family Gadidae) make up the next most abundant fish group at 11% of the fish remains identified to taxon by both NISP and MNI counts. Seven individual Pacific cod are represented by head elements (right articulars and left ceratohyals). The largest measurement sample (#3 measurement on 13 quadrates) provided total length estimates from 35 cm to 87 cm. The *Awa'uq* Pacific cod lengths fit well within the reported lengths of Pacific cod from the modern Gulf of Alaska longline fishery where, from 1978 to 2004, the majority of the Pacific cod caught measured between 50 and 75 cm; the smallest caught measured between 30 and 40 cm (Thompson et al. 2003:tables 2.7, 2.9a; Thompson et al. 2004:figs. 2.2–2.4). The skeletal part distribution for order Gadiformes shows an underrepresentation of trunk portions compared to heads, with vertebrae composing only 2.5 trunk MAU compared to the eight MAU from head elements.

Salmon (order Salmoniformes) make up only 3% of the identified fish specimens. A minimum of two individual salmon are represented by two first vertebrae. All but one of the identified salmon bones (a right coracoid) were vertebrae. Since the coracoid is part of the pectoral girdle located just behind the head, no head elements were identified. This underrepresentation of salmon head elements is typical of sites in the region (Partlow 2006; West 2009).

Flatfishes (order Pleuronectiformes) make up only 3% of the fish specimens identified to taxon. Nearly all of the pleuronectiform bones (124 of 128) are halibut. The majority of these halibut remains appear to be from very large fish and consist mainly of vertebrae, branchial arch elements, and cleithra. A minimum of three individual halibut are represented by three left cleithra. The

remaining four pleuronectiform bones are from small unidentified flatfishes. The skeletal part distribution for order Pleuronectiformes shows an underrepresentation of trunk portions compared to heads, with vertebrae composing only 0.34 MAU compared to the 1.5 MAU from the head.

DISCUSSION

In general, the taxonomic distribution of fish remains reported here is similar to that reported by Etnier (2011:table 2) for the site as a whole, with two exceptions. While sorting the bulk and ½" (1.27 cm) screened samples into classes (mammal, bird, fish, etc.), Etnier (2011:58) noted low proportions of Pacific herring and abundant Pacific halibut remains. This impression from sorting midden samples is quite different from the distribution of taxa based on detailed analysis of the bulk samples reported here. With identifications of the bulk samples completed, Pacific herring is the most abundant fish species (by both NISP and MNI counts), while Pacific halibut is one of the least abundant. This discrepancy is likely due to screen-size differences. Large cod and halibut bones would be recovered in ½" (1.27 cm) screens in the field, while most herring bones would fall through. The ⅛" (3.2 mm) screens used on the bulk samples, however, would adequately recover most of the small herring remains (Hanson 1991; Maschner 1997; Moss et al. 2011:285).

The *Awa'uq* fish assemblage reported from the bulk samples stands out among other Kodiak Archipelago archaeological fish assemblages in two principal ways: (1) the abundance of herring and (2) the dominance of sculpins over cod. Figure 1 shows the locations of fifteen reported fish assemblages from around the archipelago. How the *Awa'uq* fish assemblage differs from the other fourteen assemblages in terms of herring, cod, and sculpin abundances is discussed below.

The abundance of Pacific herring remains is significant, considering how rarely they have been reported in Kodiak Archipelago sites to date. Out of fifteen sites with reported fish remains, 73% (11 of 15) produced no herring at all. Only three sites besides *Awa'uq* produced herring bones: AFG-012, New Karluk, and Monashka Bay. At all three sites, herring comprise at most 1.2% of specimens identified to the order level or higher (Table 2). Originally, no herring remains were reported from AFG-012 (Partlow 2000), but a re-examination of the unidentified specimens for this paper revealed 39 vertebra fragments and one hyomandibular. It is possible that such small numbers of herring remains from individual sites reflects the introduction of herring bones via the stomach contents of larger fish or even fur seal. For example, in their experimental burnt fish bone study, Steffen and Mackie (2005:27) discovered 41 herring remains (mostly vertebrae) introduced to their hearth via the stomach contents of a large lingcod (*Ophiodon elongatus*). The *Awa'uq* assemblage stands out with herring comprising 60% of identified specimens. This pattern is especially striking given the large sample sizes. Excluding *Awa'uq*, 96,467 fish specimens were identified from fourteen Kodiak Archipelago sites, yet only 187 herring bones were reported (from the AFG-012, New Karluk, and Monashka Bay sites).

While herring remains are rare in Kodiak Archipelago fish assemblages, they are very common in assemblages from the Northwest Coast. In a large study that included 171 assemblages from the Northwest Coast (southeastern Alaska to the Washington Coast), herring occurred in 99% of the assemblages, was the highest ranked taxon in 56% of the assemblages, and in the top two most abundant taxa in 80% of the assemblages (McKechnie et al. 2014:E809). Among peoples of the Northwest Coast, herring were harvested not only in the spring but through the summer months and into the fall (Moss et al. 2011:282–283). Because of their high fat content, fall herring were prized for rendering into oil (Emmons 1991:145; Moss 2011:283). How do we explain the relative lack of herring in Kodiak fish assemblages compared to the abundance of herring in Northwest Coast fish assemblages?

The rarity of herring remains in Kodiak Archipelago sites cannot be explained simply by screen-size bias. There are 86,122 identified fish specimens reported from ten Kodiak Archipelago assemblages (excluding *Awa'uq*) recovered using ⅛" (3.2 mm) mesh screens (Table 2). Even so there were only 187 herring bones identified from these samples.

Can the scarcity of herring in most Kodiak faunal assemblages compared to the *Awa'uq* assemblage be explained by differences in herring seasonal distribution

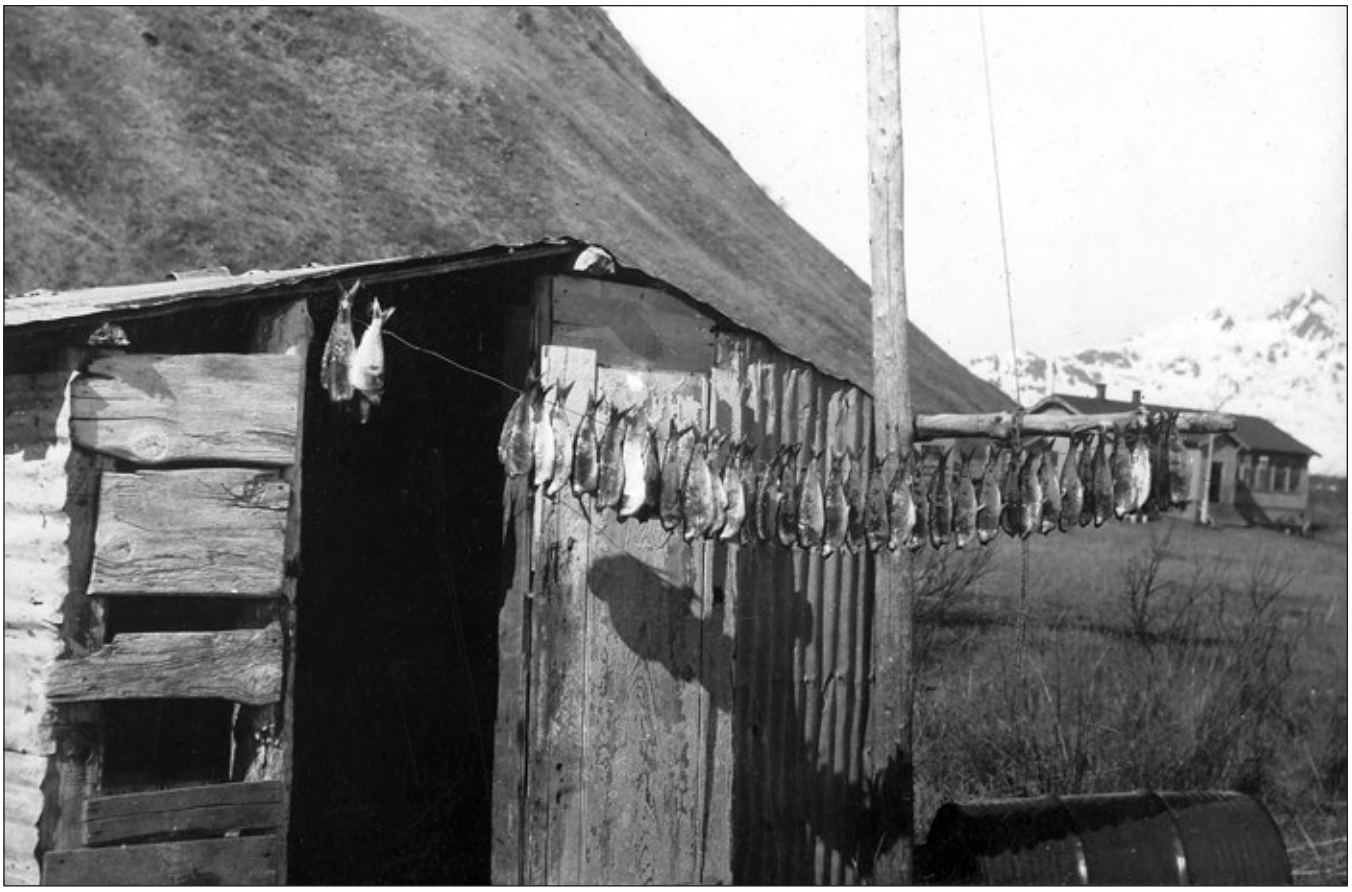

Figure 2. Herring drying in Old Harbor, Kodiak Island, 1946–1949. Photograph by Fred and Marie Bailey, Andrewvitch Collection, AM694:128. Courtesy Alutiiq Museum and Archaeological Repository. Note that the heads of these fish have been removed prior to stringing for drying.

and abundance? Pacific herring are a marine fish often found schooling in large numbers close to shore during spring spawning (Mecklenburg et al. 2002:134). Today, herring spawn in Kodiak waters from late March through late May and are considered abundant in many areas of the archipelago (Gretsch 2004). Herring spawning areas appear concentrated on the north and west sides of the Kodiak Archipelago, especially along Shelikof Strait (National Oceanic and Atmospheric Administration [NOAA] 1997). They spawn in large numbers along southern Afognak Island, including Afognak Bay, Uganik Bay, Uyak Bay, parts of Chiniak Bay, and Sitkalidak Strait and in smaller numbers in Kizhuyak Bay (Gretsch 2004). These modern fishery distributions would seem to indicate that all of the sites reported in Table 1 are located within a few miles of abundant herring spawning areas, but it is not clear that this is the case at a more detailed scale (e.g., Kopperl 2003:135; Steffian et al. 2015:172). It should be noted that even where herring are generally abundant, the exact locations they will spawn in the Kodiak Archipelago can vary in any given year (Steffian and Counceller 2012:77).

Historically, herring have been both a major subsistence resource and commercial spring (mid-April to mid-May) fishery in the Kodiak Archipelago (Fig. 2; Mishler 2001:53–54, 200, 226). They were plentiful in Kodiak waters in the late nineteenth century, and large schools of them were reported in Ugak Bay on Kodiak Island in early July of 1880 (Bean 1887:220). They have been fished commercially in Kodiak waters since 1912, and many Alutiiq people still harvest herring roe stuck to seaweed (Steffian and Counceller 2012:77). Historically, the Sitkalidak area, where the *Awa'uq* site is located, was known as the setting of a major herring fishery (Clark 1986:42). A commercial herring saltery was built in nearby Three Saints Bay in the mid-1920s

Table 2. Herring (order Clupeiformes) abundance in Kodiak Archipelago fish assemblages

Site	Tradition[1]	Screen Size	Total Fish[2] (NISP)	Herring (% of NISP)	Source
AFG-012	Koniag	⅛"	7,020	< 1	Partlow 2000:table 7.02
Settlement Point (AFG-015)	Koniag	⅛"	19,804	0	Partlow 2000:table 7.01
Igvak (AFG-016)	Historic	⅛"	18,122	0	Partlow 2014:table 2
New Karluk (KAR-001)	Koniag	⅛"	18,656	< 1	West 2009:table 4.3
Larsen Bay (KAR-029)	Koniag	¼"	332	0	Yesner 1989:table 1
Old Karluk (KAR-031)	Koniag	⅛"	13,797	0	West 2009:table 4.4
Monashka Bay (KOD-026)	Koniag	⅛"	4,097	1	Aymond 2015:table 7
Crag Point (KOD-044)	Kachemak	¼"	2,486	0	Kopperl 2003:table 5.2
Three Saints Harbor Krepost (KOD-083)	Historic	⅛"	473	0	Crowell 1997:table 10
Kiavak (KOD-099)	Koniag	⅛"	1,152	0	Partlow 2000:table 7.03
Rolling Bay (KOD-101)	Koniag	⅛"	125	0	Partlow 2000:table 7.04
Uyak (KOD-145)	Kachemak	¼"	1,519	0	Kopperl 2003:table 5.3
Rice Ridge (KOD-363)	Ocean Bay	¼"	6,008	0	Kopperl 2003:table 5.1, Kopperl pers. comm. 2015
Horseshoe Cove (KOD-415)	Kachemak	⅛"	2,877	0	Hays 2007:table 10
Awa'uq (KOD-450)	Koniag–Historic	⅛"	4,227	60	this article

[1] Approximate dates: Historic (< 200 BP), Koniag (900–200 BP), Kachemak (4000–900 BP), Ocean Bay (7500–4000 BP) (West 2011).

[2] Bony fish remains identified to the order level or lower.

(Befu 1970:30; Mishler 2001:35). McDonald Lagoon, just north of the site, is a major herring spawning and feeding habitat and the location of both commercial and subsistence herring fisheries today (Alaska Department of Natural Resources 2004). The Kodiak Archipelago does not seem to have suffered a herring population crash like that which occurred in Prince William Sound following the 1989 Exxon *Valdez* oil spill (Woody et al. 2005:12–14).

Whether the Alutiiq people traditionally caught herring prior to the twentieth century commercial fishery, however, is not clear: the ethnohistoric literature (e.g., Davydov 1977; Gideon 1989; Holmberg 1985) does not mention herring. If herring were caught in Sitkalidak waters primarily during spring spawning, then their abundance in the *Awa'uq* fish assemblage could reflect a spring occupation. A spring occupation matches Etnier's (2011:62) evidence for a specialized late spring harvest of migrating Northern fur seals at the site. Northern fur seals are known to prey opportunistically on schooling fish such as herring (Perez and Bigg 1986) and are also reported to follow schools of herring far into Sitka Sound (Kajimura 1984). Thus, one possible explanation for the relative lack of herring from Kodiak sites is that we lack faunal assemblages from sites occupied during the spring herring spawning where herring could be easily harvested.

The *Awa'uq* assemblage also differs from other Kodiak fish assemblages in the relative abundance of sculpins and other scorpaeniforms. Unlike *Awa'uq,* most regional fish assemblages are dominated by salmon and/or cod. Comparing the same fifteen Kodiak Archipelago sites, scorpaeniforms compose 10% or less of the combined order Salmoniformes, Gadiformes and Scorpaeniformes NISP in all but three samples (Table 3). The only exceptions are *Awa'uq*, where scorpaeniforms compose 63% of this total; Horseshoe Cove, where they compose 44%; and Monashka Bay, where they compose 25%. Horseshoe Cove has no herring and very little salmon (< 1% of order-level NISP), and nearly equal proportions of gadids (53%) to scorpaeniforms (41%). This site has been interpreted as the remains of a seasonal cod fishing camp occupied during the spring and early summer (Saltonstall and Steffian 2006:96).

What role did yellow Irish lords play in subsistence at the *Awa'uq* site? Although Turner (1886:95) describes this species as "excellent food" among nineteenth-century Aleuts, the Kodiak ethnohistoric literature is mute on the importance of sculpins to the Alutiiq people. Ideas about the possible role of large sculpins must be inferred from modern fisheries data and angling. Yellow Irish lords have been the most abundant sculpin in recent Gulf of Alaska fisheries biomass surveys (Ormseth and TenBrink 2010) and are found at depths usually less than 110 m (TenBrink and Buckley 2013:126). Adults 29–34 cm in fork length have been found spawning in shallow water in eastside Kodiak bays from June through August (Blackburn and Jackson 1982:499). Adults have been caught by line fishing from docks from June to August in the Aleutians (Burger et al. 2006:36, 38). Large sculpins, including Irish lords, can also be caught while line fishing from boats for cod or halibut today in Kodiak waters (Mishler 2001:186). Perhaps yellow Irish lords were simply more locally abundant than cod during the time the *Awa'uq* fish assemblage was deposited on site.

CONCLUSION

The herring-dominated *Awa'uq* fish assemblage is unique among faunal assemblages analyzed thus far from the Kodiak Archipelago. All other reported Kodiak Archipelago archaeological fish assemblages are dominated by salmonids and gadids. Settlement survey results support the significance of salmon to prehistoric economies of the archipelago; numerous large settlements designed for harvesting salmon during the Kachemak and Koniag traditions have been found along major river systems such as the Ayakulik and in the Olga Lakes region (see Saltonstall and Steffian 2007; Steffian and Saltonstall 2004). Large Pacific cod played an important role alongside salmon fisheries, although smaller saffron cod (*Eleginus gracilis*) may have been a valuable resource as well (Partlow and Kopperl 2011; Partlow and Munk 2015).

Unlike Pacific cod, herring probably would have been harvested not with long lines and hooks but with nets, leisters, or rakes. Herring were caught by the thousands in the Aleutians using seines in the late nineteenth century (Jochelson [1933] 2002:51; Turner 1886:111).

Table 3. Relative abundance of scorpaeniform, salmoniform, and gadiform fishes in Kodiak Archipelago assemblages

Site	Tradition[1]	Total fish in three orders[2] (NISP)	Scorpaeniform % of three orders	Source
AFG-012	Koniag	6,944	10	Partlow 2000:table 7.02
Settlement Point (AFG-015)	Koniag	19,687	4	Partlow 2000:table 7.06
Igvak (AFG-016)	Historic	17,921	8	Partlow 2014:table 2
New Karluk (KAR-001)	Koniag	18,274	1	West 2009:table 4.1
Larsen Bay (KAR-029)	Koniag	332	2	Yesner 1989:table 1
Old Karluk (KAR-031)	Koniag	13,641	1	West 2009:table 4.2
Monashka Bay (KOD-026)	Koniag	3,849	26	Aymond 2015:table 7
Crag Point (KOD-044)	Kachemak	2,426	4	Kopperl 2003:table 5.2
Three Saints Harbor Krepost (KOD-083)	Historic	471	0	Crowell 1997:table 10
Kiavak (KOD-099)	Koniag	1,012	4	Partlow 2000:table 7.17
Rolling Bay (KOD-101)	Koniag	125	2	Partlow 2000:table 7.04
Uyak (KOD-145)	Kachemak	1,495	4	Kopperl 2003:table 5.3
Rice Ridge (KOD-363)	Ocean Bay	5,826	6	Kopperl 2003:table 5.1, Kopperl pers. comm. 2015
Horseshoe Cove (KOD-415)	Kachemak	2,687	44	Hays 2007:table 10
Awa'uq (KOD-450)	Koniag–Historic	1,561	63	this article

[1] Approximate dates: Historic (< 200 BP), Koniag (900–200 BP), Kachemak (4000–900 BP), Ocean Bay (7500–4000 BP) (West 2011).

[2] Fish remains identified to orders Scorpaeniformes, Salmoniformes, and Gadiformes. In all of these assemblages except *Awa'uq*, fish identified to these orders or better compose 88–100% of NISP. At *Awa'uq*, fishes from these three orders compose 37% of NISP.

Historically, the Alutiiq people of Prince William Sound caught herring with either wooden leisters or special herring rakes (Birket-Smith 1953:227). The Tlingit of southeastern Alaska also traditionally used herring rakes to harvest the fish (Moss et al. 2011:283). The presence of many small notched stones as well as larger notched cobbles in Kachemak Tradition sites on Kodiak suggests net technology for harvesting salmon existed as early as 3,000 years ago (Steffian et al. 2006), so net technology would have been available for harvesting herring as well.

The uniqueness of the *Awa'uq* fish assemblage raises questions. First, how do we explain the scarcity of herring in the majority of other Kodiak Archipelago assemblages? Nearly all of the other sites analyzed so far are located in bays where herring are present today, so it does not seem to be a simple spatial sampling bias. It is not likely a recovery bias either, given the large numbers of fish bones recovered from ⅛" (3.2 mm) screens at these sites. It is possible that the other sites were not occupied during the spring herring spawning season, although most were winter villages probably inhabited fall through spring. Will we find other herring-dominated fish assemblages as more sites are excavated, or is the site truly unique? Is the rarity of herring assemblages related to the unpredictability of spawning location? Whatever the explanation, there is presently insufficient evidence

to suggest a significant role for herring in the precontact subsistence system, which appears to have been heavily focused on salmon and cod fisheries. Were herring not considered as important a resource compared to other subsistence resources available during the spring in the archipelago? There are no clear answers to these questions, and many may need to await future faunal analyses at other sites.

The abundance of herring and scarcity of salmon in the *Awa'uq* fish assemblage supports Etnier's (2011) conclusion that this site was occupied during the spring fur seal migration, although it should be remembered that all faunal remains are derived from a single 2 x 2 m midden unit and the fish from four bulk samples in that unit. These comprise a small sample with which to characterize the site as a whole. Disposal context, especially house floor versus exterior midden, can significantly affect fish taxonomic proportions (Partlow 2006). The midden faunal assemblage tells only part of the *Awa'uq* site story. This site was more than a spring hunting and fishing camp. Shelikov's historic 1784 siege took place in late summer (August), not spring. The twenty-eight multiroom house depressions at the site are consistent with the idea of the site as a permanent refuge for not only the women and children but the men as well during enemy attacks (see Black 2004). It is likely that *Awa'uq* was occupied at different times of the year when necessary as a refuge.

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