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A Zooarchaeological Analysis of the Monashka Bay Site (KOD-026) Kodiak Island, Alaska

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A ZOOARCHAEOLOGICAL ANALYSIS OF THE MONASHKA BAY SITE

(KOD-026)

KODIAK ISLAND, ALASKA

A Thesis

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by

Ayla Aymond

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ABSTRACT

A ZOOARCHAEOLOGICAL ANALYSIS OF THE MONASHKA BAY SITE

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This thesis involved the initial analysis of fauna recovered in 1989 by Christopher Donta at the Monashka Bay site on Kodiak Island. Analysis included all vertebrate remains (n = 36,273) larger than 1/8" from bulk samples collected in Area 3, a midden dating AD 1550-1670 during the site's Koniag occupation. Results indicated a focus on cod (68% of fish identified to order), with modest amounts of sculpin, and small amounts of flatfish, salmon, herring, bird, and sea mammal. The predominance of cod is likewise seen at other Koniag-era sites in the vicinity, though the lack of salmon, which composed 2% of fish remains identified to order or better, is unique to Monashka Bay. This project was undertaken to ascertain patterns in resource use at the site, allow comparisons with other Kodiak sites, and contribute to an article reporting findings of the 1989 investigations at Monashka Bay.

ACKNOWLEDGEMENTS

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I would also like to acknowledge the Alaska Consortium of Zooarchaeologists for their generous financial support of this project. Much of this project was guided by my desire to give back to this organization through sharing my results with other Alaska zooarchaeologists. Their contribution also allowed me to collaborate with other researchers, especially Jennie Shaw of Salix Archaeological Services, who kindly offered to look at my charcoal samples. Likewise, I am indebted to the Central Washington University School of Graduate Studies and Research for their financial support, which allowed me to obtain three additional dates for the site. Without these financial contributions, my results would certainly be less robust.

I would also like to acknowledge the Burke Museum's archaeology department. Without the cooperation and support of Laura Phillips and Siri Linz, this project would not have gotten off the ground. Thanks also to Jeff Bradley, of the Burke's mammalogy department, for allowing me access to the collections and encouraging me along the way. I am extremely pleased to be able to work with the Burke staff and am excited by the idea that this project might spur future researchers to make use of their expertise and collections. Thanks also go out to Patrick Saltonstall, Marnie Leist, and Amy Steffian at the Alutiiq Museum for their support of this project.

Finally, I would like to express my gratitude to my family, including my parents, my siblings, and my partner, Chris Moose, for their unconditional love and support, and likewise to the CWU cohort, especially Bethany Oliver and Tom Hale, who are like family to me.

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CHAPTER I

INTRODUCTION

The Kodiak Archipelago is a group of islands located in the northwest Gulf of Alaska, southeast of the Alaska Peninsula. The archipelago has been inhabited by humans for at least 7000 years in a series of distinctively different and increasingly complex cultural traditions (Clark 1966, 1998). Ethnographies of the native peoples have been recorded since the time of first Russian contact in 1763 (Black 2004). Since then, cultural anthropologists and archaeologists have worked to understand the cultural history of the area, establishing a regional chronology based on resource utilization and shifts in technology visible in the archaeological record (Fitzhugh 2001; Mills 1994; Steffian et al. 2006). This extensive work has allowed for investigation into research domains like resource intensification, human response to climate change, evolution of social complexity, and the role of ethnography in interpreting the past (Kopperl 2003; West 2009; Fitzhugh 2003; Crowell et al. 2001). Faunal analysis of archaeological animal bone is one way to address these issues (Butler and Campbell 2004; Henshaw 1999; Orchard 2000; Yesner 1998).

Faunal analyses have shown that subsistence practices were not uniform through time or between archaeological sites in the Pacific Northwest (Butler and Campbell 2004), including the Kodiak Archipelago (Clark 1998). The Kodiak economy has been reliant on marine resources throughout prehistory and into the present day, though differential use of these resources seems to characterize each cultural tradition along with associated technologies and levels of cultural complexity (Clark 1998). The major cultural/chronological units defined by archaeologists for the region include the initial Ocean Bay tradition followed by the Kachemak tradition and finally the Koniag tradition to European contact. Although the transition between the Ocean Bay and early Kachemak traditions (ca. 1800 cal BC) is well understood, Clark (1998:176) argues that a lack of data makes the shift from the more recent late Kachemak to Koniag traditions (1000-1300 AD) more difficult to characterize.

Clark (1974a, 1998) has emphasized that the body of archaeological knowledge from the archipelago is dynamic because while the region is relatively well-understood, data from a single site still has the potential to contribute new insights regarding specific research questions while fitting into a larger and better known theoretical framework. Addressing some of these ideas can be complicated, however, because various archaeological methods have been employed in the region over the past several decades.

Until the 1990s, archaeologists did not often collect adequate samples from a site and preference was given to complete or diagnostic artifacts over more “mundane” materials (Daly 1969). Furthermore, material removed from excavations was rarely screened, as has become the standard more recently (Partlow 2006). This has resulted in a skewed sample and makes some types of analyses difficult, if not impossible, to do (Butler and Campbell 2004; Moss 1998:105; Partlow 2006). The ability to compare samples between different sites is essential to further our understanding of subsistence strategy in the region.

The Monashka Bay site (KOD-026), located on the northeastern shores of Kodiak Island has the potential to address some of these concerns. The site was first tested in 1961 by Donald W. Clark (Clark 1963, 1974a) and excavated in 1989 under the direction of Christopher Donta (1994) as part of a larger effort by Bryn Mawr College to better understand the prehistory of the Kodiak region. The site is unique in that it contains both Late Kachemak and Early Koniag components, including intact housepit features, lithic artifacts, and a modest faunal assemblage from both components. Though most of the material from the site was collected without the use of screens, the Monashka Bay assemblage is unusual in terms of recovery methods for its time in that several bulk samples were taken from one area of the site. These samples represent the actual contents of the middens and can be analyzed to provide a better understanding of how resources were used at the site.

Despite the excellent research potential provided by the Monashka Bay assemblage, the Bryn Mawr excavations remain unreported. The purpose of this thesis is (1) to complete a faunal analysis of the bulk samples from the Monashka Bay site; (2) to collaborate with Donta to produce an article on the site, built upon Donta's unpublished manuscript (1994), which will include a discussion of site zooarchaeology; and (3) to contextualize the collection within the broader context of archaeological faunal remains from Kodiak, and perhaps contribute to our understandings of resource use and resource intensification on Kodiak.

My work contributes to the primary research objectives laid out by Donta (1994), including questions about site use and seasonality and how cultural change may have come about during the Late Kachemak/Early Koniag cultural transition. It builds on questions about cultural change and subsistence at the site and in the Kodiak Archipelago in the context of more recent studies in Alaskan zooarchaeology (such as Kopperl 2003; Moss and Cannon 2011a). Since one of the major goals of this project is to compare my results with other sites, my data adds to the overall understanding of Kachemak and Koniag subsistence strategies on Kodiak Island. The data from this study also adds to the ongoing debate about whether resource use simply reflects what is locally available or if changing patterns in resource use represent intensification and increasing cultural complexity (Butler and Campbell 2004; Cannon 1998; Knecht 1995; Yesner 1998). Finally, the study indirectly addresses the "curation crisis," which affects the collection, storage, and management strategies for archaeological assemblages, by generating new data from a pre-existing, yet unanalyzed collection. The results of this work will be made publicly available to other researchers in the form of a scholarly journal article submitted for peer review and publication to the *Alaska Journal of Anthropology*.

Organization of Thesis

This chapter has served as a broad introduction of the scope, purpose, and relevance of this thesis. In Chapter II, I establish the environmental and cultural setting of the Kodiak Archipelago in general, and the Monashka Bay site (KOD-026) in particular. Chapter III adds further detail about previous investigations at Monashka Bay. Chapter IV describes the sample selection rationale and methods employed in the faunal analysis and radiocarbon dating. In Chapter V, I share the results of the radiocarbon and faunal analyses and interpret those results as they pertain to the site and within the larger regional context. Chapter V concludes with a discussion of the further research potential of the Monashka Bay site as well as other sites with faunal assemblages in the Kodiak Archipelago. Finally, Chapter VI contains the manuscript of a journal article submitted for publication in the *Alaska Journal of Anthropology*.

CHAPTER II

ENVIRONMENTAL AND CULTURAL SETTING

Environmental Setting

The Kodiak Archipelago is located in the northwest portion of the Gulf of Alaska, southeast of the Alaska Peninsula. The Monashka Bay site is located approximately 5 km northeast of Kodiak, Alaska on the northeastern part of Kodiak Island (Figure 1). The site is on Monashka Bay, which opens into Marmot Bay to the northeast. The land is currently owned by the Town of Kodiak and is adjacent to Fort Abercrombie State Park. The site itself is located on the northwest side of a small peninsula, which is bounded on the east by Mill Bay. Two drainage systems, Pillar Creek and Monashka Creek, are located in the immediate vicinity of the site and drain into Monashka Bay. There is also a small, unnamed stream that passes through the site (Clark 1974a; Donta 1994). The site's proximity to Kodiak, the most populous community on the island (with a population of 6,130 according to the 2010 census [United States Census Bureau 2010]), renders it vulnerable to disturbance by recreationists visiting the nearby state park or using the boat launch in the immediate vicinity of the site. Historically, homesteading (ca. 1940-1950) and military activity (in 1942) have also posed a threat to the archaeological resources at the Monashka Bay site (Clark 1963, 1974a).

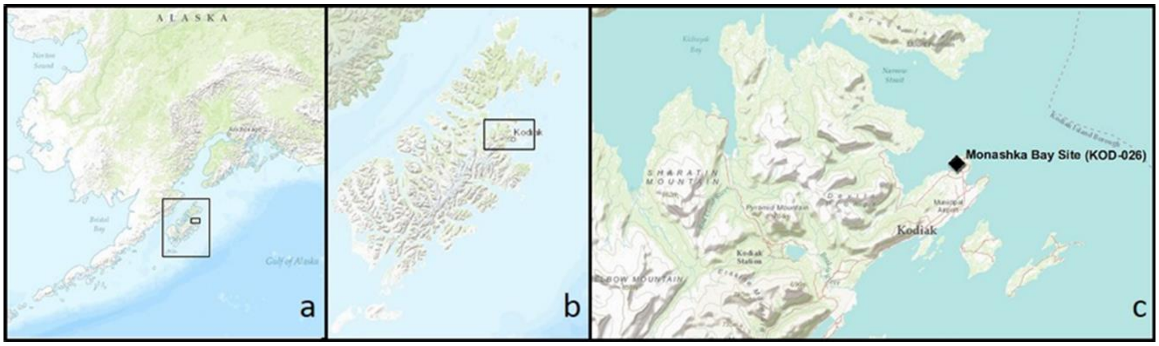

Figure 1. Location of Kodiak Island and the Monashka Bay site (KOD-026). View (a) shows an overview of the region, including southwest Alaska and the Gulf of Alaska; view (b) shows the Kodiak Archipelago, including Kodiak Island and the town of Kodiak (center); view (c) shows the location of the Monashka Bay site (KOD-026). Map created in ArcGIS using base map from United States Geological Survey (2014).

The environment on the Kodiak Archipelago is extremely dynamic. As part of the Pacific "ring of fire," it is among the most geologically volatile areas on earth and experiences earthquakes, tsunamis, and volcanic eruptions on a fairly regular basis (Mann et al. 1998). Weather patterns are notably milder than many other locations around the North Pacific Rim with short, cool summers and rainy winters with a high number of inclement or stormy days. Temperatures range from an average high of 59.7°F in July to an average low of 26.1°F in January (Western Regional Climate Center 2014). The average annual precipitation is 68.08 in (1,526 mm), with the majority coming in the months of October through March (Western Regional Climate Center 2014).

The dynamic weather patterns in the North Pacific Ocean are also partially responsible for the large variety of animal life available in the region. Strong ocean currents and heavy winds dredge minerals and nutrients from the ocean floor and carry them into the Gulf of Alaska. This supports a large mass of plankton, which serves as the foundation for one of the world's most productive marine ecosystems (National Oceanic and Atmospheric Administration [NOAA] Fisheries 2014). The littoral zone supports a variety of shellfish, including limpets, chitons, periwinkles, mussels, clams, and cockles. Sea mammals are also abundant and include sea lions, seals, porpoise, sea otters, and whales (NOAA Fisheries 2013). Anadromous fish have always been important to the region's economy and even small streams on Kodiak, such as Pillar Creek and Monashka Creek near the Monashka Bay site, support runs of salmon (Alaska Natural Heritage Program [ANHP] 2014a, 2014b; Clark 1963, 1974a; Donta 1994). Migratory seabirds are also abundant and include puffins, ducks, and auklets among many others (MacIntosh 1998). Though the ecosystem is mainly centered on marine animals, terrestrial fauna include brown bear, foxes, and ground squirrels (ANHP 2014a, 2014b).

Vegetation on Kodiak Island is generally determined by elevation, though grasslands and tundra predominate in the south and southwest portions of the island while wooded areas are more common in the north and northeast today (Kautz and Taber 2004). Floodplains today are dominated by a mix of black cottonwood (*Populus trichocarpa*), willow, and alder (*Alnus* spp.) (Kautz and Taber 2004). The northeast portion of the island, which includes Monashka Bay, is covered almost exclusively in Sitka spruce (*Picea stichensis*) and black cottonwood (*Populus trichocarpa*), though the site area and surrounding slopes are not forested (Boggs et al. 2014; Clark 1974a:26; Donta 1994; Shaw 2015). Alders (*Alnus stichensis*), grasses, nettles, and cow parsnip (*Heracleum maximum*) make up most of the ground cover in the vicinity of the site (Donta 1994). The site surface itself was covered in disturbance vegetation (nettles, in particular) at the time of Clark's excavations in 1961 (Clark 1963, 1974a) and Donta (1994) noted disturbance vegetation as well.

The topography of Kodiak Island is varied, and includes rugged mountains exceeding 1300 m (4400 ft) in elevation as well as relatively low-lying tundra in the southwestern portion of the island (Kautz and Taber 2004). More moderate relief is found in flat-bottomed, glacially sculpted valleys, floodplains, and lowland shores, capes, and peninsulas. Shorelines throughout the archipelago are complex and include elongated fjords, straits, bays, and lagoons. High energy outer shorelines are characterized by exposed bedrock headlands and cobble beaches, while gravel spits or mudflats are common in more protected areas (Kautz and Taber 2004). Exposed bedrock and gray slate boulders make up a major part of the local geology and, consequently, many of the lithic artifacts recovered from the Monashka Bay site and others in the vicinity (Clark 1974a).

Surface sediments on Kodiak Island range from shallow deposits on slopes to deep deposits within low-lying areas such as river valleys. Generally speaking, sediments are comprised of a silty volcanic ash overlying a loamy and gravelly glacial till or bedrock residuum (Kautz and Taber 2004). Sediments at the Monashka Bay site reflect the overall trends for the area, with less than one meter of loam and volcanic ash overlying glacial till. An orange-brown volcanic ash, 60 cm in depth, overlies the till in the vicinity of the site (Donta 1994). Cultural deposits generally rest on top of this soil, though in portions of the site this ash was purposefully removed (Donta 1994). A detailed discussion of site stratigraphy is included in the following chapter.

The Monashka Bay site is situated on top of a low bluff along the shoreline, however the deepest cultural deposits are located several feet above the high tide line, rendering the site somewhat resistant to erosion from normal tidal activity (Clark 1963, 1974a). The site is vulnerable to high tides and waves caused by sea level change or tsunamis (Clark 1974a) as is true for the entire shoreline of the island (Losey 2005). Coastal subsidence caused by tectonic activity poses both acute and long-term threats to the Monashka Bay site as well as other similarly-situated sites in the region (Donta 1994; Mann et al. 1998). Specific impacts to the site resulting from tectonic activity are discussed in the following chapter.

Cultural Setting

The sequence of past cultures on the Kodiak Archipelago is relatively well understood when compared with other areas around the North Pacific Rim. This is due to a long history of archaeological work in the area as well as the distinct artifact types that distinguish one tradition’s technology from the next (Clark 1998). Early efforts to create a cultural history for the Kodiak Archipelago split prehistory into just two periods (Hrdlička 1944), but a more refined picture has emerged since (Clark 1992). Today, the cultural history of the area is usually described in terms of three distinct cultural traditions, each with two subdivisions. Generally speaking, this sequence likely represents the in situ development of cultural complexity and intensive maritime resource use, with some influence on social and material culture coming from interactions with adjacent regions, such as coastal southeast Alaska, the Bering Sea region, and the

Aleutian Islands (Clark 1984; Jordan and Knecht 1988). A brief outline of each tradition is given in Table 1.

Table 1. Kodiak Archipelago Cultural History[1]

Cal Year BP	Cultural Tradition	Characteristics.	Associated Sites	Sources
7500-5000	Ocean Bay I	Small settlements, chipped stone tools, maritime adaptation	Sitkalidak Roadcut (KOD-119); Tanginak Spring (KOD-481); Rice Ridge (KOD-363)	Clark 1979; Fitzhugh, 2002, 2003; Kopperl 2003
5000-3700	Ocean Bay II	Larger settlements, increasing sedentism, maritime adaptation, ground slate tools	Rice Ridge (KOD-363); Qus'ituq (KAR-280); Blisky (KOD-210)	Hausler-Knecht 1991; Kopperl 2003; Saltonstall and Steffian 2007; Steffian et al. 1998
3700-2700	Early Kachemak	Inland settlements, increased fish use, ground slate replaces chipped stone	Array (KOD-562); Bruhn Point (KOD-909); Blisky (KOD-210); Outlet (KOD-561); Old Kiavak (KOD-100)	Steffian et al. 2006; Heizer 1956; Steffian 1992; Clark 1970, 1974b
2700-900	Late Kachemak	Increased population size, larger villages and complex house structures, artwork, intensive use of fish	Blisky (KOD-210); Outlet (KOD-561); Uyak (KOD-145); Three Saints (KOD-083); Crag Point (KOD-044); Old Karluk (KAR-031)	Steffian et al. 2006; Workman and Workman 2010; Hrdlička 1944; Crowell, 1986; Heizer 1956; Steffian 1992; Clark 1970, 1974b; Jordan and Knecht 1988
900-200	Koniag (Early and Late/ Developed)	Increasing social complexity, multi-room houses, defensive sites, warfare, artwork, slavery, some localized pottery use	New Karluk (KAR-001); Uyak (KOD-145); Monashka Bay (KOD-026); Kiavak (KOD-099); Rolling Bay (KOD-101)	Hrdlička 1944; Jordan and Knecht 1988; Crowell, 1986; Knecht 1995; Donta 1993; Clark 1974b, 1998;
200	Alutiiq/ Russian	First European contact	Mikt'sqaq Angayuk (KOD-014)	Margaris et al. 2015

[1] Adapted from West (2009: Table 2.1); Kopperl (2003: Table 1.1, 2012).

Humans first arrived on Kodiak Island sometime prior to 7500 BP, likely from an adjacent region with a similar environment, such as the Aleutian Islands or Alaska Peninsula (Clark 1992; Fitzhugh 2001). The Ocean Bay tradition roughly spans this initial colonization to about 3700 BP. During this time, populations likely consisted of small, but growing residentially-mobile groups of hunter-gatherers who spread across the archipelago, settling in the most ideal locations for obtaining marine resources (Fitzhugh 2002, 2003; Kopperl 2012). Early inhabitants of the archipelago likely arrived fully adapted to the coastal environment and were probably highly skilled in the use of watercraft and the hunting technology required to take advantage of marine resources (Clark 1992; Fitzhugh 2003). This is evidenced by a focus on site locations along the coast with easy access to marine resources, artifact assemblages that include bone harpoon pieces and fishing gear, as well as evidence of use of a wide variety of marine mammals, birds, and fish in the rare instances of sites with faunal preservation (Kopperl 2012).

Ocean Bay is divided into two phases; Ocean Bay I (approximately 7500-5000 BP) and the later Ocean Bay II phase (approximately 5000-3700 BP). Both phases have a generalized, portable artifact assemblage, including barbed harpoons, microblades (which would have been affixed to bone points), and small lamps. The earlier Ocean Bay I phase is characterized by an almost exclusive reliance on chipped stone tool use transitioning to much more pronounced reliance on ground slate technology at the beginning of the Ocean Bay II phase. In general, the artifact assemblage seems to reflect the widely-accepted notion that Ocean Bay people were mobile hunter-gatherers who exploited resources across a wide range of micro-habitats (Fitzhugh 2003).

Archaeological deposits reflect this pattern, with Ocean Bay I sites being notably small in size with thin, even ephemeral deposits. Excavations in Ocean Bay II components show slightly more complex characteristics, including occasional thick middens, posthole features, and housepit depressions suggesting more substantial dwellings and increasingly sedentary (or possibly more specialized) settlement patterns (Kopperl 2012). A few sites associated with the Ocean Bay tradition contain components from both phases (Clark 1979; Hausler-Knecht 1991; Kopperl 2003; Steffian et al. 1998, 2006) and many sites seem to have been used repeatedly, but only for short intervals (Fitzhugh 2003). Notable exceptions include the Rice Ridge site (KOD-363) and the Mink Island site (XMK-030, located off the coast of the Alaska Peninsula). These sites span Ocean Bay I and II and contain remarkably extensive cultural deposits and good organic preservation, including a large faunal assemblage (Casperson 2012; Kopperl 2003, 2012).

The Kachemak tradition, from approximately 3500-900 BP, is the least documented prehistoric cultural tradition on Kodiak (Steffian et al. 1998), but there is strong evidence for cultural continuity between the Ocean Bay and Kachemak traditions (Clark 1998). This period marks a transition from dispersed settlements of mobile hunter-gatherers to semi-permanent to permanent villages with an economy focused on intensive salmon fishing and shellfish collection (Fitzhugh 1995; Hays 2007; Steffian et al. 2006). As with Ocean Bay, this period is divided into two phases. The Early

Kachemak (sometimes referred to as Old Kiavak) dates to approximately 3700-2700 BP (Clark 1996) and the Late Kachemak (or Three Saints) dates to 2700-900 BP (Clark 1970; Workman and Workman 2010). Artifact types during the Kachemak are much more varied than those associated with the Ocean Bay tradition and most are interpreted as being indicative of more specialized resource use (Fitzhugh 2003). For example, semi-lunar ground slate knives, or ulus, are seen in large numbers, suggesting an increased reliance on fish processing for storage (Steffian et al. 2006). Similarly, notched flat beach cobbles (interpreted as net weights for fishing and/or bird hunting), ground stone plummets (presumably for long-line fishing), and toggling harpoon heads first appear, hinting at increased specialization and efficiency (Fitzhugh 2003). Growing population size and social complexity is also evidenced by personal adornment (mainly in the form of labrets, see Saltonstall and Steffian 2001), ornately carved items such as lamps, elaborate mortuary practices, and the appearance of exotic materials, suggesting regular travel and trade with mainland Alaska (Fagan 2008; Fitzhugh 2003; Workman and Workman 2010).

Settlement patterns during Kachemak times also reflect the notion of increased social complexity and population growth. Several sites in this period are interpreted as being functionally-specific and though there is some evidence that Ocean Bay people made use of riverine resources, the Kachemak people were first to build structures in upriver environments away from the coast, presumably to make use of salmon (Fitzhugh 2003; Steffian et al. 2006). Groups of semi-subterranean house pits ranging widely in number and size are common, though many would only have been large enough to accommodate small nuclear families (Fitzhugh 2003). By the Late Kachemak, houses often incorporated some internal storage features, usually in the form of corner alcoves (Fitzhugh 2003; Jordan and Knecht 1988; Steffian et al. 2006).

The Koniag tradition is the third and final major division of Alutiiq prehistory. Though the division between the Early Koniag and Late (or "Developed") Koniag phases is somewhat more contested (Clark 1998, and see Chapter VI in this thesis), the tradition as a whole spans from the Early Koniag beginning around 900 BP to the first contact with Russian explorers in the mid-1700s (Clark 1984, 1998). There has been much debate over whether Koniag represents a replacement or a continuation of Kachemak life (Dumond 1987; Hrdlička 1944; Scott 1992; Workman and Workman 2010), but most of the evidence seems to support a gradual cultural shift (Jordan and Knecht 1988).

The best reported Koniag site to date has been the Karluk-1 or "New Karluk" site (KAR-001), located at the mouth of the Karluk River on the southwest side of Kodiak Island. The site was excavated in the mid-1980s by a team led by Richard Jordan and Richard Knecht from Bryn Mawr College in collaboration with the Kodiak Area Native Association (Jordan and Knecht 1988; Knecht 1995; Steffian et al. 2015). At over four meters, excavations on the site were unusually deep, uncovering ten house floors and three intact midden deposits. Organic preservation at the site was remarkable owing to the anaerobic environment, and the site produced an extraordinary array of organic artifacts and faunal remains for analysis (Jordan and Knecht 1988; Knecht 1995; West 2009, 2011).

Artifact types from the Koniag time period overlap with those found during the Kachemak and continue to reflect reliance on sea mammals and large fish harvests, but most types are temporally diagnostic and unique to the Koniag tradition. Several new artifact types make an appearance, most notably the heavy grooved splitting adzes, which indicate an increased focus on woodworking and coinciding with the initial appearance of Sitka spruce forests in the Archipelago (Clark 1998; Knecht 1995; Shaw 2015). Coarse gravel-tempered pottery also appears sporadically during this time and whaling culture is fully developed by the Late Koniag phase. Early Russian explorers observed organized whaling parties and complex social organization was associated with the whaling traditions of the Late Koniag (Crowell 1994). Additionally, increased population sizes (Fitzhugh 2002, 2003) and region-wide warfare (Fitzhugh 2003; Knecht 1995) were evident during Koniag times.

Koniag settlement patterns show a continuation of use of riverine environments, and villages along the coastline grew in terms of number and size of structures, with appearances of permanent villages along rivers and outer coastlines. Archaeological evidence suggests significant variation in the size and shape of Koniag houses, with many measuring several times larger than those found in Kachemak sites (Knecht 1995). Larger aggregations of 20 to 30 houses may represent large fall gatherings centered on the whale harvest, which may have been followed by dispersal to smaller fishing camps in the spring (Fitzhugh 2003). Fitzhugh (2003) posits that the change in house patterns from Kachemak to Koniag represents an emergence of ranked and stratified households.

Generally speaking, Koniag houses are comprised of a large central room with a central hearth, clay-lined storage pits, and several side rooms or alcoves radiating from the central room (Clark 1984). An example is shown in Figure 2. Based on the summary by Knecht and Jordan (1995), Koniag houses were large enough to accommodate fifteen or more people, usually in family groups. The floor was excavated below ground level and large posts held up a timber frame, which was covered in earth and sod. Side chambers served as sleeping quarters for individual families or were used for steam baths or storage. A large fire hearth was located in the central room and smoke escaped through an opening in the ceiling. Variation in the size and configuration of these structures indicates the complexity of Koniag communities. Remains of houses are often visible on the surface of archaeological sites, appearing as shallow depressions, sometimes surrounded by disturbance vegetation like nettles. Figure 3 shows historic photos of this type of structure.

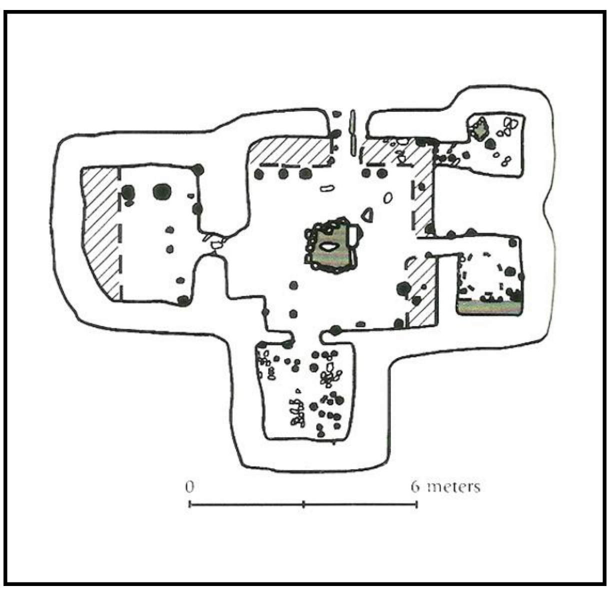

Figure 2. Floorplan of a Koniag house (Crowell et al. 2001:124, Figure 117).

Figure 3. 1918 photo of entrances to Nunamiut sod-covered houses similar to Koniag houses on Kodiak. Taken in the Severnovsk village by J.D. Sayres of the National Geographic Society Katmai Expeditions. Photo courtesy UAA Archives and Manuscript Department and accessed through the National Park Service Website (National Park Service 2014).

As archaeologically defined, the Late Koniag period lasted until Russian contact on Kodiak Island. In the early 1740s, after the Bering Expedition returned to Russia with sea otter, fox, and fur seal pelts from the Commander Islands, Siberian, English, and Spanish merchants launched over 100 privately financed expeditions to explore opportunities of maritime fur trading along the Alaska Coast (Black 2004; Crowell 1997; Crowell et al. 2001). Expeditions in Alaska soon led to the first contact with the indigenous population of Kodiak Island in 1763 (Black 2004). The native peoples of the region have been referred to by a variety of names, but today the name “Alutiiq” (plural “Alutiit”) is self-designated by the community and refers to both the language and the people of the Gulf of Alaska (Pullar and Knecht 1995). Following Fitzhugh (2003), I use the terms “Koniag” and “Alutiiq” in this paper to distinguish between the last prehistoric cultural patterns on Kodiak and the dramatically altered lifeways experienced by the people of Kodiak after Russian contact.

The earliest accounts of Alutiiq life in the archipelago come from observations from Russian expeditions and, later, ethnohistoric accounts dating to the early and mid-1800s. It is clear that the population was large, with complex sedentary villages relying on a wide variety of resources (Crowell et al. 2001). The first Russian landings on Kodiak Island met with hostility and it was not until the arrival of Grigory Shelikhov's heavily armed expedition, followed by the infamous massacre at Refuge Rock (KOD-450), that the Alutiit were defeated and a permanent base of operations was established at Three Saints Bay (KOD-083) in southeast Kodiak (Crowell et al. 2001; Fitzhugh 2003). In the years that followed, the native population was decimated by persistent disease, violence, and enforced acculturation. The colonial labor system imposed by the Shelikhov Company and other competing interests involved the establishment of forts, work stations, and small outposts across the Alutiiq region (Crowell 1997; Crowell et al. 2001). Forced labor under this system enabled competing firms to expand their control of fur and food production into Cook Inlet, the Alaska Peninsula, and Prince William Sound. Perhaps unsurprisingly, religion played a major role during this era, and Russian Orthodox missions were established throughout the region (Kan 1988).

Russia sold Alaska to the United States in 1867, but the change had little immediate impact on the lives of the Alutiit. Disease and poverty were commonplace and many people lacked access to education. American churches sought to diminish indigenous and Russian cultural influences, enforcing English-only classrooms and discouraging traditional cultural activities (Crowell et al. 2001). Since the 1960s, a cultural revitalization movement has taken place and several community organizations are working to reincorporate traditional lifeways into Alutiiq life (Crowell et al. 2001).

Previous Zooarchaeological Work in the Kodiak Archipelago

Archaeological research on Kodiak has focused on establishing and refining the region's cultural history (Clark 1998; Hrdlička 1944; Jordan and Knecht 1988), collecting ethnographies of the Alutiiq people (Crowell et al. 2001), understanding the rise of social complexity (Crowell 1997; Donta 1993; Fitzhugh 2003; Saltonstall and Steffian 2001), explaining cultural transitions (Jordan and Knecht 1988), and extensive archaeological survey to document new sites in various environmental settings (de Laguna 1934; Jordan and Knecht 1988).

Studies of subsistence practices using faunal assemblages, particularly those associated with later Koniag-era sites, are most relevant to this study. Table 2 lists all known sites with analyzed fauna from the Kodiak Archipelago. Though these efforts were undertaken as a way to answer a diverse array of research questions, one crucial commonality is the overwhelming presence of fish remains.

Table 2. Sites with Reported Fauna in the Kodiak Archipelago[1]

Site#	Site Name	Primary Cultural Tradition(s)[2]	Classes Included	Sample Size (NISP)	Screen Size	Reference
AFG-012	None	Koniag	All vertebrates	13,206	1/8”	Partlow 2000
AFG-015	Settlement Point	Koniag	All vertebrates	55,718	1/8”	Partlow 2000
KAR-001	New Karluk	Koniag	Fish	18,885	1/8”	West 2009
KAR-029	Larsen Bay	Late Kachemak, Early Koniag	All vertebrates	870	1/4"	Yesner 1989
KAR-031	Old Karluk	Late Kachemak	Fish	13,882	1/8”	West 2009
KOD-044	Crag Point	Kachemak	Mammals, fish	3,131	1/4”	Kopperl 2003
KOD-099	Kiavak	Koniag	Fish, birds	4,521	1/8” (fish)	Partlow 2000
KOD-101	Rolling Bay	Koniag	Fish, birds	1,252	1/8” (fish)	Partlow 2000
KOD-145	Uyak	Late Kachemak, Koniag	Mammals, fish	2,142	1/4”	Kopperl 2003
KOD-363	Rice Ridge	Ocean Bay I/II	Mammals, fish	9,201	1/4"	Kopperl 2003
KOD-415	Horseshoe Cove	Early Kachemak	Fish	3,034	1/4"	Hays 2007

[1] This list comprises only sites within the Kodiak Archipelago proper, though several other faunal studies have been done in the region. Notable studies include those near Amalik Bay on the coast of the Alaska Peninsula such as Mink Island (XMK-030) (Caperson 2012) and Little Takli Island (XMK-031) (Hood 2013) and sites in the Cook Inlet area such as Chugachik Island (SEL-033) (Lobdell 1980) and Yukon Fox Farm (SEL-041) (Yesner 1992). Preliminary faunal identifications by Amorosi (1987) are not included because more comprehensive work was completed on these sites later.
[2] Some of these sites contain multiple cultural components. The component(s) associated with analyzed faunal remains are listed here.

The analysis of fish remains is especially important along the North American Pacific Coast given the abundance of fish in archaeological sites, but until the 1970s, fish were omitted from faunal analyses and largely discounted from considerations of Northwest Coast economies (Moss and Cannon 2011b). Daly (1969) discusses the “tendency to regard animal remains as being of second-class status, ranking well below stone tools and potsherds in potential cultural significance” (Daly 1969:146). Fish remains, in particular, were singled out as a point of difficulty, since analysis is not straightforward (Daly 1969:147). Richard W. Casteel's landmark book, *Fish Remains in Archaeology* (1976) demonstrated how analysts could use fish remains to identify fish species, site seasonality, and estimate the body size of individual fish. Casteel pointed out that fish remains from archaeological sites were useful to many disciplines, from biology to climatology.

The extent to which valuable interpretations can be made using fish remains, however, depends on the quality of collection methods. The idea of systematic sampling with an appropriate screen size is not new (e.g., Payne 1972; Shaffer 1992), but the relationship between screen size and the recovery of certain fish taxa is still being explored today. According to Partlow (2006), the lack of systematic collection of faunal remains has contributed to a misunderstanding (or at least a limited understanding) of the role of certain fish species in the North Pacific. Partlow used the Settlement Point (AFG-015) faunal assemblage to show that salmon bone recovery varied significantly by screen size and disposal context. Partlow (2006:74) recommends developing sampling strategies on a site-by-site basis based on a variety of factors including types of fauna, degree of bone fragmentation, and research questions. Pre-excavation exploration is optimal, but the use of nested screens in the lab to analyze bulk samples is another way to address these concerns.

Taphonomic factors often influence skeletal part survivorship at archaeological sites, making meaningful analysis and inter-site comparisons less fruitful. Studies of structural bone density (a proxy measure of preservation potential) seek to mitigate this problem (Butler and Chatters 1994; McKinney 2013; Smith 2008; Smith et al. 2011). Recent work in this area has led Smith et al. (2011) to conclude that interpretations of salmon-dominated fish assemblages should take into account the role of density-mediated element attrition before body part representation is taken as evidence of past human behavior. Their results suggest that this is not a serious concern for cod, since cod cranial and postcranial elements exhibit similar densities (Smith et al. 2011).

Orchard (2000, 2001) proposes another approach, emphasizing that methods of osteometrics are equally important to getting the most out of faunal assemblages. Orchard champions the use of statistical regression of bone measurements of faunal remains to estimate the live size of fish. Orchard (2001) generated regression formulae for six fish taxa common to the Gulf of Alaska and used them to provide fine-grained weight estimates for fish from five archaeological sites from the central and western Aleutian Islands.

Models created by archaeologists to explain the development of cultural complexity often point to resource intensification as a possible cause. In the North Pacific, salmon is the favored species for testing this hypothesis because it is nutritionally dense and returns to its spawning streams in predictable cycles (Moss and Cannon 2011b). Though many studies of salmon intensification have been undertaken along the Pacific Coast, Partlow's (2000) dissertation represents the first such effort on Kodiak Island as well as the first comprehensive study of faunal remains from Kodiak archaeological sites. Partlow's aim was to assess whether salmon intensification accompanied the changing house design and size associated with the Late Koniag tradition (Partlow 2000). To test for intensification, she examined whether the Koniag people were specializing in salmon catch and whether there was evidence for increased storage of dried fish. As part of this work, she analyzed over 60,000 specimens from four sites. For comparative purposes, she chose two Early Koniag sites (AFG-012, and Settlement Point [AFG-015]) and two Late Koniag sites (Kiavak [KOD-099], Rolling Bay [KOD-101]). She compared her data between these sites and the New Karluk (KAR-001) and Old Karluk (KAR-031) sites, which had undergone preliminary analysis and been reported by Amorosi (1987). At the time, the Karluk samples represented the only reported sizeable Late Koniag fish assemblages from the Kodiak Archipelago (Partlow 2000). Using the data from Settlement Point, Partlow concluded that indicators of salmon intensification accompanied changing house patterns.

Kopperl (2003), in his dissertation, examined the relative taxonomic abundance of prey species within and between sites to test whether resource intensification played a causal role in the development of cultural complexity on Kodiak Island. Following Fitzhugh's (2003) model, Kopperl found evidence of decreased foraging efficiency as subsistence practices shifted from large sea mammals to lower-ranked, more labor intensive fish resources (Kopperl 2003). Kopperl also tested for resource depression on certain prey populations and found evidence through changes in relative skeletal abundance, increased butchering intensity, changes in age structure of prey, and other factors.

More recently Hays (2007) hints at some of these issues in his faunal analysis of the Horseshoe Cove site (KOD-415). Using a systematically collected sample, Hays conducted a faunal analysis for his master's thesis with similar methods and scope to the research presented here. Hays' (2007) results pointed to mass harvesting of offshore fish resources as a crucial to the origins and development of Kachemak culture.

Although there have been some investigations about whether resource intensification contributed to the emergence of cultural complexity in the North Pacific from the perspective of the Kodiak Archipelago (e.g., Kopperl 2003; Partlow 2000), a broader view was taken by Butler and Campbell (2004). They reviewed 63 faunal assemblages from the Northwest Coast (somewhat removed from the Kodiak Archipelago, but related culturally [Drucker 1965; Fitzhugh and Crowell 1988]), and found no evidence of the intensification of salmon over other fish species over time, nor did they find evidence for resource depression.

West (2009) took a different approach, exploring the extent to which human populations might have been impacted by fluctuating salmon populations. This fluctuation is thought to have been driven by climate change (Finney et al. 2000). West (2009) used salmon abundance data, local records of climate change based on fish otoliths, and archaeological fish remains to find out if climate change may have been a driving factor in the shift from riverine to coastal fishing sites on Kodiak Island. Such a shift is seen between the Old Karluk (KAR-031) and New Karluk (KAR-001) sites. West (2009) found no strong evidence to indicate that resource availability or climate change are related to the changes in fishing strategy seen at the Karluk sites, and instead concluded that a variety of complex factors are likely responsible for the changes seen.

CHAPTER III

THE MONASHKA BAY SITE

The Monashka Bay site presently consists of an approximately 90 m long deposit of cultural materials lying in a north-south direction along the eastern portion of Monashka Bay (Clark 1963; Donta 1994). Site deposits reach a maximum of 2 m in depth near the center of the site, but are about only about 1 m deep in most other areas. The site extends a maximum of 20 m from the erosion front and the lowest deposits lie approximately 1 m above high tide level. As of 1994, there were six other prehistoric archaeological sites known on the bay, but KOD-026 was the only one of substantial size (Donta 1994).

As mentioned briefly in the preceding chapter, the site has been severely impacted by human and natural activity over the past century. Clark (1963) mentions that a cod saltery was located in the immediate vicinity of the site in the early 1900s, but the extent of impact to the site is unknown. Though largely intact, site deposits were “sealed” in tephra following the 1912 Novarupta eruption on the Alaska Peninsula, portions of the site were disturbed in the mid-twentieth century during World War II mobilization and the construction of Fort Abercrombie in 1942 (Clark 1963; Donta 1994). At that time, the U.S. Army reportedly dug away a portion of the site for use as a rifle range (Clark 1963; Donta 1994). Mining Kodiak’s beaches for gravel to use in defense construction was also common during this period, but it is unclear whether this took place within the site boundaries (Clark 1974a, 1974b).

Also during the 1940s, a human cranium was reportedly found under an exposed whale bone, but the disposition of these remains was unknown as of the 1960s (Clark 1963). Sometime around 1948, the northern portion of the site was plowed for cultivation and several artifacts and a human cranium were collected (Clark 1963:6; Donta 1994). Between 1948 and approximately 1954, Clark and others made surface collections from the exposed seaward edge of the site. Though the survey was informal and the finds lacked context, Clark includes them in his analysis of the later (1961-1962) investigations discussed in detail below (Clark 1963, 1974a).

In 1959, the site suffered major damage when a large portion was bulldozed to create a parking area, a gravel road, and a boat launch. The road impacted the eastern deposits and the boat ramp was plowed through the center of the site. Some of the spoils from this operation were dumped in other parts of the site, obscuring above-ground cultural features. More informal collections were made at this time, prompting further investigation by Clark in 1961 and 1962. These excavations are discussed in detail in the following section. Finally, the March 1964 "Good Friday" earthquake likely caused significant damage to the site when a series of tsunami waves impacted many northeast coastal sites in the archipelago and resulted in an unknown amount of erosion (Clark 1974a:53). Additionally, coastal subsidence in this portion of Kodiak as a result of this event is estimated between four and six feet, further increasing the rate of erosion at the site after the earthquake (Donta 1994). Disturbance vegetation, mainly in the form of nettles (*Urtica*), was present on the site in the 1960s and 1980s, giving evidence to the many activities, both cultural and natural, affecting the site over time (Clark 1963; Donta 1994).

Clark's 1961-1962 Investigations

Information about Donald Clark's 1961-1962 investigations at the site is available from two major sources. The 1974 monograph published in the National Museum of Man *Mercury Series* provides 181 pages of information and is the most widely available. There is also a typed 1963 manuscript on file at the Alutiiq Museum in Kodiak, from which the 1974 monograph was condensed. It has many details not present in the monograph, included both in the typescript and in handwritten marginal notes. In a foreword attached to the manuscript dated April, 1988, Clark comments that this work was intentionally preserved as "it may be of local interest" and also notes that "there are also detailed stratigraphic drawings that were not published."

Although informal surface collections were made as early as 1948, formal excavation did not take place at Monashka Bay until 1961, after bulldozer activity exposed subsurface cultural deposits in 1959 (Clark 1974a:26). Clark, in conjunction with the Kodiak and Aleutian Islands Historical Society, conducted excavations during the summers of 1961 and 1962 (Clark 1963, 1974a). The project was part of a larger effort by the University of Wisconsin and was funded by the National Science Foundation. Between 1961 and 1964, The Aleut-Konyag [sic] Prehistory and Ecology Project led more than a dozen field parties, overseen by principal investigators W.S. Laughlin (anthropology) and W.G. Reeder (zoology). The project had the primary goal of training amateur archaeologists in field methods and the two secondary goals of clarifying Kodiak's cultural chronology and the acquisition of museum specimens (Clark 1963, 1974a). According to Clark (1963), the Monashka Bay site was eminently suitable for this because it was owned by the City of Kodiak, was accessible by car, and had already been damaged, or at least disturbed. Participation was not as high as the group had originally anticipated, however, and most of the work ended up being done by Clark and a small field crew. Clark's efforts were concentrated on the central portion of the site, which contained the deepest cultural deposits and which had been exposed during construction activity.

Layout of site excavations was described in general in the monograph (Clark 1974a) and in detail in the manuscript (Clark 1963). Clark mapped the site in 1961. A north-south baseline was placed using two prominent trees as reference points, and a 6-foot grid was laid over the site (Figure 4). Excavations during the 1961 field season focused on portions of the site directly adjacent to the 1959 bulldozer cut and portions of three 6 x 6 ft units were excavated (Figure 5). 1962 was a shorter field season, limited by poor spring weather conditions, and one 6 x 7 ft section was excavated (Figure 5). In total, Clark excavated portions of four 6 x 6 ft units to a maximum depth of 2.4 m below the ground surface.

Excavation proceeded by natural stratigraphic level within each unit. Screens were not used, as was common practice at the time, and given the project's research goals of generating a museum collection, this is unsurprising. Faunal remains were observed but not collected.

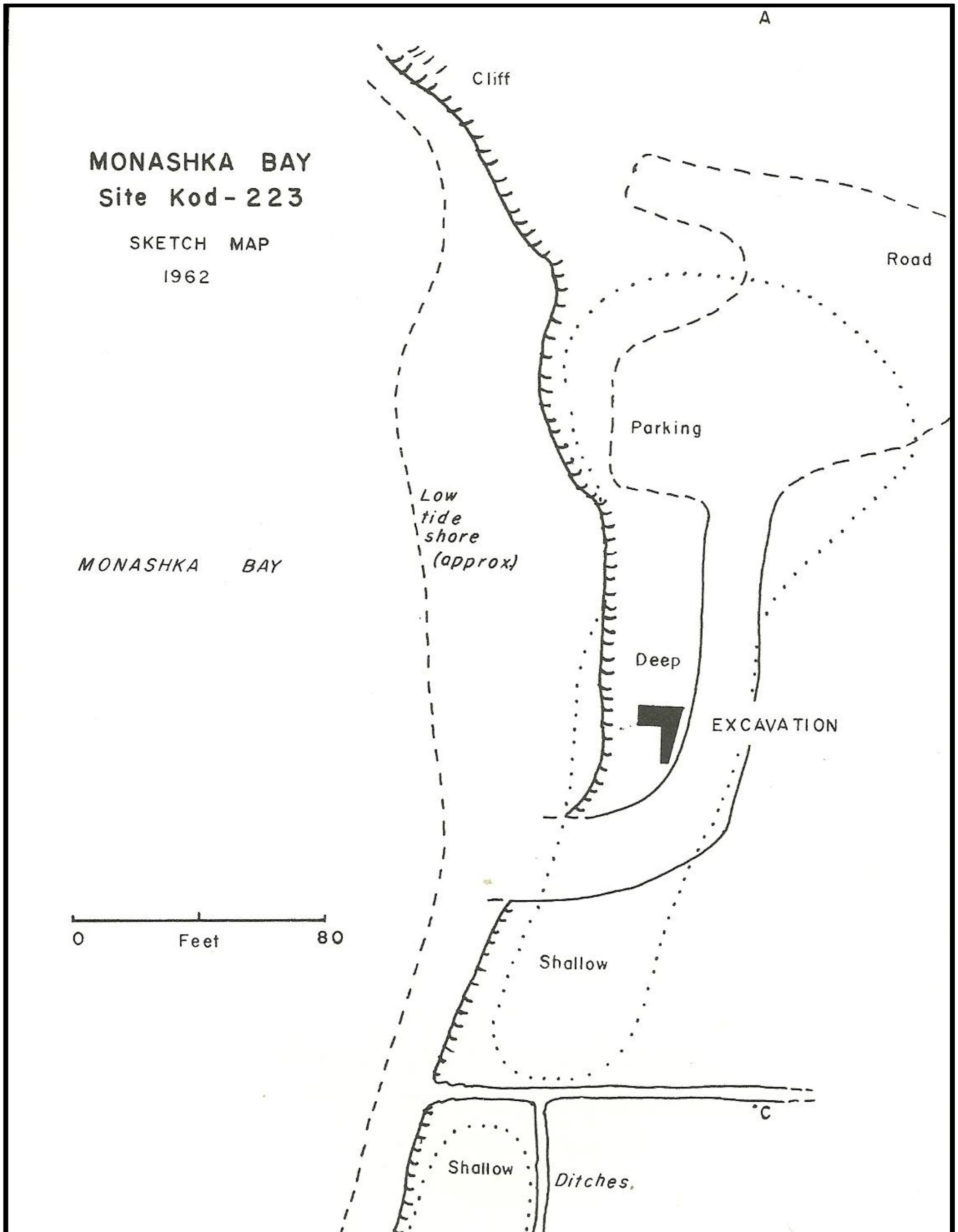

Figure 4. 1962 sketch map of the Monashka Bay site (Clark 1974a:Figure 6). The dotted line represents the original site limits. Shallow deposits extend south of the area shown. The base line runs True North from B (small trees), through C, to A (large trees). The excavation shown represents Clark's 1961 and 1962 field seasons at the site. Note that the number KOD-223 is from Clark's own system, and the currently accepted site number is KOD-026.

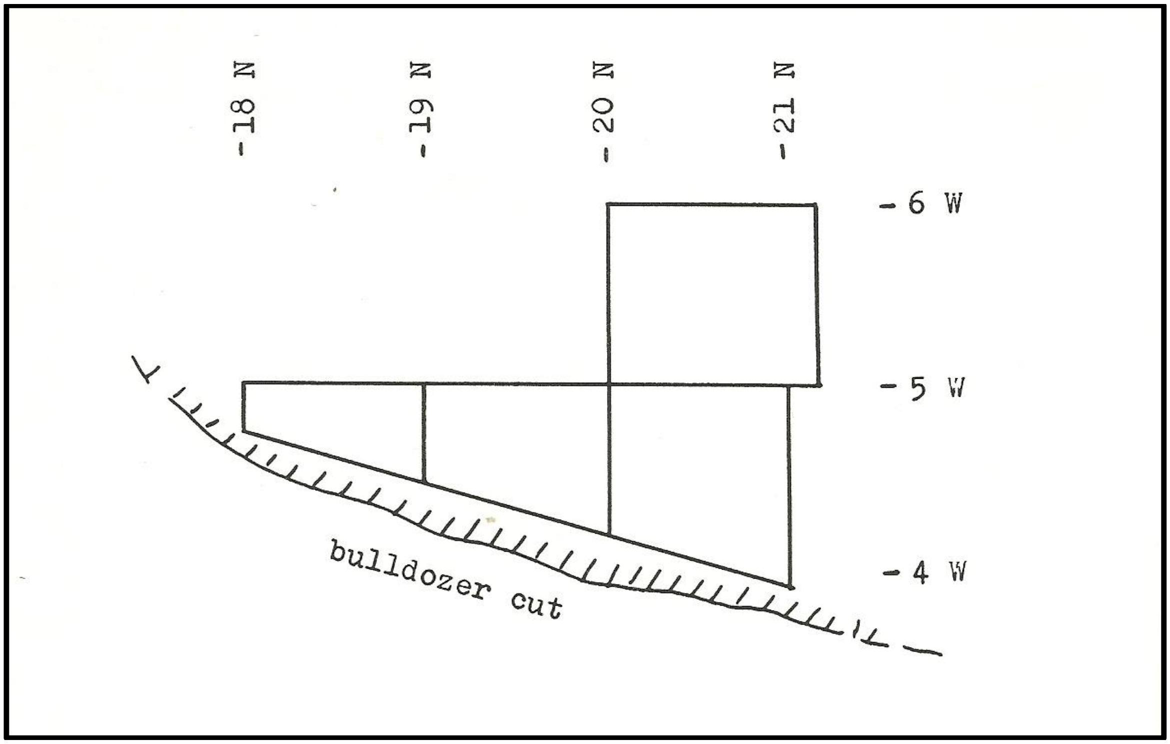

Figure 5. 1961 and 1962 excavations at Monashka Bay (Clark 1974a:Figure 7). Each grid designation (e.g., 5W to 6W) measures 6 x 6 ft.

Clark (1974a) divided the stratigraphic levels he encountered into two major units, which he labeled "Layer A" and "Layer B." A major "layered feature" was labeled "Layer C." Layer B was uppermost and contained unconsolidated deposits with large amounts of what he called "rubble" and fire-cracked rock as well as some organic matter, including rotten wood. Materials in this layer were associated with the Koniag tradition. The feature, confusingly called "Layer C," was located within this matrix. Layer C almost certainly was a Koniag housefloor, consisting of numerous thin layers of charcoal and gravel, an unlined fire pit, and a stone slab alignment, but it was only partially excavated (Clark 1974a). Clark (1963) noted midden deposits were on the site surface, particularly in disturbed areas, but he encountered only traces of shell midden or "kitchen refuse" in the excavation blocks themselves. Clark (1974a), however, recorded several areas of mixed thermally altered rock and coarse, flat rubble mixed with fish bones, particularly in the lower "A" layers. In some cases, the fish bones predominated over the rock in terms of content so much so that he refers to it as the "fish bone layer" in his notes (Clark 1963).

About 440 artifacts were collected from recorded contexts on the site over two field seasons (Clark 1974a). An additional 270 artifacts, collected out of context when the site was disturbed in 1959, are incorporated into Clark's (1974a) analysis. Materials from the "A" levels correlated with the early Kachemak tradition, while materials from the "B" levels were correlated with the Koniag tradition (Clark 1974a). Artifact types recovered from Layer A included double-edged flensing knife blades with two drilled holes, a barbed slate point, bone wedges, and grooved stones (Clark 1974a:47, Table VI). Layer B was characterized by Koniag artifact types, such as incised stones, adze bits, notched cobbles, and unstemmed chipped stone endblades (Clark 1974a:47, Table VI). Clark also associated extensive deposits of fire-cracked rock with the Koniag tradition. The "C" feature was interpreted as a Koniag housepit (Clark 1974a) and Clark obtained charcoal for radiocarbon dating from this feature (Clark 1974a).

At the time, Clark recognized that Monashka was a two-component site, but most of his collection was from the Koniag component (Clark 1974a:26, 44). Clark (1974a:45) proposed that there was a hiatus between the two occupations, citing evidence such as soil development between cultural strata and absence of some of the Late Kachemak artifact types. A single radiocarbon sample was recovered from the housepit feature (Layer C), indicating that it dated from AD 1652 ± 44 years (Clark 1974a, Mills 1994). Table 3 is a summary of radiocarbon dates obtained prior to this thesis.

Table 3. Radiocarbon dates from the Monashka Bay Site (Prior to This Thesis)

Excavation	Provenience	Lab No.	Raw Age (BP)	Calibrated Age (cal BP)[1]
Clark	Charcoal composite collected from >15cm below surface	P-1049	298 ± 44	437-300
Donta	Charcoal from 55 cm below surface, Donta presumed errant	Beta-34832	1680 ± 50	1690-1534
Donta	Charcoal from pit beneath hearth feature just above sterile soil, 106 cm below surface	Beta-33545	1570 ± 60	1535-1395

[1] These calibrated dates are the one sigma ranges provided by Mills (1994:Table 1d).

Donta's 1989 Investigations

Bryn Mawr College conducted archaeological investigations on Kodiak Island beginning in 1983 under the direction of Richard Jordan (Donta 1994). Investigations from 1983 to 1987 focused primarily on late prehistoric sites located on the western portion of the island. In 1988, investigators were interested in adding to Clark's prior work at the Monashka Bay site because it had the potential to serve as a point of comparison for their findings to that point (Donta 1994). The site was chosen because it was located on the eastern shores of Kodiak, away from sites that were better understood (Donta 1994). It was also of interest because it contained a large Koniag component as well as a Kachemak component. Up to that point, the Early Kachemak phase was not well understood and it was thought that the site would provide an opportunity to explore the relationship between the Kachemak and Koniag traditions, especially the transitional period between the two (Donta, 1994), even though Clark (1974a:45) proposed that there was a hiatus between the two occupations at Monashka Bay.

Bryn Mawr College graduate student Christopher Donta, with support from Bryn Mawr College, the Kodiak Area Native Association, and Fort Abercrombie State Park, directed fieldwork in the summer of 1989 (Donta 1994). The aim of these investigations was to document a vertical sample of the deposits present at the site using methods that would allow comparison with other sites on Kodiak, namely New Karluk (KAR-001), Old Karluk (KAR-031), and Uyak (KOD-145). Donta excavated a total of eight 2 x 2 m units, two 2 x 1 m units, and four 1 x 1 m test pits (totaling more than 70 m^3 of sediment, and about 39 m^3 of cultural deposits) during the 1989 field season. Figure 6 shows a map of the 1989 investigations. The majority of work took place within a block of seven and a half 2 x 2 m units named Area 2 (Clark's excavations were named Area 1). One of the primary goals of the 1989 investigation was to build on Clark's work and the team felt they would have the best chance in Area 2, which was thought to be the deepest portion of the site. An additional 2 x 3 m area 50 m to the south, at the south end of the site, was named Area 3. This area seemed to be different than Area 2 because it contained an exposed midden deposit, identified during initial pedestrian survey of the site. Finally, four 1 x 1 m test pits were excavated in other parts of the site to provide additional information about the extent and depth of cultural materials (Donta 1994:6). The excavations were not screened, but an uncertain number of bulk sediment samples were obtained (Donta 1994).

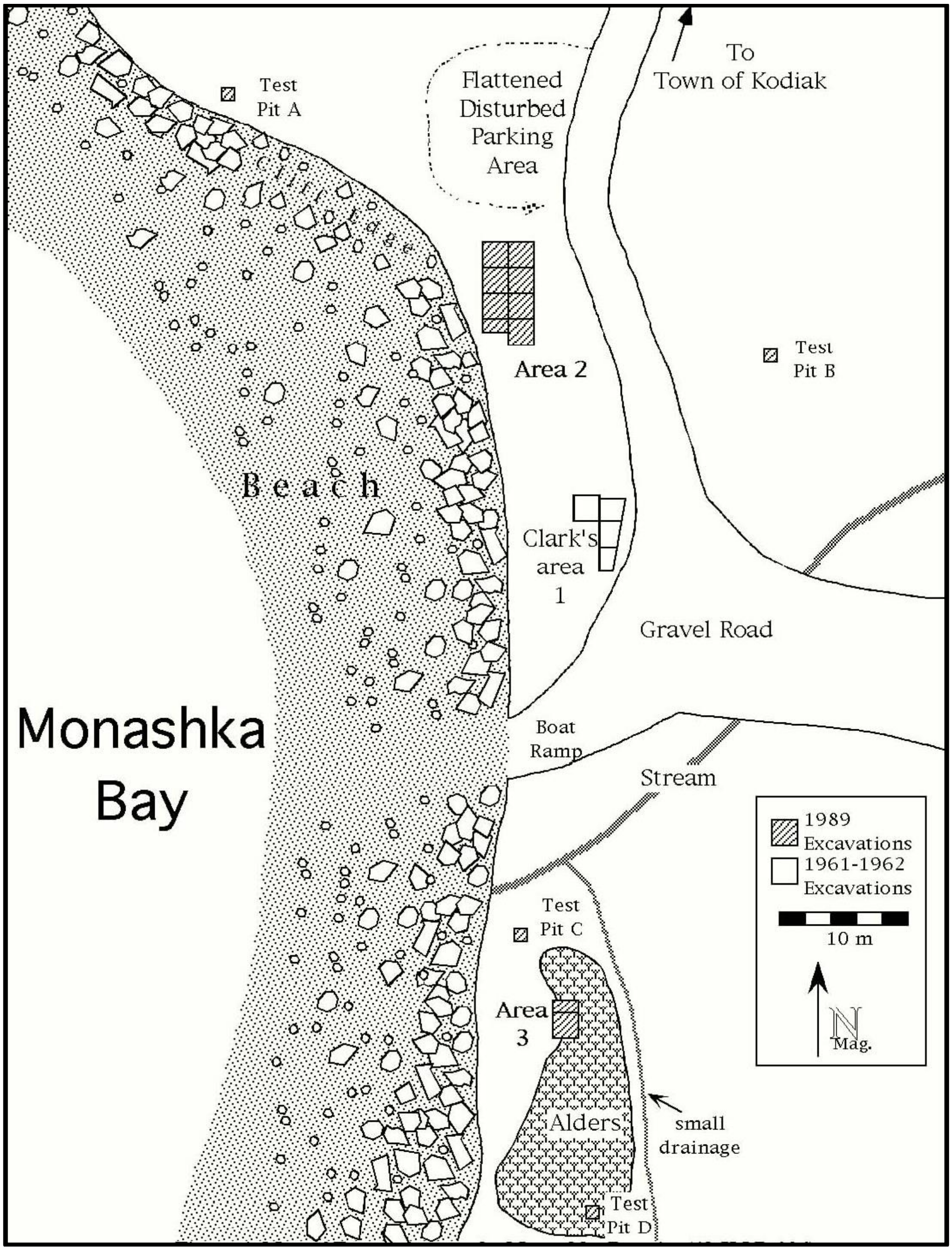

Figure 6. Map of 1989 investigations (Donta 1994 Figure 2).

Excavation was by natural level, including up to nine levels and sub-levels where house features were excavated (Area 2) and three strata in the midden areas (Area 3). These excavation levels were combined into five major strata for interpretive purposes, and are mainly applicable to excavations in Area 2. The first major stratum, at the top and called the "superstratum," ranged from 3-90 cm thick and contained historic debris and mixed ash from the 1912 Katmai eruption. "Level 1" was situated directly below the Katmai ash and consisted of a loose brown layer of loamy soil up to 30 cm thick. It did not include any housepit features, but contained diagnostic Koniag artifacts. "Level 2," from 10-50 cm thick, consisted of a number of interspersed black and brown silty layers. Level 2 was thickest in the southern portion of the Area 2 excavation, extending to 50 cm in depth. Level 2 appears to correlate with Clark's "Layer C" and contained several features associated with Koniag housepits (e.g. slab alignments and post molds). Both Levels 1 and 2 contained abundant fire-cracked rock. The third stratum, called "midden lens," occurs only in the center portion of Area 2, and is composed of thin, intersecting lenses of faunal material, mostly fish and shells. This lens reached up to 20 cm thick and in most cases was found directly overlying "Level 3," which was a thick layer of wet, greasy black soil with a moderate to high amount of rock (both fire-cracked and unmodified) throughout. Preservation was very poor in this layer and only a small amount of decaying bone was observed. Level 3 was the lowest cultural stratum, ranging from 30-130 cm thick, averaging around 80 cm. Level 3 was considered by Donta to be associated with the Late Kachemak tradition, based on the number of diagnostic artifacts, however he notes that a large number of Koniag artifacts were recovered from the upper portions of Level 3. Donta (1994) posits that there may have been some mixing owing to the loose, wet matrix comprising Level 3. Level 3 was considered equivalent to Clark's "Layer A," though it was not as extensive in the 1989 excavations. Finally, two sterile substrata underlie the cultural deposits at Monashka Bay. The uppermost is a fine orange-brown silt, possibly a tephra deposited in post-glacial times. The lower substratum is a greenish-yellow clay mixed with a high volume of angular gravels, typical of the glacial till found on Kodiak.

Two types of features were encountered in Area 2. The first group consisted of concentrations of fire-cracked rock and faunal elements, interpreted as refuse dumping episodes. The second group of features encountered in Area 2 consisted of partially intact remnants of three pithouses. These included compact, charcoal-stained living floors, stone slab alignments, postholes, pits, drainage ditches, and a single stone-lined hearth. Donta identified one of the houses as Koniag and the other two as Kachemak. Two of the houses were fragmentary, but the third house was near complete. This house encountered at the base of Level 3, was a single room about 4 x 5 m and ovoid in shape. There were more than ten features set into the floor of the house, including a series of drainage ditches covered by slab alignments, nine shallow pit features ranging in depth from 3-16 cm, and a slate-lined box-shaped stone hearth in the center of the house. Based on findings at the Uyak site, Donta concluded that this was a Kachemak housepit and a radiocarbon date of 1570 ± 60 BP obtained from a pit underneath the hearth corroborates this observation.

Since the focus of analysis for this thesis is Area 3, a detailed description of this area is provided here. Area 3 began as a 2 x 2 m test unit (designated "Square 51") excavated into the midden. After completion of Square 51, the excavation was then extended an additional 1 m to the north up to the edge of a downward slope (designated "Square 52"), making the total area excavated 6 m^2. Figure 7 shows a simplified layout of this excavation block.

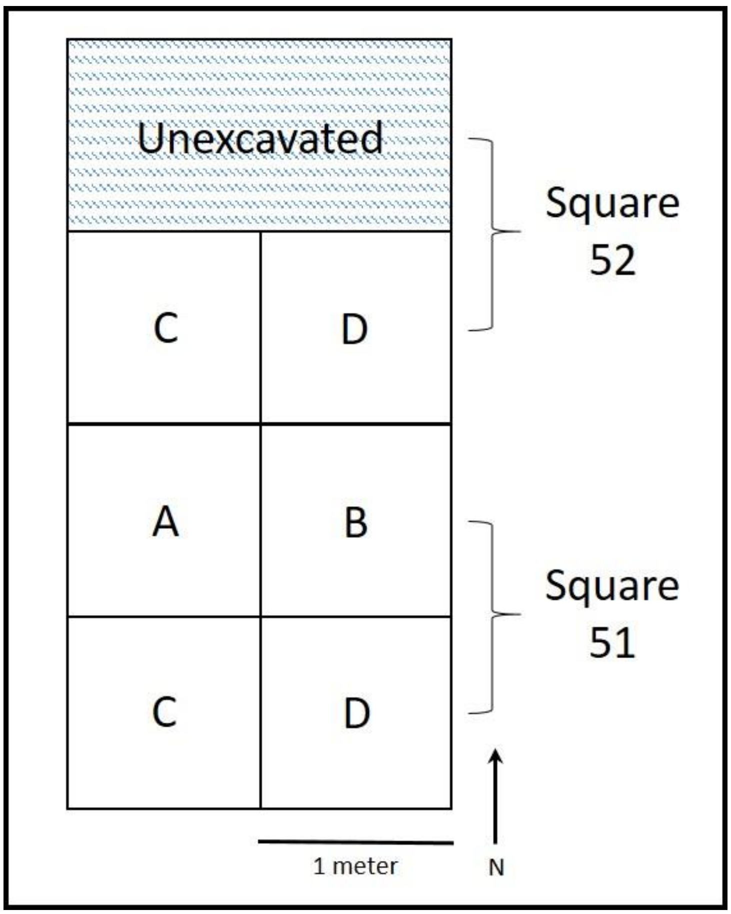

Figure 7. Simplified view of Area 3 block excavation. Each 2 x 2 m unit or "Square" was divided into four quadrants (labeled A, B, C, or D). Diagram by the author.

Based on Donta's (1994) manuscript, three stratified layers of midden were identified during excavations in Area 3. The uppermost layer (designated "Level 1") is a mix of fish bone, fire cracked rock, and black, ashy soil about 20 cm thick. Faunal material in this area was encountered less than 1 cm below the topsoil as the 1912 ash overlying much of the site had been eroded away in this vicinity. Level 1 overlies a dense faunal deposit composed of shells and sea urchin with some fish bone and occasional mammal bone in a dark brown clayey matrix from 40-80 cm thick. This deposit was designated "Level 2." The third layer is a darker, clayey wet soil with a lesser amount of decaying faunal material and some fire cracked rock, grading to a nearly sterile brown silty clay at its base. This layer, called "Level 3," is about 30 cm thick. These three midden lenses overlie a layer of sterile orange-brown silt, which is 45 cm thick. Glacial till was found at a total depth of 2.5 m below the ground surface (Donta 1994, and personal communication). Figure 8 shows an example profile from Area 3.

The Area 3 midden contained a higher percentage of non-lithic artifacts than the midden lenses described for Area 2, including several pieces of worked wood. The upper two layers of midden included a few diagnostic Koniag phase artifacts, while a lack of diagnostics in the third layer made it difficult for Donta to assign an age to the base of the midden (Donta 1994). All artifacts as well as several charcoal samples from this area were piece plotted using three point provenience.

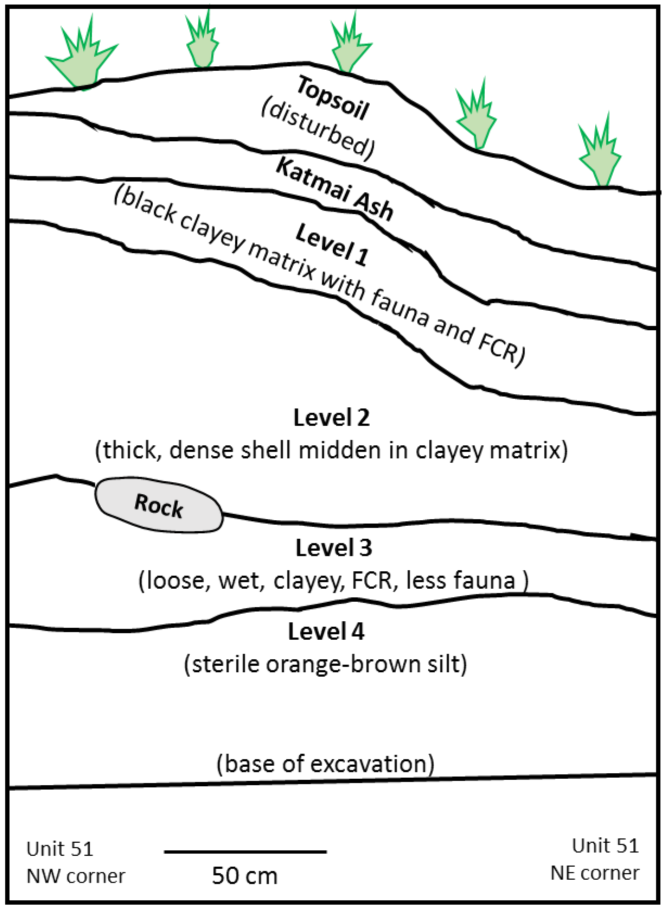

Figure 8. Example of a square wall profile from Area 3. This is the north wall of Square 51. Redrawn by the author from Donta's (1989) field notes, Adobe Acrobat file "Unit Wall Profiles."

From the site as a whole, a total of 685 artifacts were recovered, almost all of which had point provenience information documented (Donta 1994:6). Donta (1994:6) notes that 92% of these artifacts are lithic materials. The largest proportion of the assemblage collected in 1989 was from the Kachemak deposits, and the majority of it is from Area 2. The assemblage consists of ground stone, pecked stone, and chipped stone lithic artifacts as well as several modified bone implements. Specific artifact types included ground slate ulus, grooved and notched cobbles, adzes, hammerstones, and ground slate projectile points. These artifacts are discussed extensively in Chapter VI. Of particular note was the preponderance of incised stones present at the site, and at the time of excavation, the incised stone assemblage from Monashka represented the largest collection from a single site in Alaska (Donta 1994). The 147 incised pebbles are distributed as follows: 132 in Area 2, six in Area 3, and the remainder in the test units. A bone and copper engraving tool and a fiber-tempered pottery sherd, both recovered from Koniag contexts, were also unique.

Donta's collection strategy was unusual for its time and represents some of the first systematically collected fauna from the Kodiak Archipelago. Before arriving in the field, the Bryn Mawr team had consulted with Paula Molloy, then a graduate student at Harvard University, to develop a faunal sampling strategy for Monashka Bay. Donta's notes from this time (Donta 1989) show that Molloy's plan involved selecting 2 x 2 m test units from various contexts (e.g. inside and outside of house depressions). The team would then take column samples of shell midden from two 20 x 20 cm squares within those units; one that seemed to represent the thickest part of the midden and another randomly-selected square as a control. Column sampling is a technique designed to remove 100% of faunal remains from their disposal context in constant volumes, thereby eliminating screen size bias (Orton 2000). According to Molloy's plan, the midden would be bagged by arbitrary 5 cm levels or by natural stratigraphic levels (determined by observed changes in content or physical separation in the stratigraphy), whichever seemed appropriate (Donta, personal communication 2014). Further review of Donta's field notes (Donta 1989) indicates that the excavators had intentions of following this protocol, or something similar, however it appears that it was only used in Area 2 and to an unknown but limited extent.

Faunal materials encountered in Area 2 appeared to represent several dumping episodes of fire cracked rock mixed with faunal elements overlying thin, intersecting lenses of more densely packed shell midden (Donta 1994). These dumping episodes were sampled as features, and some fauna from Area 2 was collected, ostensibly using Molloy's methodology or something similar. In Area 3, faunal recovery appears to have been made in a series of bulk samples, one from each level and quadrant from each square (51 and 52), as discussed more fully in Chapter IV below.

1989 Excavation Curation History

After fieldwork was completed in the fall of 1989, at least some of the materials recovered from the Monashka Bay site were delivered to Hunter College in New York City, where faunal analysis commenced. Faunal analysis was underway in the early 1990s (Donta 1994), but it is unclear at this time who did this work and over what time frame. Non-faunal materials from the 1989 excavations were accessioned into the Alutiiq Museum's repository, while the materials from Clark's investigations are housed at the Baranov Museum, also on Kodiak Island (Patrick Saltonstall, personal communication, September 30, 2015).

The faunal remains from the 1989 excavation were kept at Hunter College. In the late 1990s or early 2000s some specimens from the collection were sent to Amy Hirons, then a graduate student and/or Research Associate at the University of Alaska Fairbanks, for stable isotope analysis. In 1999, Bob Kopperl, then a graduate student at the University of Washington, moved the faunal collection from Hunter College to the University of Washington. The collection was transferred along with several others from Kodiak for Kopperl's use in his Ph.D. work, though Kopperl never incorporated the Monashka Bay fauna into his analysis. In December 2012, the faunal collection was accessioned by the Burke Museum of Natural History and Culture in Seattle, Washington, rehoused by Burke staff and stored in eight bankers boxes at an offsite storage facility (Siri Linz, personal communication, October 16, 2015). The Hirons samples were reincorporated into the Burke Museum faunal collection in 2014.

CHAPTER IV

METHODS

Sample Selection

The initial goal of this thesis was to examine a sample of faunal remains from the site that had been systematically collected. A systematic sample was important in order to gather quantitative data on species abundance rather than a simple species list. Identifying a systematic sample from the site involved some effort, since it was known that the general site matrix was not screened. The focus was on trying to find samples collected in bulk during excavation.

A preliminary check of the faunal collection curated at the Burke Museum was made by Dr. Patrick Lubinski (CWU) in September 2013. At that time, the museum had accessioned the collection, but it had not been re-bagged or catalogued. His inspection indicated that most of the faunal material was stored in paper bags and some was sorted by size fraction, presumably for a prior analysis which was not completed. All sorting by size fraction is presumed to have been done in the laboratory (likely at Hunter College, see above) after the unscreened excavation. It was decided that the fauna from the site was promising for further investigation.

In June 2014, I visited the Burke Museum to assess whether the collection would be suitable for analysis. I made a summary of the bags and their labels. It was apparent that some of the bags had been screened, and some of the bags had been sorted by material type. Several screened bags were labeled with the same provenience information but different fraction sizes (1/4", 1/8", 1/16", and 1/16" residual) and, generally speaking, each provenience had the same number of bags for each size fraction, suggesting that these bags represent multiple "batches" of screening through graduated nested screens in a laboratory setting. This assumption is supported by the observation that samples from each size fraction were of similar volume and that the contents were visually similar. It is unknown who did this work and the nature of the research design, but the handwriting on the bags suggests that at least two individuals were involved in rehousing the collection after it was brought in from the field.

Area 1 was not considered since this was exclusively from Clark's 1961-1962 unscreened excavations, which did not include collection of faunal material. The sample needed to be from Donta's 1989 excavations. To select this sample, an examination of original field notes and extant fauna stored at the Burke Museum was undertaken. Based on a review of the field notes (Donta 1989) and my own observations, the collected faunal material from Area 2 seemed to be a small asystematic sample of what was contained within Area 2 features. As such, no materials from Area 2 were used in this analysis. Area 3, originally slated for bulk faunal sampling using Molloy's method, seemed a more likely location (Donta, personal communication 2014).

The sample chosen for this thesis was from Area 3 because it appears that all of the fauna collected from this area was in systematically-collected bulk samples. Although the field notes were not entirely clear on how the faunal bags were collected in 1989, I think all were collected in bulk bag samples, likely of a consistent volume, for four reasons: (1) most of the bags have non-faunal material in them (e.g., pebbles, charcoal fragments, seeds) as well as fauna, consistent with bulk samples; (2) many of the residual bags (<1/16”) have sediment in them, as well as small fragments of bone and shell; (3) almost all of the fauna from each quadrant had labeled size fraction bags down to 1/16” residual, and these did have tiny bone fragments; and (4) all of the fauna from each quadrant appears to compose about the same volume (most of which is shell), implying volumetric sampling. From notes and personal communication with Chris Donta, it appears that materials were removed using a volumetric sampling technique from various quadrants in each square. It is unknown what volume was used or if targeted volumes varied between proveniences. Site notes do not make reference to individual samples, but my own observations indicate that the volume of material collected was consistent within levels and between quadrants for each square. It does appear that the material may have been washed in a laboratory setting, since much of the sediment expected based on Donta’s (1989, 1994) descriptions is not in evidence. Table 4 shows the materials recovered from each unit, quadrant, and level and loaned to CWU for analysis. This sample represents the only systematically collected fauna at the site and therefore was the natural choice for this analysis. My sample includes all vertebrate faunal materials from the 1/8” and larger fractions of these bags. Non-faunal material, shell, and fractions smaller than 1/8” were not included. So in Table 4 below, all vertebrate remains from all fractions not in parentheses were analyzed.

Table 4. Samples Included in this Analysis (all from Area 3)

Initial Catalog Number	Square	Quad	Level	Size Fraction and Material Type (materials not included in loan in parentheses)
KOD026.51/1	51	A	1	1/4" bird, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.51/2	51	B	1	1/4" bird, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.51/3	51	C	1	1/4" unsorted 1/8" unsorted (1/16" unsorted not loaned)
KOD026.51/4	51	D	1	1/4" unsorted 1/8" unsorted (1/16" unsorted, <1/16" residual not loaned)
KOD026.51/5	51	A	2	1/4" mammal, bird, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.51/6	51	B	2	1/4" mammal, bird, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.51/7	51	C	2	1/4" mammal, bird, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.51/8	51	D	2	1/4" mammal, bird, fish 1/8" unsorted (1/4" shell, 1/16" unsorted not loaned)
KOD026.51/9	51	A	3	1/4" mammal, fish 1/8" unsorted (1/4" shell, 1/16" unsorted, <1/16" residual not loaned)
KOD026.51/10	51	C	3	1/4" mammal, fish 1/8" unsorted (1/4" shell not loaned)
KOD026.52/1	52	C	1	1/4" mammal, bird, fish 1/4" unsorted 1/8" unsorted (1/4" shell, 1/16" unsorted, <1/16" residual not loaned)
KOD026.52/2	52	C	1	**Bag is labeled "Midden" 1/4" mammal, bird, fish 1/8" unsorted (1/4" shell,1/16" unsorted, <1/16" residual not loaned)

Table 4. Samples Included in this Analysis (all from Area 3) (continued)

Initial Catalog Number	Square	Quad	Level	Size Fraction and Material Type (materials not included in loan in parentheses)
KOD026.52/3	52	D	1	1/4" mammal, bird, fish 1/4" unsorted 1/8" unsorted (1/4” shell, 1/16" unsorted; <1/16" residual)
KOD026.52/4	52	C	2	1/4" mammal, bird, fish 1/4" unsorted 1/8" unsorted (1/4” shell, 1/16” unsorted, <1/16" residual not loaned)
KOD026.52/5	52	D	2	1/4" mammal 1/4" unsorted 1/8" unsorted (<1/16" residual not loaned)
KOD026.52/6	52	D	2	**Bag is labeled “Midden” 1/4" mammal, bird, fish 1/8" unsorted (1/4” shell, 1/16" unsorted not loaned)
KOD026.52/7	52	C	3	1/4" mammal, fish 1/8" unsorted
KOD026.52/8	52	D	3	1/4" unsorted 1/8" unsorted

Sample Acquisition and Cataloguing

Under the guidance of Laura Phillips, Archaeology Collections Manager, and Siri Linz, Assistant Collections Manager, I re-bagged and inventoried all materials from the 1989 excavations at Monashka Bay (Area 2, Area 3, and test units). Materials with the same provenience information were combined to reduce the total number of bags present and to simplify the cataloging process, but all of the portions of original bags bearing writing were retained in the new bags. All bags were 4-mil polyethylene re-closable bags, ranging in size from 2 x 3 in to 10 x 12 in. Each bag was assigned a catalog number in the Burke Museum system and provided with an acid-free label. For example, the first bag has catalog number KOD026.51/1, meaning Area 3, Square 51, Level 1, Quad A, while the second bag is KOD026.51/2, meaning Area 3, Square 51, Level 1, Quad B. Records were kept regarding how many bags were originally present and when they were combined. Upon completion of the inventory, I submitted a research plan to the museum to qualify for a loan. A loan consisting of the bulk samples from Area 3 was then arranged between the Burke Museum and Central Washington University.

In August 2014, the collection was transferred on loan to CWU. Upon arrival at CWU, all materials were re-screened through a series of graduated nesting screens in order to ensure uniformity between samples. Material was then sorted into 1/4", 1/8”, 1/16”, and <1/16” residual size fractions. Figure 9 depicts a typical bulk sample after screening. The 1/16” unsorted midden and <1/16” unsorted residual materials were re-labeled and re-bagged in accordance with Burke Museum standards and the loan agreement. Materials from the 1/4" and 1/8” size fractions were sorted according to material type. Possible material types included sediment, rock, charcoal, shell, fish bone, bird bone, mammal bone, and unidentified bone. All materials were labeled and re-bagged in accordance with Burke standards and the loan agreement. No chipped or ground stone artifacts or modified bone materials were encountered during the sorting process. The final assigned catalog numbers and corresponding provenience and material information are on file at the Burke Museum.

Figure 9. Example of a bulk sample sorted by size fraction. This sample originated from the unsorted material in Square 52 (labeled as 1/4" and 1/8" unsorted). Materials 1/8 in and larger were sorted and all vertebrate specimens were analyzed for this thesis. Materials smaller than 1/8 in were not considered for this analysis.

As a condition of the loan, the Burke Museum requested that my results be made available in a Microsoft Excel spreadsheet so they may be incorporated into the museum's own cataloging system. This spreadsheet was submitted to the museum upon completion of my analysis. Additionally, I have rehoused and returned the materials to the Burke Museum using the methods and materials outlined in the loan agreement.

Faunal Analysis

The faunal analysis consisted of classification, tabulation, and analysis of the bulk samples from the Monashka Bay site. The bulk samples used for this analysis originated from Area 3, excavated during the 1989 investigations at Monashka Bay. All vertebrate remains from my 1/4” and 1/8” re-screening of Area 3 proveniences were examined for this analysis. Invertebrate remains, such as shellfish, were not analyzed for this project, but were sorted, labeled, and stored for possible future use.

The basic analytical unit used in this analysis was an individual bone or bone fragment, referred to as a “specimen.” Each mammal and bird specimen was examined and identified to taxon, element, portion, side, and “landmarks” (discrete bone morphological features), as possible. Each fish specimen was examined and identified to taxon, element, portion, and side, as possible.

Taphonomic processes are those which control the deposition and preservation of animal remains (Lyman 1987). Burning was the only taphonomic variable considered for all taxa. Taphonomic variables considered only for mammals and birds were weathering stage, root etching, breakage type, age indicators, maximum length, and modification (e.g., cut marks or rodent gnawing). Identifications were made conservatively due to bone fragmentation, gaps in the comparative collections, and time constraints.

Given the large size of this collection, decisions concerning which elements were included in the analysis were guided by time constraints and followed much of Partlow’s (2000) methodology. Taxonomic identification to genus and species level was attempted for all elements with the exception of the following:

1. For all mammals, taxonomic identification was not attempted for ribs (these elements were recorded by element, marine or terrestrial designation, and size class, but no detailed taxonomic information was attached);
2. For all birds, taxonomic identification was not attempted for vertebrae, ribs, and phalanges (these elements were recorded by element, but with no detailed taxonomic information attached);
3. For Family Salmonidae, taxonomic identification beyond family level was not attempted due to similarity between species;
4. For all fish, taxonomic identification was not attempted for ribs, fin rays, spines, and elements comprising the branchial arch due to similarities between fish taxa (these elements were grouped with the unidentified fish bone);
5. In fish, taxonomic identification was not attempted for elements in the circumorbital series (Cannon 1987) other than the lachrymal, with the exception of Order Scorpaeniformes, where these elements are extremely robust and easily identified;
6. For all fish, taxonomic identification was limited to order level for all vertebra;
7. For Family Gadidae, differentiation between *Gadus macrocephalus* and *Theragra chalcogramma* followed Orchard (2001) (with the exception of the pharangeal plate, which was not recorded for any taxon, see above), all other elements were identified to family level only due to similarity between these species;
8. Siding was not attempted for some fish elements (e.g. otoliths) due to time constraints, bone fragmentation, and lack of distinction between sides.

The majority of taxonomic identifications were made through direct comparison with modern osteological comparative collections. The comparative collection available at CWU is particularly well-equipped to aid in the identification of marine fishes from the Gulf of Alaska and contains specimens of some bird and mammal species from the region. For taxa not available at CWU, collections housed at the Burke Museum were consulted. Additional reference was provided by Dr. Virginia Butler's (Portland State University) online reference collection, photographs of the Alaska Consortium of Zooarchaeologists' synoptic collection provided by Rhea Hood, and published reference manuals (Cannon 1987; Cohen and Serjeantson 1996; Olsen 1979a, 1979b; Gilbert 1990; Gilbert et al. 1985; Post 2004; 2008; Yabe 1985). Dr. Megan Partlow (CWU) checked all identifications for accuracy and to ensure similarity of methods with her own research for comparative purposes (Partlow 2000, 2006). Identification consisted mainly of macroscopic analysis, though simple tools such as a 15x hand lens were also used.

All fish, birds, and mammals with current or historic distributions within the Gulf of Alaska were considered for comparison. The potential taxa are based upon geographic ranges provided in published reference materials (Mecklenburg et al. 2002; NOAA Fisheries 2013; Peterson 1990; Whittaker 1980). A size class system was used to describe marine mammal specimens not identifiable to a particular taxon, simply dividing small sea mammals (sea otter to fur seal size) from large sea mammals (fur seal to whale size). Element naming conventions and siding followed Gilbert (1990) for mammals, Gilbert et al. (1985) for birds, and Wheeler and Jones (1989) and Cannon (1987) for fish.

Taxonomy follows Wilson and Reeder (2005) for mammals, and Mecklenburg et al. (2002) for fishes.

All analyzed specimens were entered into a relational database in Microsoft Access designed by Dr. Patrick Lubinski (CWU). The database contains classification codes for side, element, portion, and landmarks if present and/or identifiable for each specimen. Information from this database can be queried to identify patterns in the data.

Queries allow calculation of common zooarchaeological metrics for animal abundance, such as number of identified specimens (NISP; Payne 1975) and minimum number of individuals (MNI; White 1953). MNI estimates were made by tabulating the occurrence of each bone portion by side and assigning the maximum value as MNI. Age, size and visual comparisons were not considered for minimum number estimates. This approach may be described as the max (L, R) method (Ringrose 1993), and it provides a conservative minimum distinction MNI estimate.

The assemblage contained significant numbers of bones from particular taxa, therefore measures of skeletal part survivorship (MNE, MAU, %MAU) were calculated to evaluate possible patterns of butchery, bone transportation, and/or bone destruction for those taxa. Estimates of minimum number of elements (MNE; Bunn 1982) were made using the same max (L, R) minimum distinction method as was used for MNI. For fish remains, one diagnostic portion of each element was used to calculate the minimum number of elements. Calculations of minimum animal units (MAU; Binford 1984) involve dividing MNE values by the number of times the element occurs in the skeleton of a single animal. Percent MAU values (%MAU; Binford 1984) were calculated by dividing element MAU values by the maximum MAU value obtained in the assemblage.

Radiocarbon Dating

While there were three radiocarbon dates available for this site prior to my thesis, none of these relate to Area 3, where the faunal sample originates. I wanted to obtain at least two dates from Area 3 midden, one from the top and bottom. The original intent was to use radiocarbon samples collected in 1989 and noted in the field records for the two sample units (Squares 51 and 52). However, these samples could not be located in 2014 at the Burke Museum, Alutiiq Museum, or in Dr. Donta's possession. Instead I decided to use charcoal residue found mixed with the bulk sample materials. This charcoal had be removed during my initial effort to sort the shell midden by material type. These samples originated from a single "column" of the midden in Area 3, meaning each is drawn from the same unit and quadrant (Square 51, Quad A) and each represents a successive level (1,2, and 3) as identified by Donta during the 1989 investigations (Donta 1994). The range of depths from each midden level are known, but the location of each charcoal fragment within the level is unknown because each was drawn from a bulk sample.

To obtain dates, I applied for and was awarded two research grants. A Central Washington University Master's Research or Creative Activity Fellowship was awarded in December, 2014 in the amount of $1,000 towards radiocarbon dating. The 2015 Alaska Consortium of Zooarchaeologists' Christina Jensen Scholarship was awarded in the amount of $1,000, with no expenditure requirements. These allowed both a charcoal analysis and three radiocarbon dates from the Monashka Bay site.

Prior to submission of charcoal for radiocarbon dating, and by suggestion of Laura Phillips, I obtained an analysis of the charcoal to allow selection of short-lived species that provide the best chronological information. With permission from the Burke Museum, Jennie Shaw of Salix Archaeological Services analyzed 13 charcoal fragments from Area 3. Shaw is experienced in identifying charcoal from archaeological contexts on Kodiak (Shaw 2008) and was able to recommend three samples for radiocarbon dating (Shaw 2015). Shaw's (2015) resulting report details the results of the microscopic work and presents a basic paleoenvironmental summary for Kodiak and potential driftwood source areas. Further discussion of the results of this analysis can be found in Chapter V.

In accordance with Shaw's recommendations, three samples were sent to Beta Analytic in Miami, Florida, in July 2015. Commercial dating laboratories such as Beta Analytic use standardized protocols and provide a standard of quality control. Work is performed by professional technicians using identical reagents and counting parameters and a quality assurance report was provided with the results. After receiving the results from Beta Analytic, I calibrated the dates to calendar years (cal BC/AD) and calibrated radiocarbon years (cal BP). Calibration was calculated using the 2015 CALIB program (Stuiver and Reimer 2015) and the IntCal13 database (Reimer et al. 2013). Results of the radiometric analysis are discussed in Chapter V.

CHAPTER V

RESULTS AND DISCUSSION

Radiocarbon Dating and Wood Identification

I obtained radiocarbon dates from charcoal curated since the excavation to gain chronological context for the midden material in Donta's (1994) Area 3, which was used in this analysis. Previous dates from the site originated from Area 1 (Clark 1974a; Mills 1994) and Area 2 (Donta 1994; Mills 1994). These areas were located in the northern and central portions of the site, respectively, and their relationship to Area 3 (over 50 m from the nearest dated portion of the site) is uncertain. Based on artifact types identified by Donta (1994), it was clear that the Area 3 midden contained a Koniag component, but it was unknown if a Kachemak component was also present. Since both previous investigations encountered Kachemak and Koniag components in other portions of the site, I wanted to test whether the midden might represent either of these components, or possibly a transition between the two. At the very least, radiocarbon dating would allow me to add chronological context to my own analysis.

As described in Chapter IV, charcoal samples for accelerator mass spectroscopy (AMS) radiocarbon dating were selected from each level of the midden. I sent these 13 fragments to Jennie Shaw at Salix Archaeological Services for identification of the charcoal wood species. Her analysis results are summarized in Table 5.

Table 5. Charcoal Identification Results from Shaw (2015:Table 1)

Catalog Number	Weight (g)	Condition	Identification	Common Name
KOD026.51/1.08-CH01	<0.01	Good	*Picea* sp./*Larix* sp.	spruce/larch/tamarack
KOD026.51/1.08-CH02	<0.01	Good	*Picea* sp./*Larix* sp.	spruce/larch/tamarack
KOD026.51/1.08-CH03	<0.01	Good	*Pseudotsuga* sp.	Douglas fir
KOD026.51/1.08-CH04[1]	<0.01	Good	*Alnus* cf. *sinuata*	Alder (cf. Sitka alder)
KOD026.51/1.08-CH05	<0.01	Good	*Pseudotsuga* sp.	Douglas fir
KOD026.51/5.08-CH01	<0.02	Poor	Unidentified conifer	--
KOD026.51/5.08-CH02	0.01	Fair	*Picea* sp./*Larix* sp.	spruce/larch/tamarack
KOD026.51/5.08-CH03[1]	<0.01	Fair	*Alnus* sp.	Alder
KOD026.51/5.08-CH04	0.01	Poor	Unidentified plant material	--
KOD026.51/5.08-CH05	<0.01	Good	*Betula* sp.	Birch
KOD026.51/5.08-CH06	0.01	Poor	Unidentified plant material	--
KOD026.51/9.08-CH01	<0.01	Fair	Unidentified conifer	--
KOD026.51/9.08-CH02[1]	<0.01	Good	*Alnus* sp.	Alder

[1]Reccomended by Shaw (2015) for AMS dating.

Shaw (2015) identified alder, birch, Douglas fir, and spruce/larch/tamarack wood in the samples. She reports on the ethnographic uses of these species in her report, which is not repeated here. Shaw identified three samples as alder (*Alnus* sp.), which is represented by two species on Kodiak. The native alder species is *Alnus sinuata* (Sitka alder), though *Alnus rubra* (red alder) is ubiquitous in the Pacific Coastal Forest biome to the south, and so may be washed onto Kodiak shores as driftwood (Shaw 2015). According to Shaw (2015), most charcoal fragments cannot be identified to species, but since both species of alder are relatively short-lived (<50 years maximum age), they are one of the most suitable taxa for radiocarbon dating on Kodiak, avoiding the "old wood" problem, which causes artificial inflation of radiometric dates. Since the three radiocarbon samples used in this thesis were drawn from alder, I feel confident that my dates are correct and representative of the midden.

Radiometric analysis returned dates in chronological order with the midden levels, suggesting that the midden was intact. The date from midden Level 1, the uppermost, returned a raw age of 240 ± 30 BP. The sample from the middle portion of the midden, Level 2, returned a raw age of 290 ± 30 BP. Finally, a sample from Level 3, at the base of the midden, returned a raw age of 320 ± 30 BP. I then calibrated these dates along with the three others previously obtained from the site using the CALIB 7.0.4 program (Stuiver and Reimer 2015) and the IntCal13 dataset (Reimer et al. 2013). Results of all radiocarbon dates from the site as well as my recalibration is reported in Table 6.

Charcoal samples yielded a calibrated date range for the Area 3 midden from AD 1518 to AD 1797. The error margins do overlap at two standard deviations, however, so it is possible that the timeframe was much more compressed than what is suggested by simply assuming the averages of each date are correct. In any case, this analysis revealed that the depositional timeframe for the midden was relatively limited, only about 150 radiocarbon years in total. The concurrent dates also suggest that the midden was relatively intact, with little impact to stratigraphy from natural or cultural post-depositional processes. It does seem possible that the midden was comprised of several dumping episodes because the natural levels observed in the field were visually distinct, as indicated by Donta (1989, 1994), but the dates suggest that these took place over the course of decades, not centuries. The results of this analysis suggest that, though the site

Table 6. Charcoal Radiocarbon Dates from the Monashka Bay Site

Provenience	Lab No.	Raw Age (BP)	Calibrated Age[1] (AD)	Relative Area[1]	References
Area 2, Square 5, 55 cm below ground surface in top portion of Level 3, approx. 10 cm above a slab feature, Donta presumed errant.	Beta-34832	1680 ± 50	260-279 326-418	0.124 0.875	Donta 1994; Mills 1994
Area 2, Square 4, 106 cm below surface at base of Level 3, from a pit beneath hearth feature, just above sterile subsoil.	Beta-33545	1570 ± 60	421-545	1.000	Donta 1994, Mills 1994
Area 3, Square 51, Quad A, alder from midden bulk sample, Level 3, approx. 129-172 cm below surface[2].	Beta-416118	320 ± 30	1518-1594 1618-1640	0.786 0.213	This thesis
Area 1, composite sample collected from >15cm below surface, in "C" Levels (a feature interpreted as a Koniag housefloor).	P-1049	298 ± 44	1517-1594 1618-1649	0.713 0.286	Clark 1974a; Mills 1994
Area 3, Square 51, Quad A, alder from midden bulk sample, Level 2, approx. 73-129 cm below surface[2].	Beta-416117	290 ± 30	1522-1574 1627-1651	0.671 0.329	This thesis
Area 3, Square 51, Quad A, alder from midden bulk sample, Level 1, approx. 33-73 cm below surface[2].	Beta-416116	240 ± 30	1643-1668 1782-1797	0.670 0.329	This thesis

[1] Extent of 1 sigma age range calibrated with CALIB version 7.0.4 (Stuiver and Reimer 2015) using the IntCal13 dataset (Reimer et al. 2013). Relative area is the probability that calibrated age falls within this range from the same program.
[2] Depths approximated using Donta's (1989) field notes. Measurements taken using depths given for NW corner of Unit 51, Quad A, which provides the best documentation of the excavation depths for this block.

contains Kachemak and Koniag components as previously reported (Clark 1974a; Donta 1994), the Area 3 midden dates only to the Koniag time period, and since the dates are clearly after AD 1400, to what is typically called Late or "Developed" Koniag. A further discussion of the diagnostic artifacts from the site and their significance in establishing site chronology, will be presented in the following chapter, which contains a draft manuscript of a journal article to be submitted for publication.

Faunal Analysis Results

A total of 36,273 faunal specimens were examined for this thesis. All but 12 specimens were identified at least to class level (Chondrichthyes, Osteichthyes, Aves, or Mammalia). The majority of these were unidentified fish remains (31,978, 88%). The distribution by taxonomic class was 1 (<0.01%) Chondrichthyes, 36,074 (99.48%), Osteichthyes, 119 (<0.01%) Aves, and 56 (<0.01%) Mammalia. Fishes overwhelmingly dominate the assemblage, even if the unidentified fishes are omitted (4,097/4,272, 96%).

At least 14 different fish taxa were identified, including shark/ray/skate, salmon, herring, cods (Pacific cod and walleye pollock), kelp greenling, sculpins (Yellow Irish Lord, Red Irish Lord, cf. great sculpin), rockfish, and flatfishes (Pacific halibut, arrowtooth flounder, starry flounder, and rock sole). Cods dominate the fish assemblage, composing 2,783/4,097 (68%) of fish specimens identified to order level or better. Fish bones are mostly unburned; all but 37 of the 36,074 (~0.10%) showing no signs of burning. The burned bones include 12 blackened and 25 calcined, from unspecified gadids or scorpaeniforms or unidentified fishes. Fish identifications are summarized in Table 7. Skeletal part distributions are detailed in the discussion section below.

Table 7. Summary of Fish Identifications

Order	Taxon	Common Name	NISP	MNI
Class Chondrichthyes (cartilaginous fishes):				
Unknown	Unidentified	Unidentified shark/ray/skate	1	1
Class Osteichthyes (bony fishes):				
Salmoniformes	*Oncorhynchus* sp.	Unspecified salmon	80	3
Clupeiformes	*Clupea pallasii*	Pacific herring	49	1
Gadiformes	Family Gadidae	Cod family	2,322	--
	Gadus macrocephalus	Pacific cod	460	43
	Theragara chalcogramma	Walleye Pollock	1	1
Scorpaeniformes	Family Hexigrammidae	Greenling family	3	--
	Hexagrammos decagrammus	Kelp greenling	3	1
	Hexagrammos sp.	Unspecified greenling	8	--
	Family Cottidae	Sculpin family	57	--
	Hemilepidotus jordani	Yellow Irish Lord	99	6
	Hemilepidotus hemilepidotus	Red Irish Lord	1	1
	Hemilepidotus sp.	Unspecified Irish Lord	328	--
	Myoxocephalus sp.	Unspecified sculpin	3	1
	Sebastes sp.	Unspecified rockfish	9	1
	Unidentified	Unidentified scorpaeniform	475	--
Pleuronectiformes	Family Pleuronectidae	Righteye flounder family	12	--
	Subfamily Hippoglossinae	Arrowtooth or halibut	2	--
	Hippoglossus stenolepis	Pacific halibut	47	3
	Atheresthes stomias	Arrowtooth flounder	1	1
	Subfamily Pleuronectinae		1	--
	Lepidopsetta sp.	Unspecified rock sole	4	1
	Platichthyes stellatus	Starry flounder	1	1
	Unknown	Unidentified pleuronectiform	130	--
Unknown	Unidentified	Unidentified bony fish	31,977	--
		TOTAL	36,075	65

Order Salmoniformes (salmon and kin) makes up 2% (n = 80/4,097) of the fish identified to order or better. Of these, all are salmon (*Oncorhynchus* sp.) of the Family Salmonidae. The 80 specimens are composed of a variety of elements, including cranial (e.g., articular, ceratohyal, preopercle), pectoral (e.g., cleithrum, coracoid), and trunk (e.g., basipterygia, vertebrae) elements. There is a minimum of three individual fish based on three left basipterygia.

Order Clupeiformes (herrings and anchovies) composes 2% (n = 49) of the fish identified to order or better. This group is represented entirely by Pacific herring (*Clupea pallasii*) of the Family Clupeidae. Seven cranial and one pectoral element were identified, but most specimens were vertebrae. Given a count of 41 vertebrae identified, there is a minimum of a single herring based on the 51-57 vertebrae reported for this species by Mecklenberg et al. (2002:134). If vertebrae are not considered, the cranial and pectoral elements still produce an MNI of one.

Order Gadiformes (cods) dominates the assemblage with 68% (n = 2,783) of the fish identified to order or better. Identified gadids include walleye pollock (*Theragra chalcogramma*), with one specimen, and Pacific cod (*Gadus macrocephalus*), with 460 specimens. The Pacific cod specimens include the eight different elements selected to represent this species (articular, dentary, epihyal, interhyal, premaxilla, quadrate, vomer, first vertebra, following Orchard 2001, see Chapter IV). There is a minimum of 43 individual Pacific cod based on the 43 left dentary bones identified in the assemblage. Most of the specimens in this order were identified only to family, and included 54 different elements, representing all parts of the body.

Order Scorpaeniformes (rockfishes, sculpins, and greenlings) makes up 24% (n = 986) of the fish identified to order or better. Identified scorpaeniforms include rockfish (n = 9), greenlings (n = 14 total, three of which were identified as kelp greenling [*Hexagrammos decagrammus*]), sculpins (n = 488 total, of which 99 are Yellow Irish Lord [*Hemilepidotus jordani*]), one is Red Irish Lord (*Hemilepidotus hemilepidotus*), and three are *Myoxocephalus* sp. (one of five species possible in the region, including great sculpin [*M. polyacanthocephalus*]). Of the scorpaeniforms identified to species level, Irish Lords (Family Cottidae) are the most prevalent. Of these, Yellow Irish Lords (*Hemilepidotus jordani*) are most numerous, with a minimum number of six individuals based on left preopercles.

Order Pleuronectiformes (flatfishes) comprises 5% (n = 198) of the fish identified to order or better, and is represented by at least four species. Identified flatfishes include Pacific halibut (*Hippoglossus stenolepis*) (n = 47), arrowtooth flounder (*Atheresthes stomias*) (n = 1), rock sole (*Lepidopsetta* sp.) (n = 4), and starry flounder (*Platichthyes stellatus*) (n = 1). The estimated MNI for halibut is three, based on three left angulars, and for the other taxa is a single fish.

Birds comprise 0.3% (n = 119/36,273) of the total assemblage and 82 of the specimens were identified to order or better. Three orders are represented: Procellariiformes (albatrosses, shearwaters, petrels, and kin), Anseriformes (waterfowl), and Charadriiformes (auks, gulls, and kin). Charadriiformes, especially gulls, dominate the identified assemblage. Table 8 presents a summary of the bird taxa identified in this analysis.

Order Procellariiformes comprises 11% of identified bird specimens (9/82). Identified taxa include one Northern fulmar (*Fulmarus glacialis*) specimen, seven specimens of unidentified shearwater (*Puffinus* sp.), and one unidentified specimen from Family Procellaridae (shearwaters, petrels, fulmars, and kin). There are a minimum of three shearwaters based on three right and left proximal tarsometatarsi.

Table 8. Summary of Bird Identifications

Order	Taxon	Common Name	NISP	MNI
Class Aves (birds):				
Procellariiformes	Family Procellariidae	Shearwaters/petrel family	1	--
	Fulmarus glacialis	Northern fulmar	1	1
	Puffinus sp.	Unidentified shearwater	7	3
Anseriformes	Family Anatidae	Duck/goose/swan family	15	--
	Somateria sp.	Unidentified eider	2	1
Charadriiformes	Family Alcidae	Auk family	--	--
	Brachyramphus marmoratus	Marbled murrelet	2	1
	Family Laridae	Gull/kittiwake/tern family	--	--
	Subfamily Larinae	Gull subfamily	16	--
	Larus argentatus	Herring gull	1	1
	Larus canus	Mew gull	1	1
	Larus sp.	Unidentified gull	17	--
	Rissa sp.	Unidentified kittiwake	19	3
Unknown	Unidentified	Unidentified bird	37	--
		TOTAL	119	11

Order Anseriformes comprises 21% (n = 17/82) of bird specimens identified to order or better. Based on their size, these 17 specimens are all from ducks. Of these, two are eider (*Somateria* sp.), and the remainder (n = 15) were identified to family level only. The eider bones comprise a minimum of a single bird, but a minimum number of two individuals belonging to this family could be identified based on two left distal coracoids.

Charadriiformes are present in Families Alcidae (auks), and Laridae (gulls and kin). Identified charadriiforms include marbled murrelet (*Brachyramphus marmoratus*), herring gull (*Larus argentatus*), mew gull (*Larus canus*), and kittiwake (*Rissa* sp.). Family Alcidae comprises 3% of the bird assemblage, while Family Laridae makes up 68% (n = 56/82) of birds identified to order or better. Within Family Laridae, 16 specimens were identified as belonging to kittiwakes (*Rissa* sp.) and 17 specimens were identified as belonging to genus Larus (*Larus* sp.).There are a minimum of three kittiwakes based on three left proximal carpometacarpi.

Like the birds, mammals make up a small proportion of the Monashka Bay assemblage. Mammals make up just 0.15% (n = 56/36,273) of the total assemblage and 15 mammal specimens were identified to order or better. Table 9 details the mammals identified from the Monashka Bay site for this analysis. All of the specimens except one were clearly sea mammals based on overall morphology and density. The single land mammal bone was a tibia from a red fox (*Vulpes vulpes*).

Table 9. Summary of Mammal Identifications

Order	Taxon	Common Name	NISP	MNI
Class Mammalia (mammals):				
Carnivora	Family Canidae	Dog family	--	--
	Vulpes vulpes	Red Fox	1	1
	Family Mustelidae	Weasel family	--	--
	Enhydra lutris	Sea Otter	1	1
	Family Otariidae	Eared seal family	--	--
	Callorhinus ursinus	Northern fur seal	3	1
	Family Phocidae	Hair seal family	--	--
	Phoca sp.	Unidentified seal	6	1
Cetacea	Suborder Odontoceti	Unidentified toothed whale	3	--
	Family Phocoenidae	Porpoise family	--	--
	Phocoena phocoena	Harbor porpoise	1	1
Unknown	Sea Mammal: Small	Sea otter to fur seal-size	32	--
	Sea Mammal: Large	Fur seal to whale-size	7	--
	Unidentified	Unidentified mammal	2	--
		TOTAL	56	5

Identified sea mammals included sea otter (*Enhydra lutris*), fur seal (*Callorhinus ursinus*), harbor/ribbon/ringed seal (*Phoca* sp.), and at least two different species of toothed whales (an identified harbor porpoise [*Phocoena phocoena*] scapula and a vertebral centrum from a much larger whale). The sea otter is represented by a single tibia, the fur seal by three specimens (from a radius and an astragalus), and the seal by six specimens (two femur fragments and four proximal ribs). Many mammal elements (n = 39) were identified to size class only, including most ribs and phalanges.

Faunal Discussion

To discern patterns within the Monashka Bay faunal assemblage, I investigated taxonomic distributions by stratigraphic level, taxonomic distributions by screen size, and fish skeletal part representation. The first was an attempt to determine if there was any change in fauna exploited over time from the bottom to the top of the midden in Area 3. The second was an attempt to determine if there was any sampling bias against small fish taxa apparent in the analyzed assemblage. The third was an attempt to see if there was evidence of use of stored fish or simply local catches of fresh fish.

A summary of taxonomic distribution by stratigraphic level is provided in Table 10. The sample size is very different between levels. Level 3 has almost no bone, as expected, due to a lack of shell in this level (Donta 1989, 1994). Level 1 and 2 both have good bone samples, but Level 2 has twice the sample as Level 1, probably because of the high shell content noted by Donta (1989).

Table 10. Identified Taxa by Stratigraphic Level (NISP)

Order	Taxon	Level 1	Level 2	Level 3	Total
Class Chondrichthyes (cartilaginous fishes):					
Unknown	Unidentified shark/ray/skate	--	1	--	1
Class Osteichthyes (bony fishes):					
Salmoniformes	*Oncorhynchus* sp.	33	47	--	80
Clupeiformes	*Clupea pallasii*	24	25	--	49
Gadiformes	Family Gadidae	812	1,502	8	2,322
	Gadus macrocephalus	172	287	1	460
	Theragara chalcogramma	--	--	1	1
Scorpaeniformes	Family Hexigrammidae	2	1	1	3
	Hexagrammos sp.	--	11	--	11
	Family Cottidae	2	54	1	57
	Hemilepidotus sp.	78	351	--	428
	Myoxocephalus sp.	2	1	--	3
	Sebastes sp.	2	7	--	9
	Unidentified scorpaeniform	127	347	1	475
Pleuronectiformes	Family Pleuronectidae	6	6	--	12
	Subfamily Hippoglossinae	16	33	1	50
	Subfamily Pleuronectinae	3	3	--	6
	Unknown flatfish	29	101	--	130
Unknown	Unidentified fish	10,305	21,572	100	31,977
Class Aves (birds):					
Anseriformes	Family Anatidae	2	15	--	17
Charadriiformes	Family Laridae	32	20	--	52
	Family Alcidae	3	--	11	3
Procellariiformes	Family Procellariidae	1	8	--	9
Unknown	Unidentified bird	24	13	1	38
Class Mammalia (mammals):					
Carnivora	*Vulpes vulpes*	--	--	1	1
	Enhydra lutris	--	1	--	1
	Family Phocidae	--	3	--	3
	Phoca vitulina	1	3	2	6
Cetacea	Suborder Odontoceti	--	3	1	4
Unknown	Unidentified mammal	15	22	4	41
Unknown Class	Unidentified	5	7	--	12
	TOTAL	11,695	24,444	134	36,273

Fish taxa distributions do not seem to vary much across levels, justifying treatment of this sample as a single level. Many of the differences in taxa between levels are probably simply due to sample size. The one striking pattern that does not align with sample size is with the alcid bird remains, which are totally absent in Level 2, but are represented in Level 1 (NISP = 3) and Level 3 (NISP = 11). Although these are small samples, they are noteworthy given the radically different size of the overall level samples. The meaning of this pattern is unclear, and since the exact location and rationale for the bulk samples is unknown, it would not be prudent to hypothesize further.

It is also possible that there are differences in bone counts or taxonomic distribution horizontally as well as vertically. Given the small spatial sample, it does not seem worthwhile to investigate this in detail, but bone counts by quadrant are: 51A = 756, 51B = 138, 51C = 587, 51D = 631, 52C = 19,142, 52D = 15,007. This is a striking difference between units, with Square 51 averaging 528 specimens per quad, and Square 52 averaging 17,074 specimens, more than 30 times larger than the Square 51 quads. This is not easy to understand. If the bulk samples taken were the same volume in each quad, as a casual visual inspection implied, one would not expect such a difference. Perhaps the samples were not the same volume between the two squares, and the samples obtained in Square 52 were larger for some reason. As mentioned in Chapter IV, though it appears that materials were originally removed using a volumetric sampling technique, it is unknown what volume was used or if targeted volumes varied between proveniences. Site notes do not make reference to individual samples, so providing a satisfactory explanation for the difference in bone counts by provenience remains a challenge.

The investigation of possible screen size bias is summarized in Table 11, which is limited to fish since I was interested in investigating the lack of herring or other small fish. I was interested in this to determine the efficacy of bulk samples and using different size fractions in a lab setting following recommendations discussed by Partlow (2006). Not surprisingly, the herring remains recovered from the bulk samples were found mostly in the 1/8” screen fraction (96%), while other fish groups varied from about half in the 1/4" fraction and half in the 1/8” fraction (Order Scorpaeniformes), to mostly in the 1/4" screen (cods and flatfishes). These trends are as expected for fish size, and emphasize that the cods and flatfishes are large specimens of these groups, a pattern that was visible subjectively throughout the analysis, especially while using modern comparative skeletons.

I evaluated skeletal part representation for the three orders with large sample sizes (Salmoniformes, Gadiformes, and Scorpaeniformes) using minimum animal units (MAUs) for four body regions: cranial, pectoral, trunk, and tail. Skeletal part representation is detailed in Table 12. The pattern for Gadiformes and Scorpaeniformes is strikingly similar, with strong representation of the cranial and pectoral regions, and moderate representation of trunk and tail regions. Though represented by a much smaller MNE, Salmoniformes show a slightly different trend, represented primarily by the pectoral and trunk regions.

Table 11. Fish Taxa Recovery by Screen Size

Taxon	1/4" Screen		1/8" Screen		Site Total Fish	
	#	%	#	%	#	%
Salmoniformes						
Oncorhynchus sp.	47	58.75	33	41.25	80	0.22
Salmoniformes Total	47	58.75	33	41.25	80	0.22
Clupeiformes						
Clupea pallasii	2	4.08	47	95.91	49	0.13
Clupeiformes Total	2	4.08	47	95.91	49	0.13
Gadiformes						
Family Gadidae						
Gadus macrocephalus	1,866	80.36	456	19.63	2,322	6.43
Theragara chalcogramma	409	17.61	51	11.08	460	1.27
	--	--	1	100.00	1	<0.01
Gadiformes Total	2275	81.74	508	18.25	2783	7.71
Scorpaeniformes						
Family Hexigrammidae						
Hexagrammos	2	66.66	1	33.33	3	<0.01
Decagrammus	1	33.33	2	66.66	3	<0.01
Hexagrammos sp.	6	75.00	2	25.00	8	0.02
Family Cottidae	14	24.56	43	75.43	57	0.15
H. jordani	83	83.83	16	16.16	99	0.27
H. hemilepidotus	1	100	--	--	1	<0.01
Hemilepidotus sp.	179	54.57	149	45.42	328	0.90
Myoxocephalus sp.	3	100	--	--	3	<0.01
Sebastes sp.	7	77.77	2	22.22	9	0.02
Unidentified	151	31.78	324	72.00	475	1.31
Scorpaeniformes Total	447	45.33	539	54.66	986	2.73
Pleuronectiformes						
Family Pleuronectidae						
Subfamily Hippoglossinae	11	91.66	1	8.33	12	0.03
Hippoglossus stenolepis	27	100	--	--	27	0.07
Atheresthes stomias	22	100	--	--	22	0.06
Subfamily Pleuronectinae	1	100	--	--	1	<0.01
Lepidopsetta sp.		--	1	100	1	<0.01
Platichthyes stellatus	2	50.00	2	50.00	4	0.01
Unknown	1	100.00	--	--	1	<0.01
	124	95.38	6	4.61	130	0.36
Pleuronectiformes Total	188	94.94	10	5.05	198	0.54
Identified Total	2,959	72.24	1,137	27.75	4,096	11.35
Unidentified Total	4,418	13.80	27,559	86.12	31,977	88.64
Site Total	7,377	20.45	28,696	79.54	36,073	100

Table 12: Skeletal Part Representation by Order

Body Region	Salmoniformes[1]			Gadiformes[2]			Scorpaeniformes[3]		
	MNE	MAU	%MAU	MNE	MAU	%MAU	MNE	MAU	%MAU
Cranial	2	1	40	42	21	100	32	16	100
Pectoral	5	2.5	100	36	18	86	18	9	56
Trunk	3	1.5	60	13	6.5	31	10	5	31
Tail	n/a	--	--	13	13	62	21	10.5	65

[1] For Salmoniformes, the MNE was obtained from the following elements: basypterigium (trunk), scapula (pectoral), and quadrate (cranial). There were no tail parts identified in the analysis.
[2] For Gadiformes, the MNE was obtained using the following elements: parasphenoid (cranial), supracleithrum (pectoral), basypterygium (trunk), and ultimate vertebra (tail).
[3] For Scorpaeniformes, the MNE was obtained using the following elements: epihyal (cranial), supracleithrum (pectoral), basypterygium (trunk), and ultimate vertebra (tail).

The high proportion of head parts for cod and Scorpaeniformes strongly suggests a local catch, after the methods of distinguishing local from non-local fish catch described by Lubinski and Partlow (2012). The salmon skeletal part distribution shows an under-representation of heads, possibly implying that some of the fish remains are the results of consumption of stored salmon, although there are far more heads from Monashka Bay than sites like Settlement Point and Kiavak, which have only 4-12 % cranial MAU (Partlow 2000). Additionally, the sample size is extremely small. A number of complicating factors inherent to this approach, including recovery method, taphonomic factors, disposal patterns, and choices of individual fishers (Lubinski and Partlow 2012), make this a somewhat tenuous conclusion. Furthermore, the small sample size for salmon relative to the other taxa at the Monashka Bay site is less than ideal, making definitive statements about the consumption of salmon at the site less conclusive.

Discussion of Kodiak Island Fish Samples

In terms of relative abundance of fish taxa, Monashka Bay is broadly similar to other Koniag-era fish assemblages from the Kodiak Archipelago (Table 13). The Monashka Bay site includes the same suite of taxa and in generally similar proportions, though the major difference is seen in the comparatively low ranking for salmon at Monashka Bay. Salmon dominates the New Karluk, Settlement Point, and Rolling Bay assemblages, ranking highest in taxonomic abundance. Salmon and cod abundance are virtually identical at Larsen Bay, and salmon is then the second most highly ranked taxon (after cod) at AFG-012, Old Karluk, and Kiavak. This pattern is not apparent at Monashka Bay, where cod, scorpaeniforms, and even flatfish outrank salmon by a significant margin. Additionally, the fact that Scorpaeniformes rank as the second most common taxon is slightly unusual, since they rank third (or lower) after salmon and cod at all of the other sites.

A possible explanation for the dearth of salmon remains at the Monashka Bay site is preservation, such as density-mediated attrition compared to other taxa, particularly cod. Smith (2008, Smith et al. 2011) has demonstrated that cod elements are much more dense than salmon elements, and could be expected to survive more readily, perhaps resulting in a taxonomic abundance of cod over salmon. However, there are so few salmon remains at the site, it is hard to fathom that this explanation is sufficient to explain the lack of salmon, especially given the broadly similar nature of the other sites in which salmon dominate.

Table 13. Comparison of Koniag Fish Assemblages Identified to Order in the Kodiak Archipelago[1]

Site	Salmoniformes (Rank)	Gadiformes (Rank)	Scorpaeniformes (Rank)	Pleuronectiformes (Rank)	Clupeiformes (Rank)	Other[2] (Rank)	NISP	Reference
AFG-012	1,763 (2)	4,469 (1)	712 (3)	36 (4)	--	--	6,980	Partlow (2000)
AFG-015 Settlement Point	11,839 (1)	7,132 (2)	716 (3)	117 (4)	--	79 (5)	19,883	Partlow (2000)
KAR-001 New Karluk	10,942 (1)	7,170 (2)	162 (5)	284 (3)	98 (6)	229 (4)	18,885	West (2009)
KAR-029 Larsen Bay	161 (2)	163 (1)	8 (3)	--	--	--	332	Yesner (1989)
KAR-031 Old Karluk	5,224 (2)	8,283 (1)	134 (4)	156 (3)	--	25 (5)	13,822	West (2009)
KOD-026 Monashka Bay	80 (4)	2,783 (1)	986 (2)	198 (3)	49 (5)	1 (6)	4,097	This thesis
KOD-099 Kiavak	282 (2)	690 (1)	40 (4)	140 (3)	--	--	1,152	Partlow (2000)
KOD-101 Rolling Bay	118 (1)	5 (2)	2 (3)	--	--	--	125	Partlow (2000)

[1] All of the assemblages reported here are 1/8” fractions except for Larsen Bay, which has an unknown recovery method.
[2] Includes all other bony fish orders (of which there were none), and Class Chondrichthyes.

A major contribution of this analysis is that it adds to the emerging picture of fish subsistence on Kodiak Island by showing that salmon specialization was not necessarily a hallmark of Koniag subsistence practices, as was previously thought. Though salmon is often regarded as the primary resource and driver of social complexity throughout the North Pacific Rim (Ames 1981; Erlandson et al. 1992), this role has also been widely debated (Butler and Campbell 2004). The assumption that salmon was a universally dominant resource during late prehistory in the Kodiak Archipelago is partially due to the excellent preservation at the Karluk sites, particularly Old Karluk (KAR-031), which were described fairly early in the characterization of the Koniag tradition (Jordan and Knecht 1985). That site, however, is somewhat unusual in that it is located on a highly productive salmon stream. The dominance of salmon at Old Karluk seems to support the assertion that Koniag-era sites were geared toward specialized use (Fitzhugh 2003), and that this site simply reflects a riverine resource extraction area (where salmon are the obvious prey choice), as opposed to an area dedicated to marine rather than riverine resources (West 2009). The importance of salmon during Koniag times, therefore, is not inaccurate per se, but its role may be overemphasized by the early discovery and excellent preservation at Old Karluk. Subsistence during this time was undoubtedly more diverse and flexible, a conclusion supported by the findings reported in this thesis. Even if salmon was at times the preferred and dominant resource, fluctuating populations of salmon (Finney et al. 2000) likely forced people to be more flexible in their subsistence practices and they may have developed different strategies for harvesting a wide variety of fish resources to accommodate shifts in abundance over time (West 2009).

In fact, as shown in Table 13, the most abundant fish group at many of the Koniag-era sites is Order Gadiformes, the cods. Cods are ranked first in five of the eight assemblages, and if only the midden sample was considered at Settlement Point, cods would have ranked first there as well (Partlow 2006), making six of the eight assemblages (75%) better characterized as cod-dominated rather than salmon-dominated. The Monashka Bay fish assemblage is in this way very typical of Koniag sites, but very different in the abundance of Order Scorpaeniformes and relative lack of Order Salmoniformes, demonstrating that fish subsistence during Koniag times was more diverse than originally assumed.

The faunal analysis of Koniag-era midden material from Monashka Bay indicates that subsistence was based on deeper-water fishing and this is further supported by the artifact types recovered at the site, namely grooved cobbles and notched pebbles. These artifacts are typically thought to serve as fishing line weights and net sinkers (Knecht 1995). Based on the faunal identifications, the marine fish targeted, particularly the cod and flatfishes, were demersal (living on or near the ocean floor), and could be harvested using long lines secured to the shore. Based on the very large size of many of the cod and halibut remains identified at the site, it could well be that people were intentionally targeting large fishes, likely through use of large bone hooks. Unfortunately, there is no direct evidence of such hooks at the site, due to poor preservation (Clark 1974a; Donta 1994). An in-depth discussion of artifact types recovered from the Monashka Bay site is included in Chapter VI.

Faunal remains interpreted within the context of recovered artifacts can also contribute to a better understanding of site seasonality. Typically, long-line fishing of cod and halibut was employed in the spring and summer, when warmer temperatures draw deep water taxa (such as cod and halibut) into bays and lagoons to feed (Saltonstall and Steffian 2006; West 2009). With that in mind, the abundance of cod points to a tentative conclusion that the site may have been occupied during the spring or summer months. It should be noted, however, that local variation in water temperature causes some populations of fish (cod, in particular) to be available year-round in some areas (West 2009). As a result, the presence or absence of fish species at a site cannot be relied upon as the sole indication of seasonality. The lack of salmon could be used to suggest that the faunal sample was not generated in winter, as a winter sample could be expected to include stored salmon, as in House 1 at the Settlement Point site (Partlow 2006). The presence of shearwaters in the bird assemblage also seems to imply the sample was not generated in winter, since shearwaters are abundant Kodiak Archipelago summer residents that are absent in the winter (Forsell and Gould 1981). Future research such as stable isotope analysis of shellfish remains from the site, could give a more definitive picture of site seasonality, but is currently outside the scope of this project.

Koniag sites are often thought of as being use-specific (Fitzhugh 2003), and it is possible that the Monashka Bay site was a specialized cod fishing camp, based on the large proportion of cod remains in the midden sample. This might also explain the abundance of sculpins, which are often caught incidentally during cod fishing (Mischler 2001). An alternative explanation might simply be that cod were particularly abundant at this locale compared to some other sites (an historic cod saltery was located in this bay [Clark 1963]), but a direct correlation between fish availability and archaeological abundance in the region has been disproven in at least one case (West 2009). Additionally, since cod are the most abundant order in many Koniag sites, the availability argument would seem to need to apply at all of these sites. I suspect that the processes responsible for the patterns of resource use are much more complex, encompassing perhaps fishing and storage technology, population growth, and other cultural and environmental factors, though this type of analysis is beyond the scope of this thesis. More analyses of coastal sites will shed light on the real patterns of subsistence during this time period.

The following chapter concludes this thesis with an article manuscript describing the results of Donta's 1989 excavation, which produced the faunal sample used in this thesis. The article begins with a summary of excavation methods, features, and artifacts recovered in the excavation, moves on to discuss my faunal findings, and concludes with discussion of Koniag faunal subsistence and the meaning of a particular artifact type, incised stones, to the definition of Koniag archaeological phases. The article was built from an unpublished 1994 manuscript on the excavation results by Chris Donta, adding in my thesis faunal results, and discussion with a team of researchers, including original excavator Chris Donta, faunal analysts Megan Partlow and myself, and collaborator Pat Lubinski.

CHAPTER VI

JOURNAL ARTICLE

The manuscript composing this chapter will be submitted to the *Alaska Journal of Anthropology*. It is coauthored with the student, the initial excavator who reported on the non-faunal results, and two of the committee members who provided significant assistance on the project. The manuscript begins on the next page. This is a draft of the manuscript to be submitted; the final manuscript (assuming it is accepted) will be somewhat different as it is revised for submission and in response to external peer review.

ARTIFACTS, HOUSES AND FAUNA FROM 1989 EXCAVATIONS AT THE MONASHKA BAY SITE ON KODIAK ISLAND

Christopher Donta, Ayla Aymond, Megan A. Partlow, and Patrick M. Lubinski

ABSTRACT

In 1989, Christopher Donta directed investigations at the Monashka Bay site on Kodiak Island, previously investigated by Donald Clark in 1961-1962. Excavation of 40 m^2 of units revealed partial house features and artifacts from the late Kachemak and Koniag traditions, including 147 incised slate stones, a single artifact of copper, and one sherd of fiber-tempered pottery. Radiocarbon dates span from about 1680 to 240 B.P. The incised stones and dating highlight the need for reconsidering the delineation of Koniag tradition phases already demonstrated with the recent re-dating of the Karluk site. Analysis of more than 36,000 bone specimens from the Koniag midden at the site indicates a focus on cod, with modest amounts of sculpin, and small amounts of flatfish, bird, salmon, sea mammal, and herring. This demonstrates diversity in Koniag subsistence, with unusually low proportions of salmon and high proportions of sculpins.

INTRODUCTION

The Monashka Bay site (KOD-026) is located on the northeast tip of Kodiak Island, in the Kodiak Archipelago of south-central Alaska (Figure 1). It was partly excavated in 1961-1962 under the direction of Donald Clark (1974a), revealing cultural deposits from the Kachemak and Koniag cultural traditions. These materials and their potential for better understanding the transition from Kachemak to Koniag made it of interest to the Bryn Mawr College research program on the island that began under the direction of Richard Jordan in 1983 (Jordan and Knecht 1988). In 1989, Bryn Mawr graduate student Christopher Donta directed excavations at the site in order to investigate the Kachemak to Koniag transition, and compare the data from this site to previous Bryn Mawr excavations. Data from the site was incorporated into Donta's (1993) Ph.D. dissertation and published papers on incised stones (Donta 1992, 1994), but a general report of excavation findings was not made. This paper presents findings from the 1989 excavations as well as results of faunal analysis completed for Ayla Aymond's (2015) master's thesis.

SITE DESCRIPTION AND PRIOR WORK

The Monashka Bay site is situated approximately 5 km northeast of the town of Kodiak, on the northeastern part of Kodiak Island. It is located on land belonging to the Town of Kodiak, adjacent to Fort Abercrombie State Park. The bay itself is of moderate size, about 4 km long and 2.4 km wide, opening into Marmot Bay to the northeast.

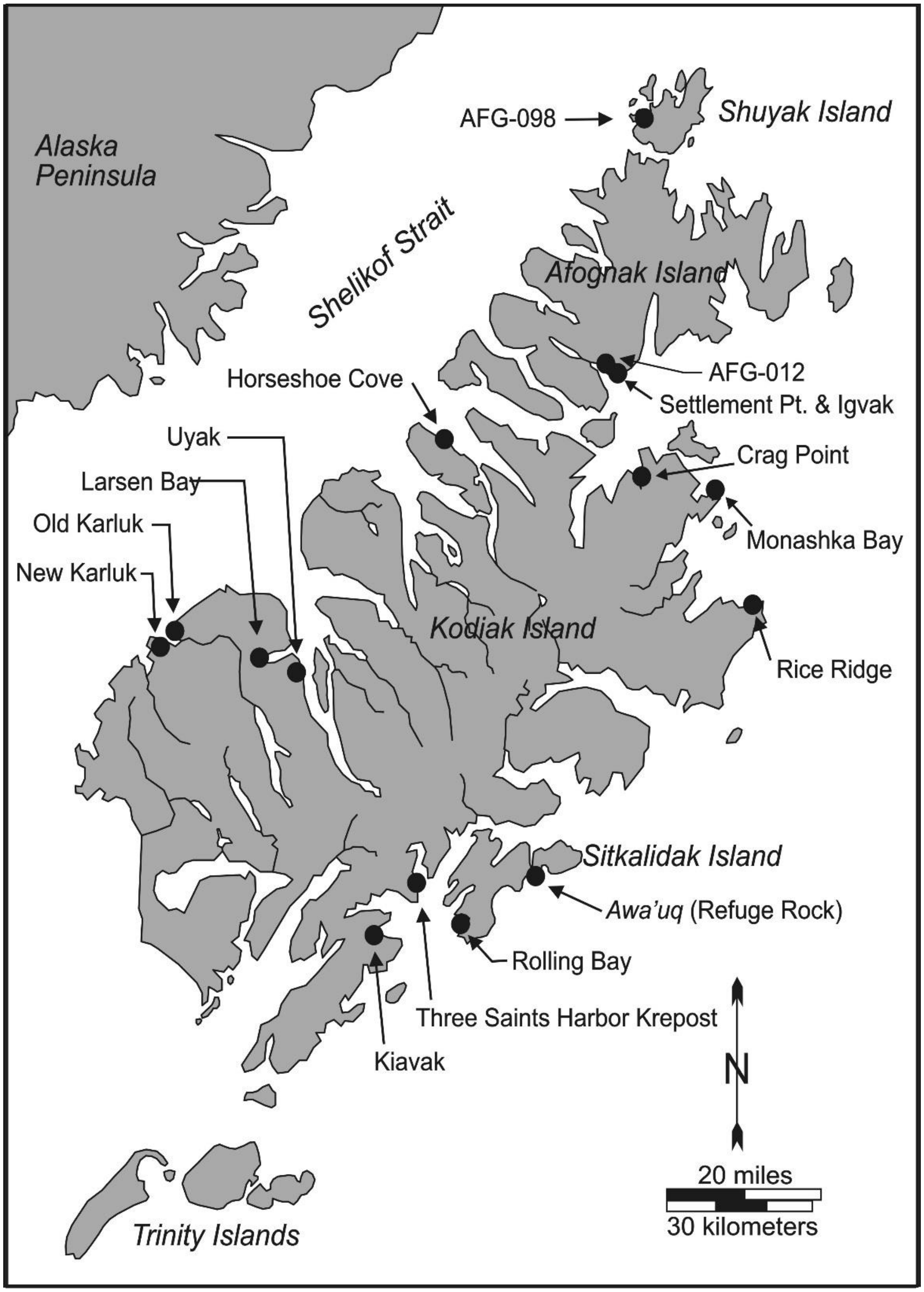

Figure 1. The Kodiak Archipelago, with location of Monashka Bay and other archaeological sites mentioned in the text.

In 1989, the Monashka Bay site (Figure 2) consisted of a ~90 m long deposit of cultural materials lying in a north-south direction along the eastern shoreline of the bay, and extending ~20 m inland from the erosion front. Based on the erosion face, the lowest deposits at the site lie ~ 1 m above high tide level. Cultural deposits appear to have been relatively undisturbed prior to the 1912 Mt. Katmai volcanic eruption on the Alaska Peninsula, which covered and sealed the underlying stratigraphy. Later impacts to the site were made for World War II mobilization at nearby Fort Abercrombie; plowing for cultivation; creation of a parking area, road, and boat launch in 1959; and the tsunamis and subsidence from the 1964 "Good Friday" earthquake (Clark 1963, 1974a).

Figure 2. 1989 photograph of the Monashka Bay site, from southwest.

Donald Clark, in conjunction with the Kodiak and Aleutian Islands Historical Society, conducted excavations at the site during the summers of 1961 and 1962 (Clark

1963, 1974a). These were placed adjacent to the boat launch road and comprised four 6 x 6 ft units dug to a maximum depth of 2.4 m below ground surface. Clark divided the stratigraphic levels he encountered into two major units, which he labeled “A” and “B.” Materials from the lower, or “A” levels Clark found to correlate with the Kachemak tradition, while the upper, “B” levels were identified as containing Koniag phase materials. A third, “C” level was also described by Clark. This consisted of a number of thin charcoal-stained gravelly laminae in association with a fire pit and a stone slab alignment, set within the “B” levels. This “C” feature appears to be a portion of a Koniag housepit (Clark 1974a:29-31). A single radiocarbon sample from the “C” levels yielded an age of 298 ± 44 B.P. (Clark 1974a:46).

1989 EXCAVATIONS, STRATIGRAPHY, AND DATING

In the summer of 1989, Christopher Donta directed investigation by a crew of four, with funding provided by the Kodiak Area Native Association and Bryn Mawr College, and supported by Fort Abercrombie State Park. Eight 2 x 2 m units, two 2 x 1 m units, and four 1 x 1 m test pits were excavated (Figure 3), totaling more than 70 m^3 of sediment, and about 39 m^3 of cultural deposits. The majority of work took place within a block of seven and a half 2 x 2 m units named Area 2 (Clark’s excavation was named

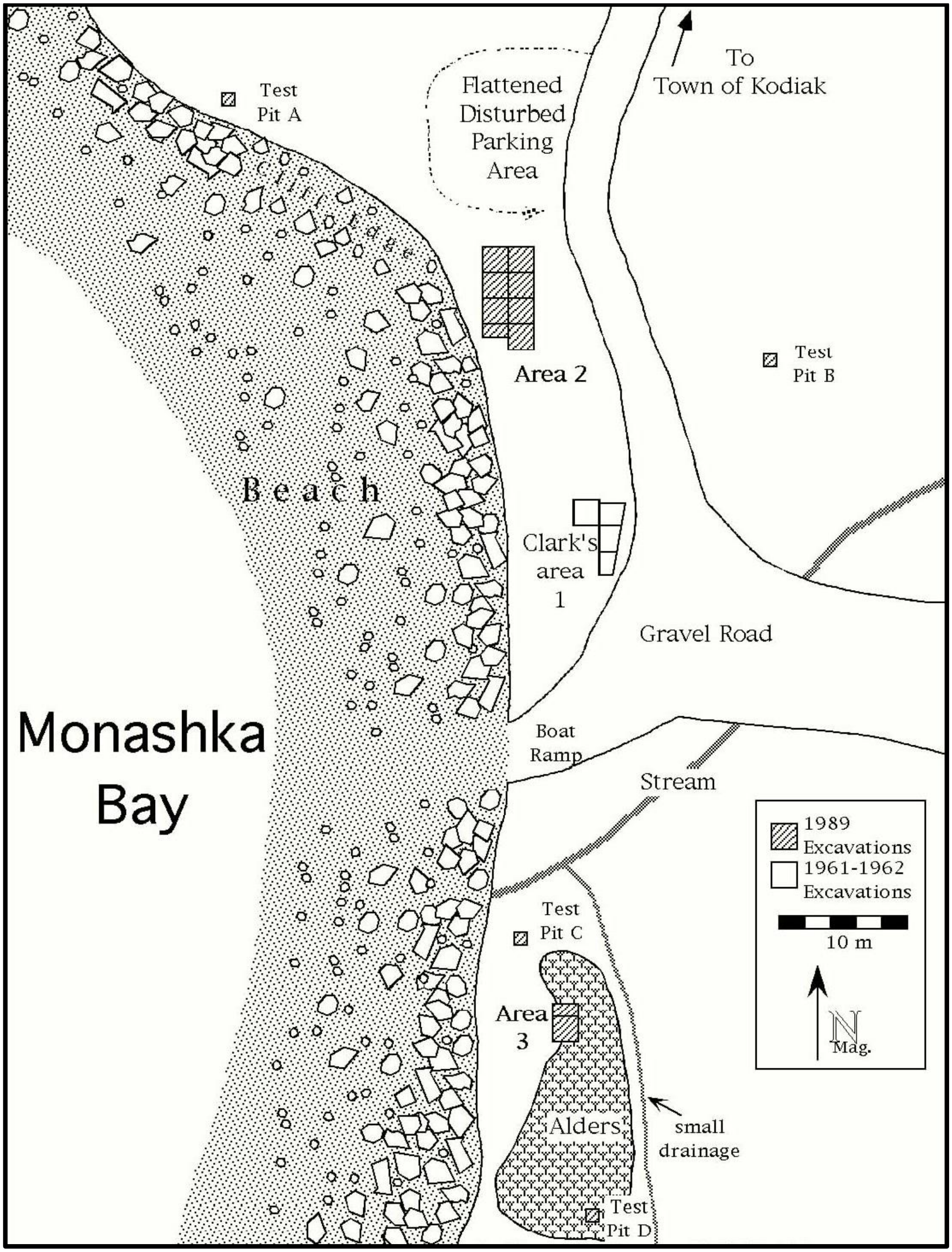

Figure 3. Excavations at the Monashka Bay site.

Area 1). An additional 2 x 3 m block (Area 3) was excavated at the southern end of the deposits, where a midden was observed. Four additional 1 x 1 m test pits were excavated in other parts of the site.

Excavation was by natural level, and recorded below a vertical datum for each block. Excavations proceeded through cultural deposits (e.g., midden) until culturally-sterile sediment was reached at 130-250 cm below surface. Artifacts of interest were collected by point provenience. Excavated fill was not screened, but bulk sediment samples were taken systematically in Area 3. In this area, a sample was collected from each 1 x 1 m sub-unit and every excavation level. In both Areas 2 and 3, three principal cultural strata were excavated and numbered Level 1 through Level 3 from the top down. These cultural strata were buried beneath 1-90 cm of construction-disturbed overburden and Katmai ash.

In Area 2, Level 1 was a loose brown layer of loamy soil, approximately 30 cm thick. Level 2, approximately 10-70 cm thick, consisted of a number of thin, gravelly or silty layers, interspersed and underlain by lenses of shell midden and concentrated fire-cracked cobbles. The thin laminae, slate slab alignments and postmolds in Level 2 indicate that it included portions of housepit features. Fire-cracked rock was abundant in both Levels 1 and 2. Level 3 was a 30-130 cm thick layer of wet, greasy black sediment with a moderate to high amounts of fire-cracked and unmodified rock.

Level 1 in Area 3 was a midden composed of fish bone, fire-cracked rock, and black, ashy soil, in most places about 20 cm thick. Level 2 was a denser faunal deposit comprised of shells, sea urchin, and bone, in a dark brown clayey soil matrix, from 40 to as much as 80 cm thick. Level 3 was a darker, clayey wet soil, with a lesser amount of decaying faunal material and some fire-cracked rock, grading into a nearly sterile brown silty clay at its base, about 30 cm thick. This layer rested directly on a sterile orange-brown silt about 45 cm thick, which was in turn underlain by glacial till at a depth of 2.5 m below the ground surface.

As with the 1961-62 excavations by Clark, the 1989 excavations revealed both Kachemak and Koniag cultural materials, described in more detail below. Based on the distribution of these materials and radiocarbon dates, Area 2 includes a Late Kachemak component in Level 3 and Koniag component(s) in Levels 1 and 2, while Area 3 appears to be Koniag only. All radiocarbon dates obtained on the site are provided in Table 1.

The assignment of Area 2, Level 3 to the Late Kachemak phase of the Kachemak tradition is based principally on the radiocarbon dates obtained in this level, which fall comfortably within the typically expressed range of 2700-800 B.P. (e.g., Steffian et al. 2006: Table 2). The assignment of Area 2, Levels 1 and 2 to the Koniag tradition is based on the occurrence of Koniag diagnostic artifacts such as a leaf-shaped end blade, points with medial ridges, and abundant incised stones (Saltonstall and Steffian 2006:Table 7). The assignment of Area 3 to the Koniag tradition is based on its three radiocarbon dates that span the depth of the deposits, all of which fall comfortably within the typically expressed range of 800-200 B.P. (e.g., Steffian et al. 2006: Table 2).

Table 1. Radiocarbon Dates from the Monashka Bay Site

Provenience	Charcoal material[1]	Lab No.	Raw Age (BP)	Calibrated Age[2] (AD)	Reference
Area 2, top of Level 3	Unknown	Beta-34832	1680 ± 50	239-533	Donta 1993; Mills 1994
Area 2, base of Level 3	Unknown	Beta-33545	1570 ± 60	354-614	Donta 1993, Mills 1994
Area 3, Level 3	Alder	Beta-416118	320 ± 30	1484-1645	Aymond 2015
Area 1, Level C	Composite	P-1049	298 ± 44	1471-1792	Clark 1974a; Mills 1994
Area 3, Level 2	Alder	Beta-416117	290 ± 30	1493-1662	Aymond 2015
Area 3, Level 1	Alder	Beta-416116	240 ± 30	1526-1949	Aymond 2015

[1] The alder samples were identified as small fragments of short-lived *Alnus* sp. wood by Shaw (2015), while the Area 2 samples were not identified. The Area 1 sample was dated using the beta decay method on a large composite sample of charcoal, while the remaining dates were by accelerator mass spectroscopy.
[2] Extent of 2 sigma age range calibrated with CALIB version 7.0.2 (Stuiver and Reimer 2014) using the IntCal13 dataset (Reimer et al. 2013).

1989 ARTIFACTS

A total of 685 artifacts were recovered from the Monashka Bay site during the 1989 excavations (Table 2). Most of this sample came from Area 2 (577/685, 84%), while 11% (75/685) was from the Area 3 midden, and the remaining artifacts were from test pits and surface finds. A number of these artifact types were distributed across both the level interpreted as Kachemak (Area 2, Level 3) and the levels interpreted as Koniag (Area 2, Levels 1-2 and Area 3). These were primarily lithic artifacts, including ground slate points and ulus; pecked and/or ground cobble net weights, mauls, and adzes (made of greywacke, quartzite, basalt, or greenstone); sandstone or pumice abraders; split cobbles; hammerstones; polishing stones; and flat beach pebbles or tabular pieces of slate with incised markings on one or more sides. The only widely distributed bone artifacts were wedges and modified pieces of uncertain use. The remaining artifact types had a more limited distribution.

Table 2. Artifact Types from 1989 Excavations

Category	Type	Count	Category	Type	Count
Hunting/Fishing	Worked cobbles	53	Household	Lamp	1
	Bone socket piece	1		Paint stone	1
	Bone points	5		Pottery	1
	Ground slate points	24		Bone handle	1
Tools	Split cobbles	42	Miscellaneous	Coal labret	1
	Hammerstones	32		Shell bead	1
	Mauls	6		Stone ball	1
	Adzes	42		Incised Stones	147
	Abrasive stones	18		Other objects	6
	Polishing stones	6			
	Ulus	105	Waste	Chipped stone	52
	Other knives	11		Ground stone	67
	Drill bits	2		Carved bone	33
	Endscraper	1		Carved wood	4
	Bone wedges	3		Unmodified lithics	13
	Bone stake	1			
	Bone awls	3			
	Engraving tool	1			

Artifacts limited to the Late Kachemak level include two ground slate Type III flensing knives (Heizer 1956), and a ground slate end scraper. The Type III knife has been postulated by Heizer (1956:51) as limited to the Kachemak tradition. There was also a single piece of pottery, a body sherd with fiber temper measuring 35 x 36 x 7 mm thick, with two perpendicular incised lines. Two Type 4b tri-notched cobbles (Clark 1974a:34), sometimes considered a Koniag diagnostic, were recovered at the very top of this level.

The pottery sherd is unusual in the Kodiak Archipelago in both its early date and tempering material. Most pottery is limited to the Koniag tradition (Saltonstall and Steffian 2006:Table 7), but Koniag pottery is invariably sand or gravel-tempered (Clark 1974b:115), unlike the Monashka Bay specimen. A few sherds with fiber tempering were recovered in 1964 excavations at the Crag Point site (Clark 1970), located about 16 km west of Monashka Bay. The Crag Point sherds were found in Late Kachemak or transitional Koniag contexts, associated with a radiocarbon date (B-835) taken from charred materials on sherds (Clark 1974b:126-127). Mills (1994:133) rejects this 1110 ± 100 B.P. estimate as too composite to be meaningful, since it was "scraped from numerous disparate pottery sherds."

There was a larger diversity of artifacts in the Koniag levels, and some artifact types were notably more abundant in Koniag levels, but it should be remembered that these levels accounted for more excavated volume at the site. Cultural materials limited to Koniag levels include: two ground slate Type I flensing knives (Heizer 1956:51), a ground slate leaf-shaped end blade, two ground slate points with medial ridges, a graywacke lamp, a fragment of spool-shaped labret made of coal, a bone harpoon socket piece, three bone awls, and a unique composite tool of bone and copper.

The labret fragment has several scratches, but no apparent design, shows some evidence of teeth wear, and would be about 41 mm long by 35 mm wide if whole. This spool or pulley-shaped labret is a typical Koniag style and size (Steffian and Saltonstall 2001). The origin of the coal is unknown, but possible sources exist on Sitkinak Island to the south of Kodiak Island, or on the Alaska Peninsula, based on a sample of Kachemak coal artifacts subject to vitrinite reflectance testing by Steffian (1992a).

The composite tool exhibits a 12 cm long bone handle with a 7 mm long copper blade inset into one end of the handle (Figure 4). The artifact is interpreted as a fine knife or engraver, and the metal is presumed native copper. A small piece (1 g) of copper oxide was found in the same level. Copper artifacts are rare but present in sites of the archipelago, such as the 85 mm long copper blade found more than a meter below surface at the Koniag-age Rolling Bay site on southeast Kodiak Island (Clark 1974b:99). The origin of the metal is uncertain, but there are a number of sources known in south-central Alaska, including the Wrangell Mountains and Prince William Sound (Cooper et al. 2008), and the inhabitants of the Kenai Peninsula traded for this material with the Chugach and Atna in the historic period (Davydov 1977:199).

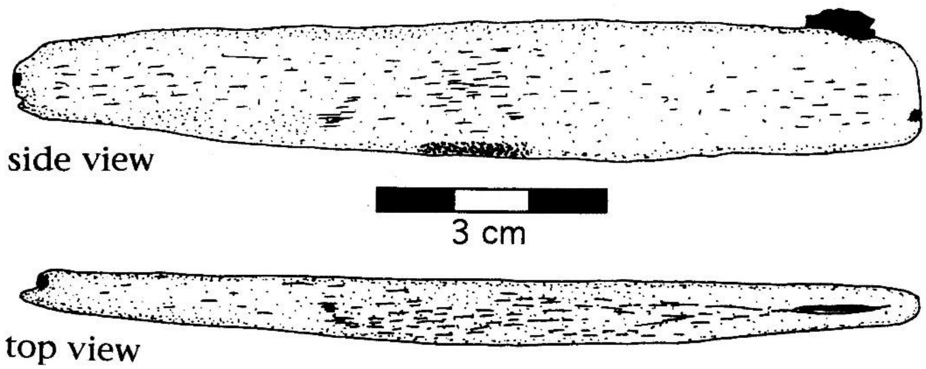

Figure 4. Bone and copper composite tool from Area 2, Level 2. The inset copper blade is indicated in black at the right end of the tool.

The most common artifacts found during the 1989 excavation were incised stones. A total of 147 flat beach pebbles or tabular pieces of slate were collected with incised markings on one or more sides, and ranging from 29-239 mm in length. Incised stones were found across the site, including both midden and housepit contexts and Koniag and Kachemak levels, though the vast majority (132) were collected from housepit contexts in Area 2, and most of those within a narrow 30 cm horizontal band in Level 2. Of the 147 incised stones, 28 specimens were incised on both sides, raising the total number of images to 175. Of this total, nearly 75% represent some portion of a human figure (see Figure 5). The remaining 25% consist of geometric or other, non-human images (see Figure 6), such as the tree-like motif found on 5% of images (Figure 6: A, B, C). The latter motif, occurring on eight specimens, was found exclusively in the Kachemak level. Cultural interpretations of incised stones are beyond the scope of this paper, and the interested reader is directed to works by Donta (1992, 1993, 1994) for more on that subject.

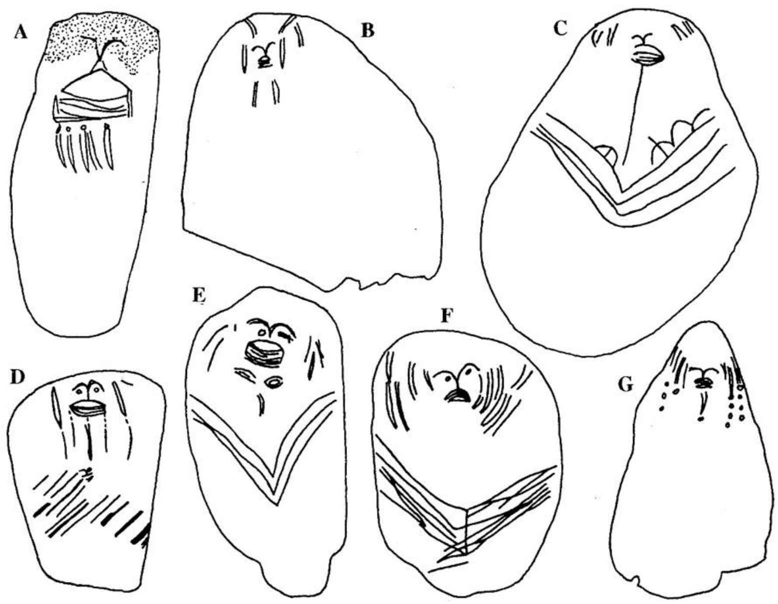

Figure 5. Examples of incised stones with anthropomorphic motifs. All from Area 2, Level 1.

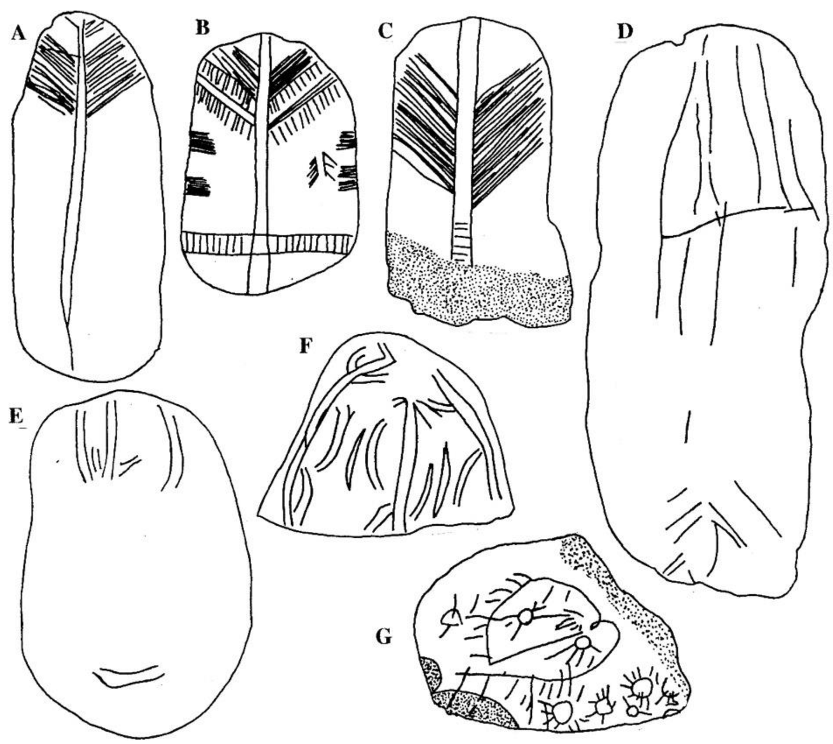

Figure 6. Examples of incised stones with non-anthropomorphic motifs. All from Area 2, Level 3 except G, which is from Level 1.

1989 FEATURES

In addition to concentrations of fire-cracked rock and lenses of shell midden within Area 2, and extensive shell midden in Area 3, Area 2 excavations revealed partial remnants of structures. These included compact, charcoal-stained living floors, as well as stone alignments, postholes, pits, drainage ditches, and a single stone-lined hearth. These features composed two structures interpreted as partial semi-subterranean pithouses: the Level 2 house, and Level 3 basal house. A third composite feature near the top of Level 3 is more ambiguous, but may be related to a house as well.

The Level 2 house feature was discovered at the very top of Level 2, and consisted of several floor layers, one wall margin, a rock alignment, three postmolds, and a clay-lined sub-floor pit (Figure 7). There was one distinct house floor composed of a black, gravelly, compact layer at the top of the level, and at least two more similar but discontinuous floor layers below, separated by thin, brown clay laminae. The wall margin at the south end of the excavation block was expressed as a looser, brown sediment interpreted as collapsed wall and roof sods. The exposed house was at least the width of the excavation block (4 m) and 6.5 m long. The rock alignment included 14 slate slabs, probably used for the subfloor drainage of water, as was noted in nearly every

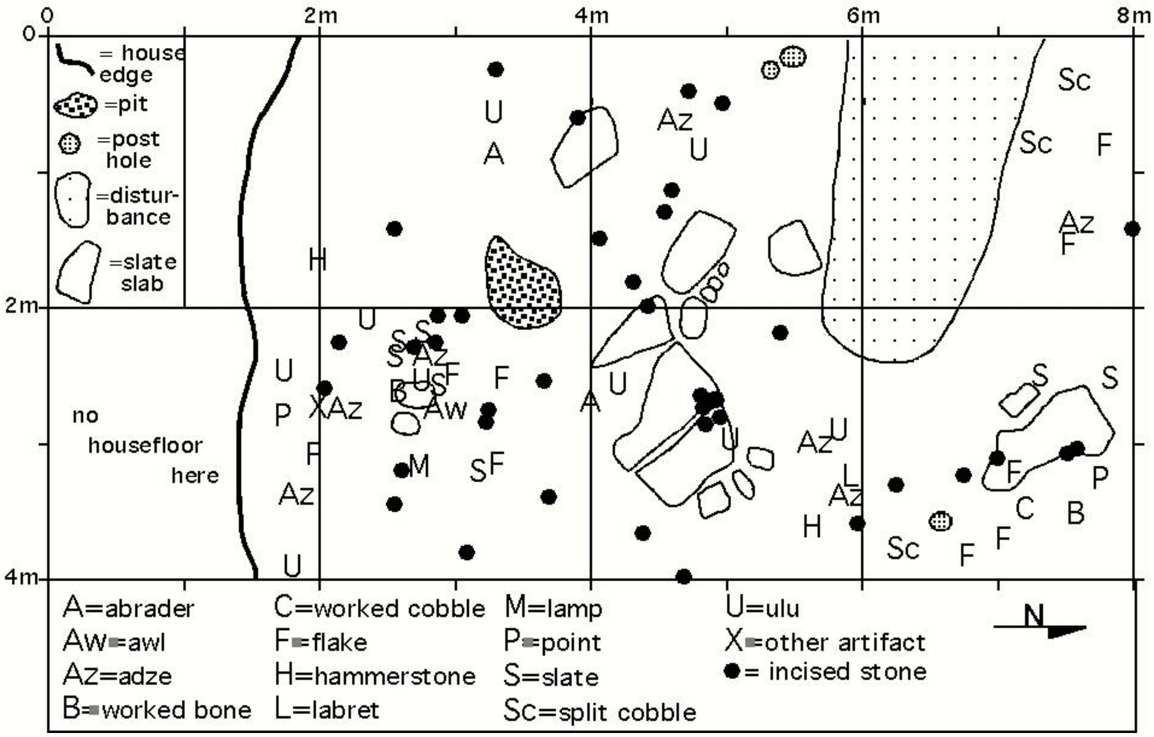

Figure 7. Plan of Level 2 house remnant and associated artifacts.

house at New Karluk (Jordan and Knecht 1988: 260-263). The three postmolds measured up to 15 cm in diameter and 7 cm deep. The clay-lined pit, presumably used for storage, is similar to features documented in House 1 at Settlement Point (Saltonstall and Steffian 2006). No hearth or entrance tunnel was found.

The dating of the Level 2 structure is based on the presence of the many incised stones and single medial-ridge type ground slate point found on the floor. There are no associated radiocarbon dates. It appears to be a Koniag house remnant, but does not show multiple rooms. The area of the exposed portion is about 26 m^2, which is somewhat large for a Koniag central room, but smaller than the central room of Structure

1 at Nunakaknak (30.25 m^2) or House 1 at Settlement Point (28.5 m^2), according to data compiled by Saltonstall and Steffian (2006:Table 31).

The upper Level 3 feature consisted of a stone alignment and two postmolds (Figure 8) within a black, wet, disagreeable-smelling sediment encountered about 50 cm below the Level 2 house floor, just under the top of Level 3. The rock alignment consisted of 25 slate slabs layered into roughly two levels, forming a sort of walkway approximately 80 cm wide by at least 160 cm long. This is thought to be a drainage feature. Two postholes measuring up to 20 cm in diameter and 30 cm in depth were uncovered to the north and northwest of the slate slabs. No distinct house floor or walls were identified with this feature. It is dated by superposition with a charcoal sample collected 10 cm above, with a radiocarbon age of 1680 ± 50 B.P., and presumed to be affiliated with the Late Kachemak phase.

The lower Level 3 house feature was the most intact structure at the site, and was found dug directly through the underlying sterile orange-brown silt into glacial till. The portion exposed in the Area 2 excavation block measured about 4.4 m wide by at least 3.6 m long, with a sort of rectangular niche in its southeast corner measuring about 50 x 50 cm. It consisted of a distinct floor with three wall margins, three drainage ditches partially covered with slate slabs, nine postmolds, a stone-lined hearth, and nine small sub-floor pit features (Figure 9).

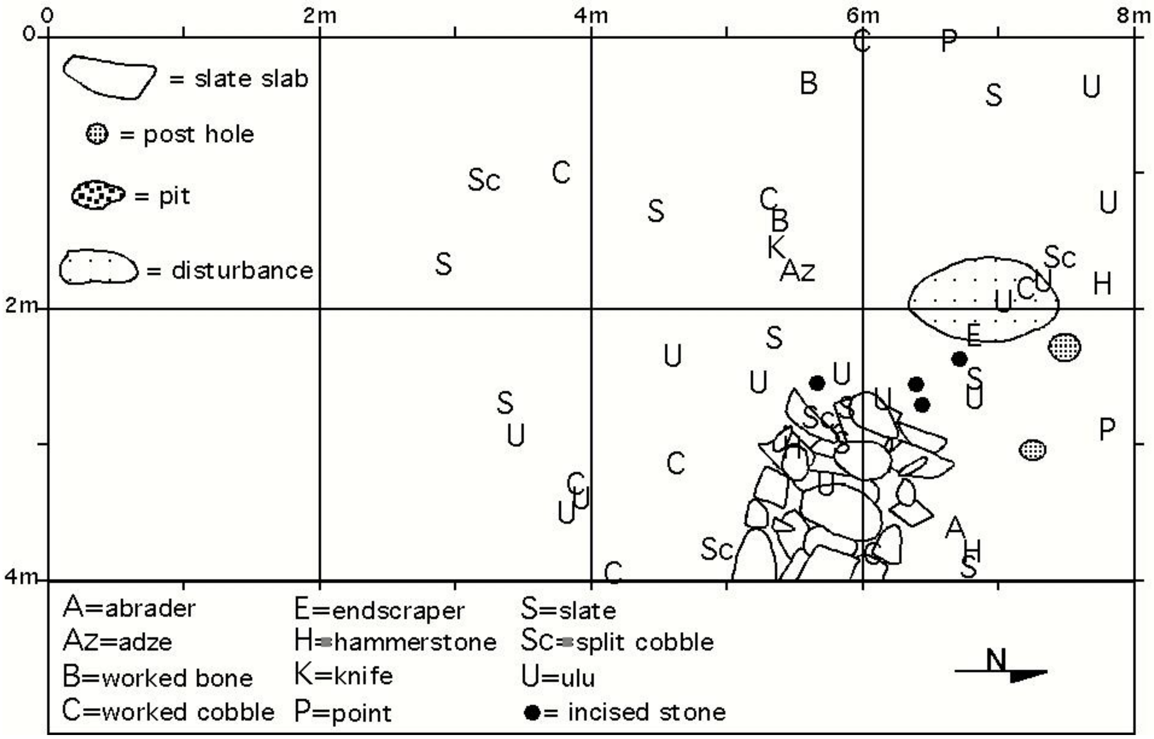

Figure 8. Plan of upper Level 3 feature and associated artifacts.

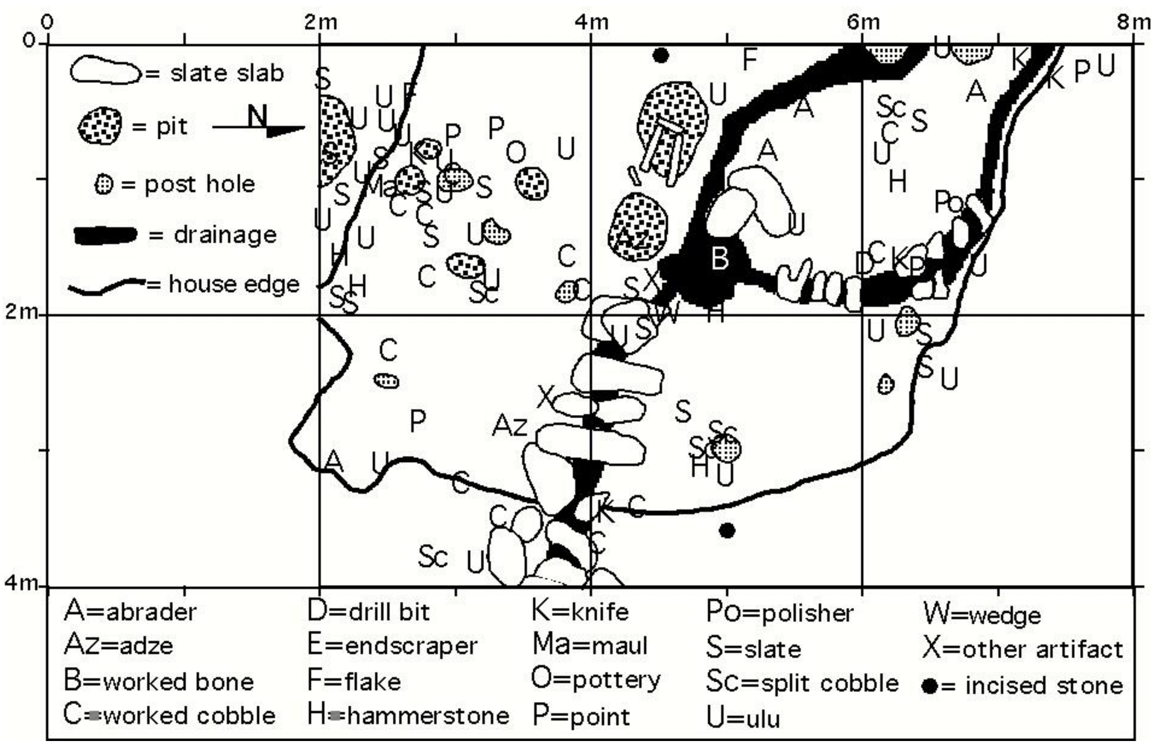

Figure 9. Plan of the basal Level 3 house remnant and associated artifacts.

The drainage ditches originated in a large pit near the center of the house, with two large slate slabs adjacent, evidently once covering this central pit feature. The largest alignment, on the eastern side of the house, included 19 stones, forming a walkway 80 cm wide and 240 cm long. The alignment continued into the east wall of the excavation profile, out of the house floor limits. The nine postmolds were up to 25 cm in diameter and dug as much as 25 cm into the underlying till. Near the center of the house was a box-shaped hearth, lined with upright slate slabs, and filled with 26 cm of charcoal and charcoal-stained sediment. Nine individual pit features were found under and to the south of the hearth, ranging from 15-50 cm in diameter and 3-16 cm deep.

The basal Level 3 structure is dated with a charcoal sample collected from a pit underneath the hearth, which returned a radiocarbon age of 1570 ± 60 B.P., which falls comfortably in the Late Kachemak phase. This house feature is similar in nature to Kachemak tradition housepits excavated at the Uyak site (Steffian 1992b), in its slate-lined hearth, slate alignments, and sub-floor pits, and the excavation of the house directly into underlying till. The area of the exposed portion (excluding the "niche") is about 15.8 m^2, well within the range of Late Kachemak houses at the Uyak site, which ranged from 8.4-35.4 m^2 (Steffian 1992b:150).

FAUNAL ANALYSIS

In 2014, Ayla Aymond and Megan Partlow began analysis of fauna recovered from bulk sediment samples collected in the 1989 excavations, then curated at the Burke Museum of Natural History and Culture at the University of Washington in Seattle.

These samples originally were collected from every 1 x 1 m quadrant and level in the Area 3 midden. Three radiocarbon samples, one each from Levels 1, 2, and 3 of Square 51 Quad A, yielded age estimates all overlapping at the 2σ level, with a mean pooled age of 283 B.P. On the basis of these dates, the analyzed faunal assemblage is limited to the Late Koniag phase. Analysis focused on vertebrate remains from the 1/8" (3.2 mm) and larger fraction.

A total of 36,273 faunal specimens were examined, of which the majority (88%) were unidentified fish remains. Even if the unidentified fishes are omitted (leaving 4,272), bony fishes overwhelmingly dominate the assemblage (96%), although there were small numbers of cartilaginous fishes (n = 1), birds (n = 119; 3%), and mammals (n = 56; 1%). At least 14 different fish taxa were identified, including shark/ray/skate, salmon, herring, cods (Pacific cod and walleye pollock), kelp greenling, sculpins (Yellow Irish Lord, Red Irish Lord, cf. great sculpin), rockfish, and flatfishes (Pacific halibut, arrowtooth flounder, starry flounder, and rock sole). Cods dominate the fish assemblage, composing 68% of fish specimens identified to order level (Table 3). The next most abundant is Order Scorpaeniformes (24%, mostly sculpins), followed by Order Pleuronectiformes (5%; mostly halibut), Order Salmoniformes (2%; salmon), and Order Clupeiformes (2%, herring).

Table 3. Fish Identifications from Area 3

Order	Taxon	Common Name	NISP	MNI
Class Chondrichthyes (cartilaginous fishes):				
Unknown	Unidentified	Unidentified shark/ray/skate	1	1
Class Osteichthyes (bony fishes):				
Salmoniformes	*Oncorhynchus* sp.	Unspecified salmon	80	3
Clupeiformes	*Clupea pallasii*	Pacific herring	49	1
Gadiformes	Family Gadidae	Cod family	2,322	--
	Gadus macrocephalus	Pacific cod	460	43
	Theragara chalcogramma	Walleye Pollock	1	1
Scorpaeniformes	Family Hexigrammidae	Greenling family	3	--
	Hexagrammos decagrammus	Kelp greenling	3	1
	Hexagrammos sp.	Unspecified greenling	8	--
	Family Cottidae	Sculpin family	57	--
	Hemilepidotus jordani	Yellow Irish Lord	99	6
	Hemilepidotus hemilepidotus	Red Irish Lord	1	1
	Hemilepidotus sp.	Unspecified Irish Lord	328	--
	Myoxocephalus sp.	Unspecified sculpin	3	1
	Sebastes sp.	Unspecified rockfish	9	1
	Unidentified	Unidentified scorpaeniform	475	--
Pleuronectiformes	Family Pleuronectidae	Righteye flounder family	15	--
	Hippoglossus stenolepis	Pacific halibut	47	3
	Atheresthes stomias	Arrowtooth flounder	1	1
	Lepidopsetta sp.	Unspecified rock sole	4	1
	Platichthyes stellatus	Starry flounder	1	1
	Unknown	Unidentified pleuronectiform	130	--
Unknown	Unidentified	Unidentified bony fish	31,977	--
		TOTAL	36,075	65

Identified birds include Northern fulmar, shearwater, eider, marbled murrelet, herring gull, mew gull, and kittiwake (Table 4). The gull family (Laridae) makes up the majority of the assemblage, composing 68% of specimens identified to order or family. Most of the remaining specimens (21%) were ducks (Family Anatidae).

Table 4. Bird Identifications from Area 3

Order	Taxon	Common Name	NISP	MNI
Class Aves (birds):				
Procellariiformes	Family Procellariidae	Shearwaters/petrel family	1	--
	Fulmarus glacialis	Northern fulmar	1	1
	Puffinus sp.	Unidentified shearwater	7	3
Anseriformes	Family Anatidae	Duck/goose/swan family	15	--
	Somateria sp.	Unidentified eider	2	1
Charadriiformes	Family Alcidae	Auk family	--	--
	Brachyramphus marmoratus	Marbled murrelet	2	1
	Family Laridae	Gull/kittiwake/tern family	16	--
	Larus sp.[1]	Unidentified gull[1]	19	2
	Rissa sp.	Unidentified kittiwake	19	3
Unknown	Unidentified	Unidentified bird	37	--
		TOTAL	119	11

[1] Includes one herring gull (*Larus argentatus*) and one mew gull (*Larus canus*) specimen.

The mammal assemblage was entirely sea mammal bone with the exception of a single red fox tibia. Identified sea mammals included sea otter, fur seal, harbor/ribbon/ringed seal, and at least two different species of toothed whales (harbor porpoise and a much larger whale). Small sea mammals (equal to or less than the size of a fur seal) dominate the mammal assemblage.

Table 5. Mammal Identifications from Area 3

Order	Taxon	Common Name	NISP	MNI
Class Mammalia (mammals):				
Carnivora	*Vulpes vulpes*	Red fox	1	1
	Enhydra lutris	Sea otter	1	1
	Callorhinus ursinus	Northern fur seal	3	1
	Phoca sp.	Unidentified seal	6	1
Cetacea	Suborder Odontoceti	Unidentified toothed whale	3	--
	Phocoena phocoena	Harbor porpoise	1	1
Unknown	Sea Mammal: Small	Sea otter to fur seal-size	32	--
	Sea Mammal: Large	Fur seal to whale-size	7	--
	Unidentified	Unidentified mammal	2	--
		TOTAL	56	5

DISCUSSION AND CONCLUSIONS

The vertebrate faunal remains from the Monashka Bay site are broadly similar to other reported Koniag faunal assemblages in the Kodiak archipelago, with a heavy emphasis on fish and similar identified taxa. There are however, some interesting divergences. For example, the small bird assemblage is dominated by gulls, and has a total lack of cormorants, both unlike the six other reported Koniag bird assemblages: AFG-098 (Reger et al. 1992), Uyak (Friedman 1935); AFG-012, Settlement Point, Kiavak, and Rolling Bay (Partlow 2000). The lack of cormorants is especially striking compared to Settlement Point, AFG-012, and Kiavak, in which cormorants are the first or second most abundant family (Partlow 2000). Historically, cormorant skins were highly prized for making birdskin parkas (Davydov 1977; Holmberg 1985).

The fish remains are also somewhat different than the five other reported Koniag midden assemblages: New Karluk and Old Karluk (West 2009), AFG-012, Settlement Point, and Kiavak (Partlow 2000). When comparing order-level fish identifications among these sites, Monashka Bay and Kiavak are the only samples in which salmon do not rank in the top two orders (Table 6). Salmon compose only 2-4% of specimens identified to order in these two samples, compared to the 25-42% in the other four samples. Monashka Bay is unique in the abundance of sculpins and greenlings, with Order Scorpaeniformes composing 24% of specimens identified to order, while this order composes from 0-10% in the other five samples. On the other hand, the Monashka Bay sample is typical in the importance of cods, with Order Gadiformes the most abundant order like 4/5 of the other midden samples.

Table 6. Comparison of Koniag Midden Fish Assemblages Identified to Order in the Kodiak Archipelago[1]

Site	Salmon.	Gadif.	Scorp.	Pleuron.	Other[2]	NISP	Reference
AFG-012	1,763	4,469	712	36	40	7,020	Partlow 2000
AFG-015 Settlement Point	2,559	4,022	432	48	1	7,062	Partlow 2000
KAR-001 New Karluk	1,141	2,059	59	92	327	3,354	West 2009
KAR-031 Old Karluk	33	19	0	0	25	77	West 2009
KOD-026 Monashka Bay	80	2,783	986	198	50	4,097	Aymond 2015
KOD-099 Kiavak	13	315	16	10	0	354	Partlow 2000

[1] Includes only midden samples from these sites to compare with the Monashka Bay midden sample, because Partlow (2000, 2006) has shown significant differences between midden and house floor fish samples. All of the assemblages reported here are 1/8” fractions.
[2] Includes Order Clupeiformes (herring), and Class Chondrichthyes (cartilaginous fishes)

It is not known why the Monashka Bay faunal assemblage varies from the other reported Koniag assemblages, although some diversity should be expected as more sites are analyzed, potentially representing variability in age, season, nearby habitats, prey abundance, and other factors. One possibility is that the Monashka Bay midden sample has little winter waste, which may account for the relative lack of (stored) salmon.

The artifacts and radiocarbon dates from the Monashka Bay site highlight the need for reconsidering the delineation of Koniag tradition phases. The Koniag tradition (Clark 1997) was initially defined by Clark (1974b) as a single phase, and split by Jordan and Knecht (1988) into Transitional, Early, and Late Koniag phases based on their work at the New Karluk site. Reworking of the definition of these phases, their corresponding diagnostic artifacts and boundary dates has been ongoing, but recent re-dating of the New Karluk site by West (2011) has emphasized the issue. West showed that many of the radiocarbon dates from New Karluk initially used by Jordan and Knecht to define the phases were overestimates plagued by old wood problems.

The initial proposed boundary between Early and Late Koniag by Knecht (1995) was AD 1400, an age boundary accepted by many until recently (e.g., Saltonstall and Steffian 2006:Table 2; West 2011:Table 1). Using this boundary, the Monashka Bay site Koniag-age radiocarbon dates would all be Late Koniag, as all post-date AD 1400, even when calibrated at 2σ (Table 1). Interestingly, the incised stone artifacts associated with these Late Koniag dates at Monashka Bay do not match the usual definition of Late Koniag material culture. The topic can be explored with the radiocarbon-dated Monashka Bay material from the B layer excavated by Clark (1974a) and Area 3 excavated by Donta. The Koniag deposits in Levels 1 and 2 of Area 2 at Monashka Bay cannot be used for this purpose since they lack radiocarbon dates.

Incised stones were initially considered the hallmark of the Early Koniag phase (Jordan and Knecht 1988:273), but dating at Monashka Bay and other sites suggests that these artifacts occur frequently after AD 1400 (Table 7). This is unequivocally the case for the 110 incised stones from B layers and seven from Area 3 at Monashka Bay. Five of the eight other Koniag sites have yielded incised stones associated exclusively with radiocarbon dates calibrated to post AD-1400, while the remaining three sites have more equivocal dating that could nonetheless be consistent with post-AD 1400 ages. Eighty percent of the dates in Table 7 (24/30) calibrate no earlier than AD 1406. These data do not support the idea of incised stones as Early Koniag diagnostic artifacts, even at the site from which this was proposed, if by Early Koniag one means AD 1250-1400.

A simple solution could be to adjust the start of the Late or Developed Koniag phase to a later time, such as AD 1500 as suggested by Steffian and Saltonstall (2014:Table 2). While this may be warranted in light of the re-dating at Karluk, and fits well with Jordan and Knecht's (1988:271) original age estimate for incised stones at AD 1350-1500, it is not clear that incised stones can remain a diagnostic Early Koniag artifact even with this change. In Table 7, four incised stone dates are post AD-1500 (including half of the New Karluk dates), and 28 of the 30 dates are consistent with post-AD 1500. Only the two dates from House 1 at Settlement Point are too young for AD 1500. The problem of associating particular artifacts with Koniag phases is not new, as Clark (2005) notes the "identification of certain artifacts as 'Transitional,' 'Early Koniag,' or 'Developed Koniag' remains highly uncertain." The issue is further confused if the incised stones from the Monashka Bay site Kachemak levels are considered: 28

Table 7: Radiocarbon-Dated Occurrences of Incised Stones from Koniag Tradition Sites

Site	Context	Incised Stones	Calibrated Age[1]	Reference
AFG-012	House floor	15	AD 1473-1653 (n = 1) AD 1325-1634 (n = 1)[2]	Partlow 2000
Settlement Point (AFG-015)	Houses; Exterior midden	353	AD 1406-1795 (n = 8) AD 1334-1635 (n = 2)	Partlow 2000
Settlement Point	House 1	62	AD 1284-1436 (n = 2)	Partlow 2000
New Karluk (KAR-001)	HF 8, HF 9, Up. Basal Midden	>120	AD 1522-1949 (n = 2) AD 1434-1624 (n = 2)	Knecht 1995; West 2011
Old Karluk (KAR-031)	L 3	3	AD 1477-1662 (n = 1)	Steffian and Saltonstall 2014, West 2009
Monashka Bay (KOD-026)	B layers	110	AD 1477-1663 (n = 1)	Clark 1974a
Monashka Bay	Area 3	7	AD 1526-1949 (n = 1) AD 1484-1662 (n = 2)	Aymond 2015
Kizhuyak (KOD-043)	--	88	AD 1217-1606 (n = 1)[2]	Clark 1974a
Rolling Bay (KOD-101)	Area 1	2	AD 1435-1638 (n = 2)	Clark 1974b
KOD-478	--	1	AD 1522-1949 (n = 1) AD 1431-1620 (n = 1)	Steffian and Saltonstall 2014
Outlet Site (KOD-562)	Area C1	4	AD 1448-1949 (n = 2)	Saltonstall p.c. 2015; Saltonstall and Steffian 2006

[1] Extent of 2 sigma age ranges calibrated with CALIB version 7.0.2 (Stuiver and Reimer 2014) using the IntCal13 dataset (Reimer et al. 2013).
[2] Date from radiocarbon sample below the incised stone-bearing level(s) and so must predate the artifacts.

from Donta's Area 2, Level 3, with calibrated age of AD 239-614. In light of these concerns, the idea that incised stones are an Early Koniag diagnostic artifact is called into question.

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