

# Out of Place Bones

## Beyond the Study of Prehistoric Subsistence

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Zooarcheologists specialize in old bones. Unlike paleontologists, who study fossil bones, and physical anthropologists, who study human skeletal material, zooarcheologists study the osteological refuse of long-past meals. Our expertise is in identifying and analyzing discarded, usually fragmentary, and often burnt skeletal remains of mammals, birds, fish, and shellfish excavated from archeological sites. During excavation, these fragments are carefully retrieved, bagged, and labeled with their exact site provenience, or place of origin within the site, before being brought back to the lab. With some collections numbering upwards of 10,000 specimens, analysis can take several months or even years. Frequently the goal of zooarcheological or faunal analysis is to provide a detailed picture of past human subsistence practices.

Even before the first bag of catalogued bones is opened, the zooarcheologist puts together a list,

inventorying all faunal species that are available in the general site area, on either a year-round or a seasonal basis. However, sometimes after the analysis has begun, there can be surprises. Sometimes the fragments are “out of place,” or *not* what is expected using modern faunal distribution maps. These fragments may represent species that once lived in an area but are now extinct or no longer present within the region or species that were brought into the site as the result of long-distance hunting forays or trade. In this review, the focus will be on bones identified from archeological sites throughout Alaska that are “out of place” geographically. It highlights some of the Pleistocene megafauna—the big game animals—hunted by the earliest Alaskans, as well as some species of sea mammals—walrus, ringed seal, and polar bear—hunted far outside their current ranges at times when past climatic and ice conditions were much different than today.



Analysis of large zooarcheological collections is time-consuming, beginning with the sorting of bones and bone fragments that are potentially identifiable. Later, we tentatively identify skeletal elements and species based on drawings and photographs in reference books and on simple pattern recognition. For example, the distal (lower) ends of the upper arm or forelimb of most mammals look similar, regardless of species. Subtle differences in morphology, such as the angle on a bony ridge or the shape of a particular ligament attachment, may be all that separate fragments of two closely related species, so we turn to comparative collections of skeletal material for positive species identifications.

In Alaska, one collection of comparative faunal material is housed at the Anthropology Laboratory at the University of Alaska Anchorage. Over the last several years, members of the Alaska Consortium of Zooarcheologists (ACZ), which is a special interest group of the Alaska Anthropological Association, have added many specimens of mammals, birds, and fish to broaden the existing comparative collection. By virtue of state and federal permits, we have been allowed to collect animal carcasses for processing. Properly prepared as clean, white skeletons, they are accessioned into the growing inventory of modern specimens used for comparative purposes by archeologists throughout the state. National Park Service (NPS) archeologists have made frequent use of these collections for identifying faunal remains from sites within Aniakchak, Bering Land Bridge, Cape Krusenstern, and other NPS units in Alaska.

## *Humans, Bison, and Elk*

For zooarcheologists working on collections from early Alaskan sites dating between 10,000 and 12,000 years ago, it is exciting to realize that some bone fragments do not match any modern species from the comparative collection. These sites represent the hunting and foraging camps of people who ranged over the narrowing isthmus of the Bering Land Bridge (Beringia) at a time when the late Pleistocene environment was rapidly changing. In general, faunal preservation at these sites is so poor that bones are either absent or so deteriorated that they cannot be identified. Fortu-

\*All the dates that appear in this article are uncalibrated. These are the dates listed in the originally published site reports. Calibrated dates may be several hundred (or more) years older than uncalibrated dates.

nately there are some exceptions, notably the Dry Creek site in the Nenana River valley, adjacent to Denali National Park and Preserve.

Dry Creek is a multi-component site excavated during the 1970s by researchers from the University of Alaska Fairbanks (UAF). It was heralded in archeological circles not only for its 11,000-year-old dates,\* but also for its preservation, albeit poor, of faunal remains in association with ancient stone tools. R. Dale Guthrie, a Quaternary biologist and paleontologist now retired from UAF, worked with the team of archeologists at the site and identified fragments of Dall's sheep, wapiti or elk, and bison in the small but significant faunal assemblage, composed mostly of teeth. Neither wapiti nor bison are native to Alaska today, though some small herds have been reintroduced into the state.

Guthrie's paleoecological reconstruction of the site allows us to imagine Beringian hunters living in an interior Alaska landscape changing from dry grassland or steppe, which was once the dominant Pleistocene habitat in Alaska. Today the environment in the region is primarily boreal forest. Pale-



*Zooarcheologist Bob Kopperl checks the differences in seal skulls during a workshop sponsored by the Alaska Consortium of Zooarchaeologists at UAA in 1999.*



*Lorraine Alfsen uncovers a mammoth bone point from the lowest component of the Broken Mammoth site during excavation in 2000.*

ontological specimens of mammoth, dating to about 12,300 years ago, were found in surveys around Dry Creek, but the bones of these behemoths were not found at the site. Guthrie argues that although mammoths, horses, camels, saiga antelopes, lions, and other species may have already become extinct in Alaska at the time when the lower two levels of Dry Creek were occupied, the regional extinction of wapiti and bison had not yet occurred. It is also interesting that the sheep, bison, and wapiti specimens from the site were as large as their Pleistocene forms, so Holocene dwarfing had apparently not yet begun.

A trio of early sites located on Shaw Creek Flats in the Tanana River valley—the Broken Mammoth site, the Mead site, and the Swan Point site—are also among the handful of early sites with faunal preservation despite the fact that their lowest occupations date to almost 12,000 years ago. This preservation is due to the sites' deposits of wind-blown glacial silt from the nearby floodplain of the Tanana River. Similar in setting to the Dry Creek site, they probably served not only as hunting overlooks for spotting and intercepting game animals, but also as “spike camps” or processing stations for the meat and hide brought back from kill sites. Best known of the three is the Broken Mammoth site, discovered in 1989 and revisited almost annually for summer test excavations and field schools sponsored by the University of Alaska Anchorage (UAA) and the Alaska State Office of History and Archaeology (OHA). Charles Holmes, an archeologist with OHA, and David Yesner, associate anthropology professor and zooarcheologist at UAA, are the principal researchers at the site.

David Yesner identified a wide range of waterfowl, small to medium-sized mammals, and fish, representing species still living in Alaska, from the earliest cultural layers at the multi-component Broken Mammoth site. He also identified small numbers of Dall's sheep, caribou, and moose bones, along with much higher frequencies of long-horned steppe bison and elk or wapiti remains. Measurements of a bison horn core from Component 3 (second from lowest) are compatible with this extinct species, and the site is outside the range for the wood bison, a northern species still found in free-ranging herds in Canada. Large-horned bison and elk were clearly the chief prey of the Broken Mammoth hunters, who also left behind an assortment of stone tools, mammoth ivory projectile points, toggles for clothing, and eyed bone needles.

The provocative name “Broken Mammoth” and the earliest dates that are at least 600 years younger than those from the Dry Creek site beg the question, “where's the mammoth?” Did humans and mammoths coexist in Alaska? Archeological evidence does prove their coexistence at several sites in the “lower 48,” but the evidence in Alaska is still circumstantial. The name “Broken Mammoth” actually comes from the numerous mammoth tusk fragments uncovered during initial site testing. Similar fragments were also recovered from the nearby Mead and Swan Point sites. No other mammoth skeletal elements have been recovered from these sites. Yesner originally postulated that the mammoth ivory, and possibly hide and meat, at the Shaw Creek sites may have been obtained at kill sites located away from the bluff-top campsites and brought back for raw material. After many field seasons of excavation, the evidence now suggests to him that the ivory represents scavenged material from the skeletons of recently extinct animals that was brought back to camp specifically for tool production. Ongoing analysis and dating of the specimens may yet bring to light indisputable evidence in support of the possible coexistence of humans and mammoths in Alaska.

Hotly debated since the topic was proposed decades ago is whether the large-scale die-off of North American megafauna at the end of the Pleistocene (approximately 10,000 years ago) was the direct result of over-predation by human hunters. The issue of whether the extinction was caused by humans, environmental change, or a combination of factors has not been resolved. An accumulating body of zooarcheological evidence indicates that

for some species it may have not have been abrupt as previously thought, particularly for the bison. The persistence of bison in Alaska and Canada virtually throughout the Holocene is documented in a recent study by Fairbanks researcher Robert Stephenson and his colleagues, in which they provide a long list of radiocarbon-dated paleontological and zooarcheological specimens. They also present oral narratives of Athapaskan elders living on the upper Yukon and Tanana Rivers that suggest that bison may have been sufficiently abundant to be a resource of some importance as recently as 200–300 years ago. Their zooarcheological evidence in Alaska consists of a bison tibia fragment from the Delta River Overlook site, dated at about 2,200 years ago, and a bison foot bone in probable association with the Killik River site, dated at about 2,300 years ago. The latter is located in Gates of the Arctic National Park and Preserve. Bison bones are also present in the upper component (about 2,000 years ago) of the Broken Mammoth site. The Gerstle River quarry site and the Silver Fox site, both in the Tanana Valley, provide evidence for the persistence of elk until about this same time period, suggesting that east-central Alaska may have served as a refugium for these species. Refugia are areas of relatively unaltered environment inhabited by relic forms of plants and animals during periods of climatic change, such as occurred at the end of the Pleistocene.

## *Scarcity of Moose in the Zooarcheological Record*

Eventually, bison and elk did become extinct in Alaska, while other large mammals, such as caribou, moose, and Dall's sheep, survived. From ethnographic and historic records we know that moose and caribou were the primary big game species hunted by the interior Alaska Athapaskans, but was this also the case prehistorically? The flip side to the *presence* of geographically out of place bones in zooarcheological assemblages is the absence or scarcity of a key species, such as moose, which we would expect to find in abundance, given present-day distributions. Today moose populations exist almost throughout Alaska, with the exception of islands in the south-east and in the Aleutians.

My experience in identifying moose and caribou comes from the analysis of zooarcheological collections from a very large sample of sites located on the Susitna River in south-central

Alaska. Seventy-eight of these sites produced bone and resulted in a huge collection of almost 143,000 specimens, ranging from minute fire-whitened fragments to complete unburned large mammal bones. Moose bones were only found at nine of the sites, including one paleontological site where five mandibles of late Pleistocene moose were recovered. The other eight sites were younger than 600 A.D. Even within the subsample of late prehistoric sites, fully 93% of the large mammal remains were identified as caribou; the remainder were moose and Dall's sheep.

David Yesner undertook a much more extensive survey of the occurrence of moose in the prehistoric archeological record of the Alaskan sub-Arctic some years ago. Questioning whether the apparently heavy reliance on moose by Athapaskans in ethnographic accounts was an accurate portrayal of their subsistence prehistorically, he turned to published accounts from 19 sites or site clusters from a vast area of interior Alaska and western Canada. Yesner's overall impression from looking at these data was that moose appear only rarely in any of these assemblages until quite recently, perhaps within the last 400 years or so. He suggests that climatic and vegetational changes, fire, and natural population cycles have all been factors in this apparent scarcity of moose in the region during most of the prehistoric period. As with the findings for the Susitna River sites discussed above, his study indicated that the species of primary importance for prehistoric populations in northern interior Alaska was caribou.

## *Cave Sites and Bear Bones*

Not all the faunal collections that zooarcheologists identify come from unequivocally cultural contexts. This is particularly true of cave sites, where the refuse from early human occupation can be difficult to differentiate from the refuse left behind by other species of predators. Work done at Trail Creek caves, on the Seward Peninsula within Bering Land Bridge National Park, provides an excellent example of the type of meticulous analysis needed to unravel the complexities of bone deposition within cave sites. Quaternary geologist David Hopkins and Danish archeologist Helge Larsen were the first to test and excavate several of the twelve caves on Trail Creek in the late 1940s. From two of the caves, Larsen and his crew recovered artifacts of ancient caribou hunters, as well as those of the historic Inupiat. The oldest tools date back 8,000 years or older.

He also reported thousands of bone fragments of extinct and extant species, including bison, horse, and mammoth dating back about 15,800 years ago. For decades after the original excavations, questions remained about the possible association of human artifacts with the bones of Pleistocene megafauna.

Within the faunal assemblages were broken canine teeth from several levels of two Trail Creek caves. Larsen identified them as dog teeth. Their size and the fact that they were broken led him to believe that they had been purposely knocked out by humans to prevent the dogs from chewing on skins or on tethering lines. Archeologists E. James Dixon and George Smith, both formerly of the University of Alaska Museum in Fairbanks, recognized that if this identification were accurate, these would be among the oldest specimens of domesticated dog in the world. Animal domestication is known archeologically from Old World sites, so these teeth were clearly out of place in an Alaskan assemblage. Dixon and Smith compared the canines with the permanent teeth of a variety of mammals that could be expected in a cave deposit, but they found no morphological and size matches until they compared the specimens with the deciduous dentition of brown bears. These teeth exfoliate during the second winter of hibernation. Their presence in the faunal assemblage from Trail Creek and other caves sites of similar age was thus attributed to a very long history of bear denning, rather than dog domestication.

Subsequent zooarcheological work at Trail Creek caves has shown that brown bears were responsible for more than simply hibernating and dropping their deciduous teeth. According to Dale Vinson, who methodically analyzed the bones from two of the Trail Creek caves tested in 1985 by the NPS, disturbance within the layers of the cave deposits was probably due to bear denning activities. Although not completely ruling out the possibility that early Alaskans brought in and modified the bones of Pleistocene mammals found in the caves, Vinson made a strong case for non-human scavengers and carnivores being responsible for the bone breakage and cut marks he documented.

## *Polar Bear, Walrus, and Ringed Seal*

Exactly when the ancient caribou hunters of northern Alaska began to dwell along the coast and hunt for sea mammals is not known for

certain. Some of the earliest evidence for sea mammal hunting on the northwest coast of Alaska is represented by only a few charred fragments of seal bones in a hearth at the earliest cultural level at the Iyatayet site on Norton Sound. The characteristic Denbigh Flint complex tools at this level date to approximately 5,500–4,000 ago. The makers of these tools are thought to be the ancestors of the present-day Inupiat of northern Alaska. J. Louis Giddings, who excavated at Iyatayet in the late 1940s and early 1950s, identified bones from an upper, 2,500-year-old level of the site (Norton culture) as predominantly “small seal.” He also identified bearded seal, walrus, and beluga in this Norton assemblage, along with a small number of caribou bones.

Since Giddings’ pioneering archeological fieldwork in northwest Alaska, our knowledge of the prehistoric cultures has increased enormously, in part because of the fieldwork and research carried out by the National Park Service in Bering Land Bridge National Preserve (BELA). As the result of surveys and excavations in BELA by archeologists Jeanne Schaaf and Roger Harritt, we now have extensive faunal collections from BELA sites at Cape Espenberg, the Ikpek Lagoon area, and the mouth of the Kitluk River. Besides the small ringed seal that appeared in collections made by Giddings, the spotted seal and the ribbon seal have been identified at BELA sites. Bearded seals or ugruk, walruses, belugas, and polar bears also occur in the assemblages. These species all thrive along the far northern coastline, locked during the winter in shore-fast ice. They are *not* out of place geographically but fit well within current distributions of sea mammals north of Bristol Bay.

South of Bristol Bay in Shelikof Strait and the Gulf of Alaska, an entirely different suite of sea mammals is usually found within faunal assemblages, even at sites dating back earlier than 6,000 years ago. The harbor seal is the only seal species of the genus *Phoca* (as opposed to fur seals in the genus *Callorhinus*) that currently inhabits Alaskan waters south of the Alaska Peninsula. Other commonly identified species are the sea otter, Steller sea lion, fur seal, and two species of porpoises. Again, these are species that would be expected in the region. Clearly out of place in southern coastal assemblages are the bones of the ice-loving polar bear, ringed seal, and walrus, so their presence in the faunal assemblage from the Margaret Bay site on Unalaska Bay in the Aleutians was a surprise to zooarcheologist Brian Davis.



*An extensive zooarcheological collection was recovered from the Mink Island site on the coast of Katmai National Park and Preserve. Archeologists built this dome structure to protect fragile site stratigraphy and artifacts during excavation. Brown bears (see center of photo) were frequent visitors at the site.*

The Margaret Bay site was noted by zoology professor Alvin Cahn, who was a Lt. Commander in the U.S. Naval Reserve stationed in Dutch Harbor in the early 1940s. Archeologists, working at the site in later decades, recognized the importance of this stratified (or many-layered) site, but it was not until excavations in 1996-97 by Richard Knecht of the Museum of the Aleutians that a dense shell midden with an abundance of animal bones was encountered and excavated. This midden was radiocarbon dated at 4,700–4,100 years before present. Brian Davis analyzed over 5,000 mammalian specimens from the midden, using the comparative collections housed at the University of Alaska Museum in Fairbanks, and he made some unexpected identifications. Harbor seal bones accounted for almost 50% of the identified specimens, but the ringed seal was also abundant at the site, contributing about 11% of the total bone count. Davis's most exciting finds were the mandible, forelimb, and hindlimb of a polar bear. The bones of this species are very rare, even within its current range on Alaska's far

northern coastline. A few specimens of walrus were also found within the Margaret Bay assemblage. The age of this midden is congruent with the Neoglacial, a cooling period of glacial advance identified between 5,000 and 3,500 years ago in the Aleutians. The effect that these climatic conditions, and the resulting geographically displaced species, had on the hunting techniques and culture of the prehistoric Aleuts will be a subject of archeological study for many years.

We are undoubtedly in for more faunal surprises and out of place bones when identification and analysis of the enormous Mink Island site collection are completed. The Mink Island site, located in Amalik Bay off the coast of Katmai National Park and Preserve, was excavated by Jeanne Schaaf and her NPS crews in 1997–2000. It has two main components: the upper one dating to 370–2,010 years before present, and the lower one dating to 5,000–7,300 years old, making it one of the oldest known sites along the south-central coastline of Alaska. Well-preserved bones recovered from both components are currently under

analysis by zooarcheologist Maribeth Murray at the University of Alaska Fairbanks. According to Murray and her colleague, S. Craig Gerlach, a neonatal walrus mandible was identified in the upper site component. According to modern species distributions, walrus are usually considered out of place in the Shelikof Strait region. The verdict on whether polar bear specimens are present among the Mink Island bear bones awaits Murray's final identification and analysis. These bones may date to a glacial period known as the Little Ice Age (1300–1850 A.D.), a global phenomenon of low temperatures that dramatically affected cultures around the world.

Walrus ivory artifacts have been found at sites farther east, in Prince William Sound, even more removed from the present-day species range. Zooarcheologist Linda Yarborough, who excavated the Palutat site, reports that ivory toggles and projectile points found at the site possibly date from between 2,000 and 1,400 years ago. There were no other skeletal elements of walrus identified at the site. Yarborough is unsure whether the ivory tusks were brought to the area in trade and the artifacts manufactured on-site, or whether these ice-adapted creatures were hunted nearby during a period of glacial advance in Prince William Sound.

## *Cultural Factors*

Natural environmental conditions affecting past animal distributions explain the presence of some bones that appear to be out of place, but cultural factors are also important to consider. In analyzing the faunal collection from the proto-historic (about 1850 A.D.) Kitluk River site a few years ago with my colleague, Angela Demma, we came across a specimen that we simply could not identify. It took several visits to wildlife biologists in Anchorage before we were satisfied with a positive identification. The specimen was a horn core of a Dall's sheep, certainly not something we expected to find on the coastal margin of the Seward Peninsula, far from any mountainous habitat. We interpreted the horn core as either a trade item or a remnant brought back from a distant hunting trip, possibly far to the north in the hilly country around Cape Lisburne or the Baird Mountains north of Kotzebue.

Trade between coastal and inland people, particularly of caribou antlers and walrus ivory, is well documented in the ethnographic literature of the Arctic and appears to have deep roots in the past. Anthropologist Otto Geist studied the Siberian

Yupik people of St. Lawrence Island in the Bering Sea during the 1930s and excavated their ancient sites, including the Kukulik Mound. He reported finding tool handles and scratchers fashioned from caribou or reindeer antlers deep within the mound. Caribou are not native to St. Lawrence Island, and reindeer were introduced as late as 1900. It therefore appears that the antlers from which these tools were fashioned must be prehistoric trade items the ancient St. Lawrence Islanders received from mainland caribou hunters. Large trade fairs, such as one held every summer at Sheshalik, near Kotzebue, in the 1800s, may have been the source of such trade goods.

Otto Geist also reported that the people of St. Lawrence Island spoke of hunting "the real walrus without tusks" in the past. Geist conjectured that they were referring to Steller's sea cow, an extinct relative of the manatee, hunted to extinction by Russian fur traders in the late 1700s and early 1800s in the Bering Sea and the Aleutians. Only recently have the bones of this species turned up in zooarcheological assemblages. Debbie Corbett, archeologist with the U.S. Fish and Wildlife Service, excavated a few fragments of what she believed to be sea cow bone from 1,000-year-old sites on Buldir Island in the western Aleutians. These bones, probably ribs, are very dense and distinctly different from bones of other sea mammals and walrus ivory. Corbett believes that the ancient Aleuts not only hunted these creatures for their meat but may have also made artifacts from their bones.

Out of place bones tease our imagination, whether they come from archeological contexts or from more recent surface finds. Notable in my experience is a foot bone brought to my office by Dale Vinson of Lake Clark–Katmai National Park and Preserve. Vinson's expertise as a zooarcheologist was called into play when, surveying on Takli Island, he stumbling upon an unusual bone he recognized as an animal not indigenous to the area. It was, in fact, part of a horse skeleton. With a bit of historic sleuthing, he was able to shed some light on this out of place bone. As the story goes, a bay gelding was the only horse that survived a shipping mishap in Amalik Bay on the Katmai coastline in 1956. The horse continued to survive in the hostile environment for the next 18 years and was known as a living legend to local fisherman. This bone, the subject of much discussion, is now properly accessioned as a historic specimen in the NPS collections at the Lake Clark–Katmai Study Center in Anchorage.

## Zooarcheology and Biogeographic History

Although bettering our knowledge of prehistoric subsistence is often the rationale in zooarcheological analyses, the bones themselves sometimes force us to go beyond subsistence in our interpretations. Some bones simply cannot be identified on the basis of present-day animal distributions. Extinctions, shifts in range, trade, and long-distance hunting are all possible factors for explaining bones that appear to be out of place. These specimens challenge our assumptions and remind us that past landscapes were different than those of today and that cultural patterns were not what we might expect them to be. The integration of a wide variety of data—geological, biological, ethnographic, and historic—has proven successful for zooarcheologists. Now it's time to turn the tables and convince wildlife biologists that zooarcheological data can benefit them by providing the element of great time depth to their studies of species that may be threatened or endangered.

Listed in the 2002 program for the 67<sup>th</sup> annual meeting of the Society for American Archaeology was a symposium entitled "Zooarchaeology's Contribution to Conservation Biology." Included were papers addressing the interface between archeological perspectives and wildlife management of elk in Washington, black bears in Minnesota, pronghorn antelopes in Wyoming, freshwater fish in Virginia and North Carolina, and others. Perhaps the paper most relevant for Alaskan wildlife managers was the one presented by Michael Etnier on seal remains from the Ozette site in western Washington. He documented the differences between prehistoric and modern abundance and migration patterns of six North Pacific sea mammal species and discussed both anthropogenic and natural catalysts for behavior change. Work such as Etnier's may be the wave of the future for wildlife managers who want to expand the narrow time range of their studies—just a few decades or less—to centuries or even millennia by looking into the zooarcheologists' bags of bones.

## Suggestions for Further Reading

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