Establishing a Faunal Comparative Collection to Aid Cultural Resource Interpretation of Sites in Western Washington

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INTRODUCTION

Analysis of fauna in the archaeological record contributes to more in-depth understanding of the anthropological relationship people had with animals in the past. To increase access and understanding of fauna associated with cultural material, Antiquity Consulting is creating a basic faunal comparative collection from salvaged remains of animals common in western Washington. By paying close attention to the bone's surface, pathologies, and context, a more holistic approach can be made during archaeological surveys. The goal of the project is to create an ethical faunal comparative collection of common native and nonnative animals in western Washington to enrich analysis of cultural resources and provide local access to a collection focused on fauna.

BACKGROUND

In the area now known as western Washington, relationships people had with animals are evident in the archaeological record. Mammal, fish, birds, and shellfish hold key evidence of how humans interacted with animals, in tandem with oral traditions and other cultural materials in context. In the Pacific Northwest, many indigenous groups sustainably harvested and preserved salmonid for over 10,700 years as the Vashon Glacier in the Puget Sound area receded (Campbell and Butler 2010; McKechnie and Moss 2016). Salmonid species are incredibly instrumental to many indigenous tribes in the Pacific Northwest; however, a variety of other fish, mammals, reptiles, amphibians, and shellfish are important in ethnobiological records. One of the earliest archaeological analyses recorded in the Columbian Basin quantified species of animals from 8 sites along the Columbia River. The assemblages included mammals such as moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), elk, bison (*Bison bison*), mountain sheep (*Ovis canadensis*), mountain goat, black bear (*Ursus americanus*), coyote, cougar (*Puma concolor*), bobcat (Lynx rufus), Canada lynx (*Lynx canadensis*), fisher (*Pekania pennanti*), badger (*Taxidea taxus*), marmot, beaver (*Castor canadensis*), whistling swan (*Cygnus columbianus*), pileated woodpecker, dog, and whale (Collier 1942). Upon further study, faunal remains associated with archaeological assemblages can paint a more holist picture of the people in the area.

Faunal remains have also been associated with European settlers from the early 19th century to the present. Europeans brought livestock, pets, and invasive species with them as they traveled west, attributing certain dates of introduction. The presence of some of these animals at archaeological sites can assist in dating the associated assemblages through relative dating at a lower cost instead of radiocarbon dating.

The Washington State Department of Fish and Wildlife (WDFW) required any individual, company, or institution to apply for a Scientific Collections Permit (SPC) which the recipient must declare the species, quantity, and intent of faunal collection. Antiquity Consulting chose to include animals on the permit that were introduced to western Washington on tracible dates such as the ring-necked pheasant introduced in 1881, eastern gray squirrel introduced in 1925, and the nutria introduced in the 1930s (Table 1). Other animals such as salmonid were included on the SCP to accurately identify certain species and taphonomic elements that could influence our understanding of the materials.

METHODS

At the start of the project, Antiquity Consulting obtained information regarding methods of acquiring, skeletonizing, and preserving animals to complete the SCP application requirements. After consulting the Burke Museum, multiple associate professors of archaeology at multiple universities, WDFW, and Washington State Department of Natural Resources, Antiquity Consulting prepared a study plan and submitted the application with a list of intended species to collect.

The application also required a statement concerning the method of collection and final disposition of each animal. Antiquity Consulting chose to use only one salvaged animal of each species that was deceased without the company's intervention. Methods of collection include fish hatcheries at the end of spawning season, roadkill, chance encounter, hunters looking for carcass disposal options, pest control, and no-kill animal shelters (Post 2003). Antiquity Consulting recognized that although animals have and will not be directly harmed due to the comparative collection, taking wildlife from an area before the carcass decomposed can deprived an ecosystem of reintroduced phosphorous, nitrogen, carbon, calcium, and potassium (Ferreira et al 2020).

Multiple methods of skeletal preservation were considered by Antiquity Consulting including dermestid beetles, natural burial and excavation, and water maceration. Dermestid beetle colonies and burial both required facilities not available (Elbroch 2006; Hinshaw 2006), which left cold-water maceration as the best option within the company's capabilities. Once an animal was obtained, it was disarticulated and placed in a solution of water and soap that was changed with a screen every few days until all organic material fell away from the bones (Hussain et al 2007; Sullivan and Romney 1999). When changing the water, it was run through ½ inch, ¼ inch, and 1/8 inch mesh screens. The bones were placed in a diluted hydrogen peroxide solution for 3 to 10 days. Once in was completely dry, the completed skeleton was catalogued and stored in an acid-free container for future comparative analysis (Elbroch 2006).

Figure 1-3: *Chinook salmon was collected from the Tumwater Falls Hatchery with permit. The first stage of processing the fish was gutting and separating the bones from the flesh (1). The bones are then placed in a combination of water and dish soap for 3 to 6 weeks. The water is periodically changed by screening the water to catch all the bones (2). After the process is complete, the skeleton was rearticulated to dry and store (3).*

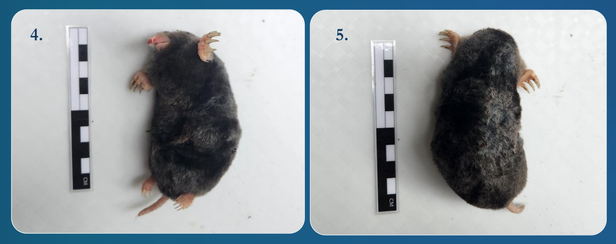

Figure 4-5: *Townsend mole (*Scapanus townsendii*) before maceration process; anterior view (4) and posterior view (5).*

RESULTS

Antiquity Consulting collected, preserved, cataloged, and stored a chinook salmon (Figure 1-3) obtained from the Tumwater Falls Hatchery and is in the process of cleaning a Townsend mole (Figure 4 and 5) in the 2024 SCP cycle. Of the two animals collected, there are various taphonomic marks such as carnivore gnawing present in the comparative collection providing valuable comparison of archaeologically associated faunal remains.

Even with a completed chinook salmon skeleton, a few bumps in the road were encountered while it was processed. The salmon was much younger and more fragile than anticipated. While re-articulating the fish, components of the skeleton that had been lost during the maceration process (Figure 3). The missing parts may have been the result of soaking the fish too long, small bones slipping through all three sizes of screens, or the fish having decomposed more than initially observed. In addition to the factors, salmon fins and other bonelike structures found in fillets are calcified nerve endings and cartilage, not bone. During the butchering process, many of these components were most likely discarded without detection. Multiple elements of the skeleton required rehydration to prevent damage while rearticulating the animal.

The Townsend mole is in the beginning stages of cold-water maceration. Due to the size of the rodent, a smaller container is used, and more time was taken to prepare the animal for the maceration process.

DISCUSSION

Antiquity Consulting will continue to add animals listed in the permit to the collection. The company will create taphonomic markers such as charred bones and butcher marks to better compare fauna from the archaeological record. Due to limited facilities, the focus of the 2024 SCP cycle will focus on smaller animals such as fish, rodents, and small mammals. Cold-water maceration, especially during the winter season, requires a longer period for the maceration process and more equipment when multiple animals are processed which should be kept in mind before collection. An ideal fauna collection would have skeletons that were buried and underwent the natural process of decomposition to recreate a more accurate image of the taphonomy encountered in the archaeological record.

Cultural Resource Management (CRM) is a field which must balance protecting archaeological sites through employing careful methods of survey and analysis with limited time and resources for a project. Companies may not have the time or resources to give attention to faunal identification and taphonomy research when a comparative collection is too far away or difficult to access. CRM has the responsibility to create resources to analyze archaeological material to the best of our ability. Companies can create their own regional comparative collection through the permitting process along with a few rudimentary tools.

The faunal comparative collection that Antiquity Consulting is building will be available to local CRM companies to assist with faunal analysis. The company is also actively looking for sources of animals listed in Table 1. Contact Antiquity Consulting if there are remains of a complete animal listed on the poster.

Table 1: 2024 Species Collection

SPECIES	SCIENTIFIC NAME	COLLECTED	SPECIES	SCIENTIFIC NAME	COLLECTED
chinook salmon	*Oncorhynchus tshawytscha*	☒	great gray owl	*Strix nebulosa*	☐
coho salmon	*Oncorhynchus kisutch*	☐	American robin	*Turdus migratorius*	☐
chum salmon	*Oncorhynchus keta*	☐	house sparrow	*Passer domesticus*	☐
house mouse	*Mus musculus*	☐	red-winged blackbird	*Agelaius phoeniceus*	☐
common opossum	*Didelphis virginiana*	☐	American crow	*Corvus brachyrhynchos*	☐
eastern cottontail	*Sylvilagus floridanus*	☐	California quail	*Callipepla californica*	☐
pika	*Ochotona princeps*	☐	black rat	*rattus rattus*	☐
raccoon	*Procyon lotor*	☐	nutria	*Myocastor coypus*	☐
striped skunk	*Mephitis mephitis*	☐	feral pig	*Sus sciofa*	☐
western gray squirrel	*Sciurus griseus*	☐	chicken	*Gallus gallus*	☐
hoary marmot	*Marmota caligata*	☐	domesticated dog	*Canus familiaris*	☐
black-tailed deer	*Odocileus hemionus*	☐	house cat	*Felis catus*	☐
elk	*Cervus elaphus*	☐	mountain goat	*Oreamus americanus*	☐
coyote	*Canis latrans*	☐	domestic cow	*Bos taurus*	☐
Townsend's mole	*Scapanus townsendii*	☒	horse	*Equus caballus*	☐
Townsend's chipmunk	*Tamias townsendii*	☐	ring-necked pheasant	*Phasianus colchicus*	☐
little brown bat	*Myotis lucifugus*	☐	pileated woodpecker	*Dryocopus pileatus*	☐
long-toed salamander	*Ambystoma macrodactylum*	☐	peregrine falcon	*Falco peregrinus*	☐