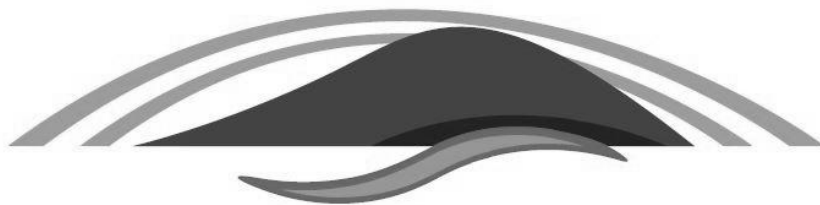


# *Journal of Northwest Anthropology*

Volume 49, Number 2

Fall 2015



Richland, WA

# **JOURNAL OF NORTHWEST ANTHROPOLOGY**

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# JOURNAL OF NORTHWEST ANTHROPOLOGY

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## MAKING THE LIST: MOUNT ST. HELENS AS A TRADITIONAL CULTURAL PROPERTY, A CASE STUDY IN TRIBAL/GOVERNMENT COOPERATION

**Richard H. McClure and Nathaniel D. Reynolds**

### ABSTRACT

In 2013, Mount St. Helens was listed in the National Register of Historic Places for its significance as a Traditional Cultural Property (TCP) of the Cowlitz Indian Tribe and the Confederated Tribes and Bands of the Yakama Nation. The mountain, known as *Lawetlat'la* by the Tribal groups, qualified for listing in the National Register as a landscape feature central to their oral traditions, geography, and cultural identity. The area designated as a TCP encompasses 12,501 acres of the Mount St. Helens National Volcanic Monument on the Gifford Pinchot National Forest of southwestern Washington State. The nomination process took several years, and was a collaborative effort between the Gifford Pinchot National Forest and Cowlitz Indian Tribe. TCP nominations and listings are infrequent; of more than 80,000 properties on the National Register of Historic Places as of 2014, *Lawetlat'la* is only the 23rd TCP listed nation-wide. We present this case study as an example of how a cooperative relationship between federal/tribal partners was fundamental to the nomination process, and will remain important for future management of this Northwest landmark.

### Introduction

Mount St. Helens is unquestionably the best-known volcano in North America, recognized especially for the catastrophic eruption of 18 May 1980, which took the lives of 57 people, caused extensive destruction, and transformed the surrounding forested landscape into a desolate moonscape (Fig. 1). The eruption was extensively covered by media and studied by scientists. The mountain is known to the Cowlitz Indian Tribe and the Confederated Tribes and Bands of the Yakama Nation as *Lawetlat'la* (from *lawilat* (v.), “emitting smoke,” and *-la*, a personifier), a Sahaptin name which translates in English to “smoker” (Kinkade 2004; Beavert and Hargus 2009). A central feature of the physical and cultural landscape for thousands of years, the mountain has a long geologic history of intermittent volcanic eruption. In 1792, British Captain



Fig. 1. Before and after photo comparison of Mount St. Helens from Johnston Ridge, 17 May 1980 and September 1980. Photos by Harry Glicken, USGS.

George Vancouver gave the volcano the English name Mount St. Helens, a name that appears on subsequent published maps (Hayes 1999).

To the general public, the appeal of Mount St. Helens as a dramatic geological wonder has overshadowed its cultural significance as a sacred place to local native people. As a place important to indigenous cultural identity, particularly for citizens of the Cowlitz Indian Tribe, the mountain was recently the focus of a collaborative effort to secure formal recognition in the National Register of Historic Places as a Traditional Cultural Property (TCP). In September 2013, *Lawetlat'la* was listed in the National Register for its significance as a TCP to the Cowlitz Indian Tribe and the Confederated Tribes and Bands of the Yakama Nation. The mountain qualified for National Register listing as a cultural landscape central to the oral traditions, geography, and identity of the native peoples of the area. The nomination process took several years, and was a joint effort by the USDA Forest Service and Cowlitz Indian Tribe. Although the Yakama Nation was supportive of the listing, they were not directly involved in the development of the nomination. The mountain is of particular importance to the Cowlitz People, and falls within the area of their aboriginal land claims made to the Indian Claims Commission of the U.S. federal government. The image of *Lawetlat'la* appears on the official seal and emblem of the Cowlitz Indian Tribe.

We present this case study as an example of how a collaborative relationship was fundamental to the *Lawetlat'la*/Mount St. Helens National Register nomination process. This article provides an overview of *Lawetlat'la*, tribal history, and federal land management; reviews the history and background of TCPs as a legal and procedural concept; provides an overview of the cultural history and significance of *Lawetlat'la* to Tribal people; and summarizes the steps of our National Register nomination and listing process. As a case study, this article provides the opportunity for an assessment of National Register guidelines with respect to Traditional Cultural Properties, and considers the potential benefits of National Register listing, as seen both from a Tribal and federal agency perspective. Finally, we look to the future, and lay out next steps for cooperative management of the *Lawetlat'la*/Mount St. Helens TCP.

## *Lawetlat'la*, Tribal History and Federal Land Management

As *Lawetlat'la* reveals in its Tribal name, “smoker,” the mountain has an eruptive history extending much further back in time than 1980. This history has always played a central role in the physical and cultural landscape of Tribal groups living on lands around the mountain. From the Tribal perspective, *Lawetlat'la* has been a traditional cultural property (*sensu lato*) since time before memory. The mountain, however, is not on Tribal lands. It lies outside direct Tribal control and governance, and within federal lands currently managed by the Forest Service as a part of the Gifford Pinchot National Forest.

During the 1855–1856 treaty period in Washington Territory, leaders of the Cowlitz Indian Tribe did not sign a treaty or cede lands despite participation in treaty councils (Fitzpatrick 1986; Dupres 2010). They retained full aboriginal title to their lands. Nonetheless, their lands were identified for division and disposal by the U.S. federal government, sold to settlers, and granted to homesteaders and corporate railroad interests. Much of the western slope of the Cascade Mountains in southern Washington State was also designated as a U.S. federal Forest Reserve in 1897, despite the fact that Cowlitz aboriginal title was never formally extinguished. These lands eventually became part of the National Forest system. Also in 1855, fourteen bands of Indians signed the Yakama Treaty and ceded lands, but these lands did not include the western slopes of the Cascade Mountains or Mount St. Helens.

Since at least 1975, with the direction and guidance that followed passage of the Indian Self-Determination and Education Assistance Act (Public Law 93-638), federal agencies have had a mandate to work cooperatively with Indian Tribes that have interests on federal lands. From that time, but before Cowlitz federal recognition (Federal Register 2000) was subsequently upheld on appeal (Federal Register 2002), the Cowlitz Indian Tribe and Gifford Pinchot National Forest maintained an informal government-to-government working relationship. It was during this interval in 1980, when the mountain violently erupted.

Following the eruption in 1982, administration of the mountain, blast zone and areas surrounding the mountain, were consolidated by Act of Congress (Public Law 97-243) as the Mount St. Helens National Volcanic Monument. The 110,000 acre (445 km<sup>2</sup>) Monument was created for research, recreation, and education. Within the Monument, the environment is left to naturally respond and recover from the ecological disturbance of the 1980 eruption. The Monument became the first such protected area to be administered by the Forest Service.

Although the Forest Service had begun fairly regular consultation with the Cowlitz Indian Tribe in the 1980s, this relationship changed dramatically in 2002, with Cowlitz federal acknowledgement confirmed. In 2003, a Memorandum of Understanding (MOU) was developed between the Cowlitz and the Gifford Pinchot National Forest to provide a framework for government-to-government consultation and cooperation. The MOU remains the primary agreement document defining the relationship, and specifies intent to collaborate in projects and programs of mutual benefit, including the “protection, perpetuation and management of cultural and natural resources . . . in the Cowlitz Indian Tribe’s traditional use areas within the National Forest.” Since establishment of the MOU, the relationship between the Cowlitz and Gifford Pinchot National Forest has evolved to more closely resemble a partnership, and has become more formalized, substantial and cooperative.

The idea for nominating Mount St. Helens to the National Register as a TCP initially arose out of conversations between Gifford Pinchot National Forest and Cowlitz Indian Tribe officials regarding partnership project opportunities. During the 2010 annual MOU review meeting, both parties expressed an interest in formally recognizing the cultural significance of Mount St. Helens through National Register listing and TCP designation. Cowlitz Tribal Chairman William Iyall asked agency officials and staff to give the project a high priority for the coming year. Subsequently, more than two years were spent gathering data, conducting interviews, and preparing a draft nomination. Throughout this process, Tribal representatives variously referred to *Lawetlat’la* as a sacred mountain, traditional cultural landscape, traditional cultural place, or traditional cultural property, and saw these terms as synonymous.

## Traditional Cultural Properties, Bulletin 38, and the *Lawetlat’la* Nomination

The National Register, authorized by the National Historic Preservation Act (NHPA) of 1966, is part of a program to coordinate and support public and private efforts to identify, evaluate, and protect America’s historic, archaeological, and traditional cultural resources. Although the original language of the NHPA provided for inclusion of places of traditional cultural significance, in practice few were initially considered. To encourage greater consideration of these places, the National Park Service (NPS) subsequently developed National Register Bulletin 38 in 1990 (Parker and King 1990), which was revised in 1992 and again in 1998, and is now known by the title, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (King 2009).



Bulletin 38 introduced the term “traditional cultural property” and offered direction on the practical application of existing National Register eligibility criteria to this class of resources. Perhaps the greatest benefit of Bulletin 38, nationally, was the role it seems to have played in raising public and agency awareness about the traditional cultural significance of places of importance to Tribes, including landscape features imbued with sacred qualities and tied to tribal histories (Lusignan 2009). Many places initially described as part of “sacred geography” of the western United States in an early study by anthropologist Deward Walker (1988a and b) were later evaluated and determined eligible to the National Register as TCPs.

In some instances, definition of TCP boundaries has proved challenging. The case of Mount Shasta, a 14,162 foot volcanic peak at the southern end of the Cascade Range in California, provides a controversial example (Guilford 2000:154–157; King 2003:170–173). The initial Forest Service determination of National Register eligibility included boundaries considered too restrictive by local tribes. When the Keeper of the National Register agreed with the tribes, the ensuing public and political dispute over boundaries led ultimately to the reversal of that decision and the acceptance of boundaries originally proposed by the Forest Service, largely because of issues relating to integrity and privately-owned lands on the lower slopes of the mountain. In another case, a TCP nomination by the Lummi Nation in Washington State encountered challenges in defining boundaries that included private property (Prendergast-Kennedy 2005). Out of concern for boundary conflict, and the question of what constitutes the physical and spiritual mountain, we gave these factors careful consideration in the development of the *Lawetlat’la* nomination.

Another contentious case, still unresolved, and at least partially a catalyst for the development of Bulletin 38, involves the San Francisco Peaks, a National Register-eligible TCP located within the Coconino National Forest of northern Arizona (King 2003:29–30, 99). A Forest Service decision to allow use of reclaimed wastewater in artificial snowmaking for a ski area resulted in a lawsuit by a coalition of Indian Tribes and environmental groups. In this case, boundary or ownership issues were not the principal source of contention; rather, conflict arose over proposed land uses within the TCP, and differing cultural perspectives regarding effects to the sacred landscape. The possibility of conflicting land uses within the *Lawetlat’la* TCP was also carefully considered in the development of the *Lawetlat’la* nomination, and will be addressed within the framework of a cooperative management plan, currently in the initial stages of development.

Recent years have seen re-evaluation of the Bulletin 38/Guidelines, and the very framework for identification of TCPs (King 2005, 2009, 2012). According to Tom King, one of its authors, the original purpose of Bulletin 38 “. . . was to remind agencies of the United States government that places important to communities in terms of their cultural identities—as defined by those communities—were just as entitled to consideration in federal planning as those valued by historians, archaeologists, and architects” (King 2012). In his re-evaluation of Bulletin 38, King expressed concern about the over-consideration of professional and academic assessment that had become embedded in the TCP nomination and review process, versus the value of the TCP to its community of origin.

We, the preparers of the *Lawetlat’la* TCP nomination, experienced this bias early in developing the nomination, when one reviewer challenged the initial proposal on the grounds that the 1980 eruption had compromised the physical integrity of the property. The same reviewer eventually understood that constant eruptions are very much a character-defining feature of the property, as recognized by the Cowlitz people in their oral traditions, and manifest in the Tribal name for the mountain.

In developing the TCP nomination, we were intimately aware of the potential challenges outlined in the cases described above, including the possibilities of contentious borders, conflicting land uses, and academic/professional biases. We hoped to collaboratively develop a nomination that would transcend the suite of challenges and controversy encountered by other TCP nominations.

Mount St. Helens was initially identified as a TCP in a management-related ethnographic sites inventory completed for the Gifford Pinchot National Forest in 1995. The inventory project was conducted by Archaeological Investigations Northwest, Inc., a Portland, Oregon consulting firm, under contract to the Forest Service. Research consisted of a comprehensive literature review and interviews with 30 tribal consultants familiar with the traditional uses of the National Forest lands. The study identified 256 places of cultural significance to the Yakama and Cowlitz people (Hajda et al. 1995). Native place names were recorded for 180 (70 percent) of these sites. Fifty-two of these places, including Mount St. Helens, are mountains or peaks, and are of special interest here, since all were considered sacred, a place to acquire power, or the home of special beings (Hajda et al. 1995:28).

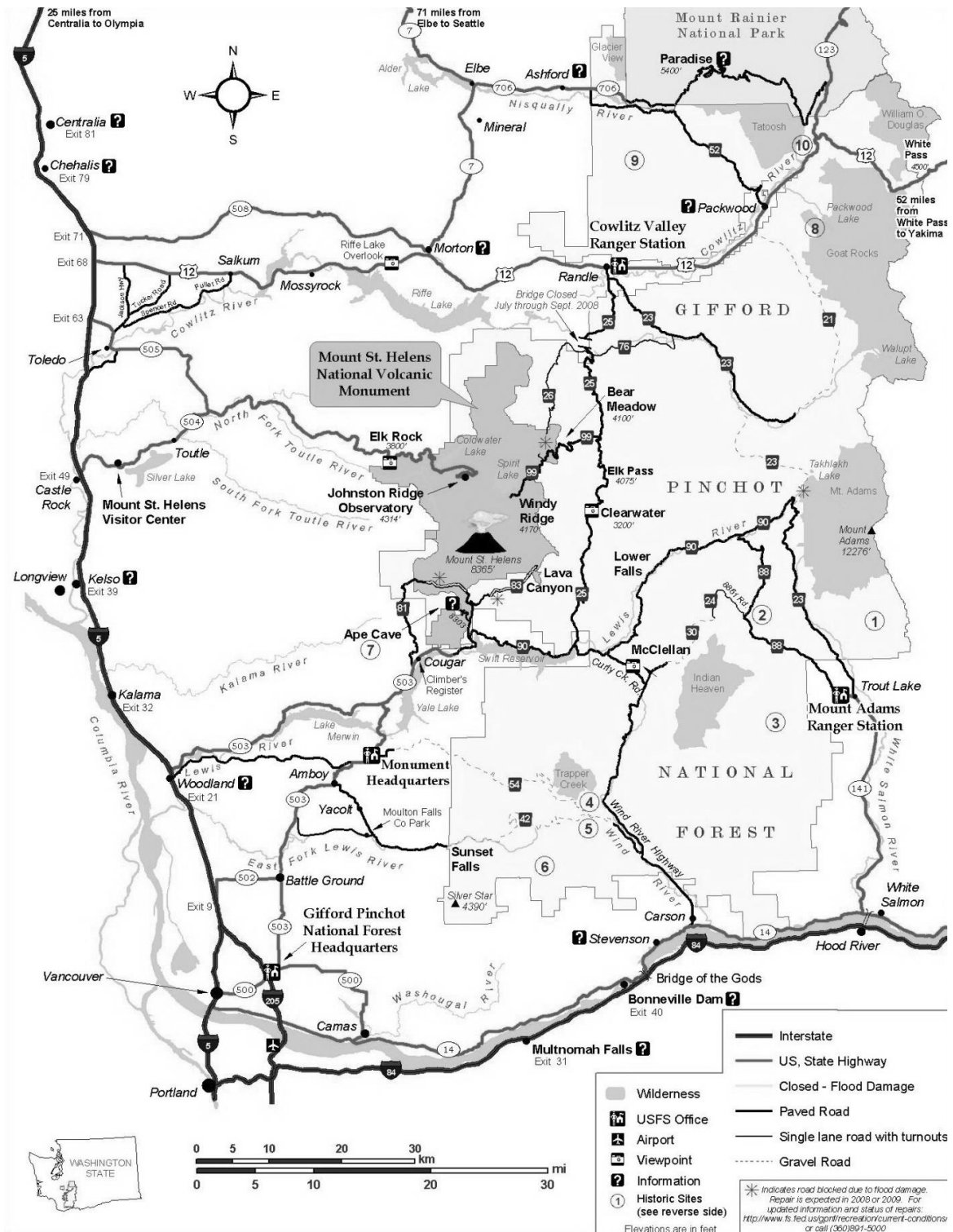
Several sites and places listed in the 1995 inventory were subsequently documented and evaluated as TCPs within the context of cultural resource survey projects completed in support of federal undertakings within the National Forest. Examples include *T'at'aLiya*, a geologic feature representing the body of a cannibal woman turned to stone by *Spilyai* (Coyote) in the myth age; *Likalwit*, a place where *Spilyai* formed a river channel to become a major fishing site for the first people; and *Skis-watum*, a large traditional huckleberry field at the crest of the Cascade Mountains. Documentation and evaluation of these places was conducted in consultation with the Yakama Nation and the Cowlitz Indian Tribe, and all assessed to date have been determined National Register-eligible as TCPs, although no others have been formally nominated.

Internal staff-level review of ethnographic sites listed in the 1995 Gifford Pinchot National Forest inventory and those places well-known to the Cowlitz community ultimately led to the selection of *Lawetlat'la*/Mount St. Helens as the most obvious choice for a formal TCP nomination. There was a significant body of oral tradition, ethnology, and mythology associated with the mountain, but little risk that publicizing the TCP would threaten archaeological resources or compromise traditional spiritual practices. Because the boundaries of the TCP lie entirely within the National Volcanic Monument, there were no private lands or multiple ownership issues to address. Finally, the potential for conflicting land uses was seen as minimal because of the Monument's primary mission to promote only research, recreation, and educational activities.

Using Bulletin 38/Guidelines, Gifford Pinchot National Forest personnel worked together with the Cowlitz Tribe on a draft nomination, conducting interviews and ethnographic research, assembling supporting documents, and determining what cultural information was suitable to include, and what was appropriate to withhold. The National Register nomination draft was initially sent to the Washington Department of Archaeology and Historic Preservation and Yakama Nation for review in late 2012. The following section of this article summarizes much of the original content of that nomination, presented here as a central piece of this case study.

### *Lawetlat'la*, General Description of the TCP

*Lawetlat'la* (Mount St. Helens) is a prominent stratovolcano located within the Cascade Mountains of southwestern Washington, 96 miles south of the city of Seattle and 50 miles northeast of the city of Portland, Oregon (Fig. 2). The mountain is within lands administered by



the Gifford Pinchot National Forest and is the central feature of the Mount St. Helens National Volcanic Monument, a popular tourist destination visited by more than 200,000 people annually. The 8,363-foot volcano rises high above other mountains and ridges in this part of the Cascade Range, and is visible from many points along the Columbia River in Oregon and Washington between the cities of Portland and Longview, as well as from communities further north, including Centralia and Chehalis.

*Lawetlat'la* is recognized as a sacred mountain, important to the cultural history and beliefs of the Cowlitz Indian Tribe and the Confederated Tribes and Bands of the Yakama Nation. The mountain is associated with events that are important to the history of these two groups, including traditions about their origin and establishment. The continued teaching of oral traditions involving *Lawetlat'la* and the performance of specific ceremonies and songs that invoke those traditions serve an important role to “teach respect for sacred things” (Hajda et al. 1995:29). Other groups more distant also recognize the cultural significance of the mountain, though it is less central to their identity.

The boundaries of the TCP were defined on the basis of traditional cultural beliefs that considered the area of the mountain above the tree line to be a place of exceptional spiritual power (Hajda et al. 1995:29, 44). Tree line on Mount St. Helens typically occurs around 4,020 feet in elevation, much lower than that of other Cascade Range volcanoes (Dale et al. 2005). The atypical tree line is due to the difficulty of ongoing regeneration after recent volcanic eruptions. Loowit Trail #216 encircles the mountain at roughly the same elevation, and thus was used as a tangible, fixed boundary for the property, approximating the culturally determined limits of the sacred space (Fig. 3). The area within the TCP boundary totals 12,501 acres.

Mount St. Helens is one of the youngest volcanoes in the Cascade Range. Over the past 40,000 years, sustained periods of magmatic activity have produced a series of successive lava domes forming the cone of the volcano. The mountain is composed primarily of dacite and andesite, volcanic rocks rich in silica, erupted over thousands of years. The largest known eruption occurred approximately 3,500 years ago, deposited a cubic mile of pyroclastic material over the region, and covered Native settlements more than twenty miles away (McClure 1992:11). A period of dome-building followed this eruption, and since that time, it has remained the most active volcano in the Cascade Range, erupting nearly once every century (and sometimes more frequently). During the Goat Rocks eruptive period, which ended in 1857, the volcano attained a maximum height of 9,677 feet (Mullineaux and Crandell 1981). Before the 1980 eruption, the upper slopes of Mount St. Helens featured eleven small glaciers.

The mountain entered a new eruptive phase in March 1980, when a 400-foot bulge formed on the northern slope of the volcano. This bulge, along with several steam eruptions and thousands of earthquakes, indicated subsurface magma activity. On 18 May 1980, the bulge and much of the summit gave way under the force of gravity and one of the largest landslides in recorded history swept north across the valley and continued westward several miles. The landslide was followed by a lateral blast that affected an area of 230 square miles. The blast completely removed, toppled, and stripped trees bare of vegetation throughout the blast zone. Pyroclastic materials flowed down the north slope of the mountain and covered the valley below in several feet of pumice and ash. Lahars amassed and flowed down the North and South Fork of the Toutle River, to the Cowlitz River, and eventually into the Columbia River. The eruption resulted in the loss of 1,300 feet elevation from the mountain's original summit and dramatically transformed the landscape and ecosystems on the north side of the volcano. Between 2004 and 2008 the mountain underwent a period of dome-building eruptions characterized by a less-explosive gradual extrusion of new rock within the 1980 crater.

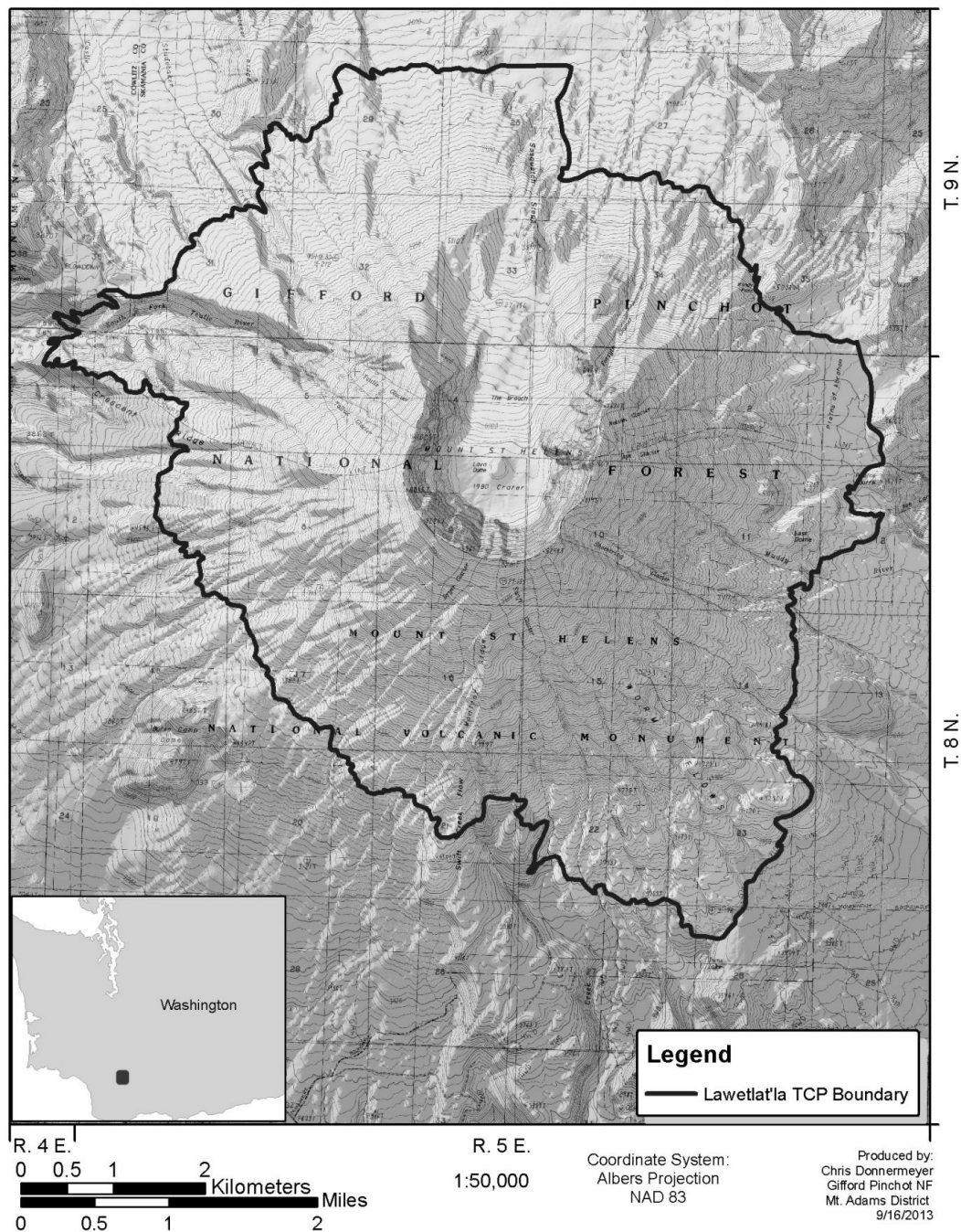


Fig. 3. Topographic map of Mount St. Helens showing boundary of NRHP/TCP designation.

Main features of the volcano today include the large crater, over a mile in diameter and 2,084 feet deep, resulting from the 1980 eruption. Two lava domes have subsequently formed in the crater. The Pumice Plain, a large pyroclastic debris field, extends north from the crater to the shoreline of Spirit Lake. On the west, south, and east sides of the mountain, bare slopes rise steeply from surrounding ridges to the crater rim. About 70 percent of glacial ice mass was lost in

the 1980 eruption, but a new glacier has formed within the crater. Channels cut into the floor of the crater and across the Pumice Plain bring melt water from annual snowpack and the Crater Glacier into the North Fork Toutle River. The slopes of the volcano are dissected by a series of steeply incised drainages that include the headwaters of the Toutle River on the north and west, the Kalama River on the southwest, and the Muddy River, a tributary of the Lewis, on the south and east.

Tree limit on the volcano essentially represents the boundary between subalpine and alpine life zones. At this elevation, plants are well-adapted to raw pumice soils and severe weather. Conifer trees of the lower subalpine forests, including mountain hemlock and subalpine fir, are typically represented at this altitude as *krumholz*—a stunted growth form. In terms of relative ground cover and density, the most common plants of this zone include grasses and sedges, lupine, phlox, penstemon, aster, and other alpine meadow flora native to the Cascade Range. The upper limit of all vegetation is around 6000 feet elevation.

Constructed features on the mountain are limited to small U.S. Geological Survey (USGS) monitoring stations and infrastructure associated with recreational trails. USGS monitoring stations on the mountain are operated and maintained by the USGS Cascades Volcano Observatory, based in Vancouver, Washington. These stations consist of small equipment installations in various locations within and around the crater. They include six tripod-mounted seismometers, a fixed-site telemetered camera with battery box and antenna, and 12 portable telemetered GPS receiver stations. These small, lightweight telemetry units are designed to be easily moved by helicopter to various locations around the volcano, as needed, for monitoring purposes.

Loowit Trail #216, forming the boundary of the TCP, was constructed in the early 1990s and has small wooden trail signs at junctions. In some areas where the trail crosses rough terrain of lava flows, the trail is marked with small cairns of stacked rocks or wooden posts. The popular Monitor Ridge climbing route, on the south side of the mountain, follows a trail through the forest, but above tree line is marked only by cairns and posts. All climbing above timberline is regulated by a permit system; only 100 permits per day are issued during the summer season. The only fixed, permanent structure within the boundary of the TCP is a small composting toilet structure on the popular Monitor Ridge climbing route, just within the TCP boundary, but below timberline.

## *Lawetlat'la*, Cultural Significance

As previously noted, *Lawetlat'la* translates as “smoker,” characterizing the eruptive nature of the mountain. Other names recorded for the mountain include *nšh'ák'w* from the Upper Chehalis people (Kinkade 1991), which translates as “water coming out,” and *aka akn*, a Kiksht (Upper Chinookan) term for “snow mountain” (Rob Moore, personal communication to McClure, 2001). Knowledge of the mountain, its creation, and behavior has been passed down through generations of Cowlitz and Yakama people through an oral tradition of myths and legends. *Lawetlat'la* was one of the first landform features created by *Spilyai*, or Coyote, a key figure of their creation myths. Other myths involve the nature of the relationships between people, their environment, and the sacred, and explain how *Lawetlat'la* came to be imbued with spiritual power. The myths offer lessons in personal conduct and cultural ideals, providing a window into traditional worldviews and perceptions of physical and spiritual reality. While traditions of oral history are of central importance in relating *Lawetlat'la* to Cowlitz spiritual beliefs, other aspects of cultural identity, such as traditional practices and rituals, and historic accounts of the mountain contribute to its cultural-historical significance.

### *Cultural Context and History*

Throughout the historic period, the rivers and forests surrounding *Lawetlat'la* were the homeland of several small tribal groups whose descendants are now affiliated with two federally-recognized Indian Tribes: the Cowlitz Indian Tribe and the Confederated Tribes and Bands of the Yakama Nation. To the north of the mountain, in the upper Cowlitz River watershed, were the Sahaptin-speaking Táytnapam (spelling after Beavert and Hargus 2009), who post-circa 1880 also became known as “Upper Cowlitz.” To the west were the Salishan-speaking Cowlitz (or Lower Cowlitz); and to the south, in the upper Lewis River watershed, were both Lewis River Táytnapam and the Xwálxwaypam. The latter group, generally known as the Klickitat, principally occupied the upper Klickitat River watershed, and are one of the fourteen bands and tribes that comprise the Yakama Nation. Following an initial period of settlement by British and Americans in the early to mid-nineteenth century, tribal distribution and affiliations were significantly altered through the effects of disease, warfare, and the dispossession of tribal lands. In the aftermath of treaty negotiations and the establishment of reservations, many Cowlitz River Táytnapam and Lewis River Táytnapam families were removed to, or opted to relocate to, the Yakama Reservation, east of the Cascade Mountains, and became enrolled Yakama tribal members. Those remaining in their homeland, west of the Cascades, retained aboriginal title and signed no treaties, but their lands were opened to settlement by Presidential Proclamation in 1863. During the late nineteenth century these groups reorganized as the Cowlitz Tribe, and by 1904 had petitioned the U.S. government for compensation for lands taken from them, lands that included *Lawetlat'la*.

In 1912, the Cowlitz Tribe again reorganized, elected a chairman and officers, and pursued a claim against the U.S. government for lands that were taken without compensation. In 1973, the Indian Claims Commission finally ruled that aboriginal title to 1.66 million acres, held exclusively by the Cowlitz, had been arbitrarily extinguished by the U.S. federal government in 1863 (Department of Justice 1971). Despite claim settlement, and a compromise agreement establishing compensation, settlement funds did not become available until 2004, after federal recognition of the Cowlitz.

### *Lawetlat'la, Oral Traditions and Identity*

The most powerful testament to the importance of *Lawetlat'la* to the Cowlitz people and neighboring groups are the oral traditions, or myths, about it and the spiritual significance attached to it as a natural, supernatural, and living entity. Tribal histories extend back in time to what is referred to as the myth age, before the people had arrived in the land (Adamson 1934; Jacobs 1959:6). Cowlitz spiritual leader Roy Wilson (1999:33) notes, “Most of the legends refer to the time when all the animals were people.” The Cowlitz term for this type of tale is *sc'pt*. Myths and legends set in this period often tell of how the land was made ready for the coming of the first people, and they describe the creation of the landforms and sacred foods that remain important to Cowlitz people today. As explained by Táytnapam elder Jim Yoke during a 1927 interview: “In this country, when the country had its beginning, in the myth age, he (Coyote) ordained it (all). He named all these places in this land (such as) the rivers, (and the) places where fish were to be obtained (and so on)” (Jacobs 1934:228). Coyote, or *Spilyai*, was the central myth-age figure responsible for making the land ready for the people.

In a long narrative of Coyote's journey up the Cowlitz River, also recorded in 1927, Lewy (Louis) Costima recounted the creation of *Lawetlat'la*:

At *xwiya'tc* ("sweat lodge," a rock at Cowlitz Falls; it used to be a sweat lodge according to native belief), Coyote sat down, he planned what to make. He thought he would make *taxu'ma* (Mt. Rainier), that he would make *pa'tu* (Mt. Adams), that he would make *law E lat' la'* ('person from whom smoke comes,' Mt. St. Helens). He thought where. (Jacobs 1934:243)

The explicit mention of the mountain in this creation narrative demonstrates that it was a prominent feature of the landscape in the eyes of the Cowlitz. A Lower Cowlitz version of the creation story, recorded in 1926 from Minnie Case, uses the Salishan name *Xwa'ni* for Coyote, and portrays the myth-age Cascade volcanoes as gendered supernatural beings:

*Xwa'ni* was travelling far up in the country; he had started from Puget Sound. He was making hills as he travelled. He thought to himself, "I'm going to make a snow mountain here. I won't make the top very round; I'll make it in three different parts." He made the mountain and said, "This shall be called '*texo'ma*' (Mount Rainier)." From there, he went south, making large hills and small ones and giving shape to the land as he travelled. After he had one a long way, he looked back: *texo'ma'* was no longer visible. "I'll make another," he said, "I'll make this one round at the top. This shall be called '*lawe'late*' (Mount St. Helens)." After he had finished it, he stood off and looked at it. It was too far away from the first, so he made another about half-way between. "This one shall be called '*tc'ili'il*' (Mount Adams)," he said, "this shall be the husband of the two others." They say that *lawe late* got jealous of *texoma* and threw some fire at her. She burnt *texoma's* head off and also burnt her backbone and shoulders. (Adamson 1934:257)

The ethnologist and linguist George Gibbs was aware of multiple versions of a similar oral tradition as early as 1854, when he noted,

The Indians report that there were once three mountains that smoked always, Mount Hood and Mount Adams being the others. Respecting Mounts Hood and St. Helens, they have a characteristic tale to the effect that they were once man and wife; that they finally quarreled and threw fire at one another, and that St. Helens was the victor; since when Mount Hood has been afraid, while St. Helens, having a stout heart, still burns. (Gibbs 1854)

Gibbs' reference does not indicate which of the two mountains was considered male or female, but a later Cowlitz version of the quarreling mountains tale, recorded in 1927 from Mary Iley, indicates *Lawetlat'la* as male:

Mount St. Helens (*lawe'latla'*) had two wives, Mount Ranier [sic] (*taxo'ma*) and Mount Adams (*patu'*). His wives quarreled. They had lots of children. They fought and fought. Finally Mount Ranier [sic] got the best of Mount Adams; she stepped on all of Mount Adams' children and killed them. She was the stronger. The children were in the way when they were fighting and so kept stepping on them. The two women and their husband turned into mountains. (Adamson 1934:268)



A Yakama version of this story, which also involves Mt. Hood and *Wahx'soom*, or Simcoe Mountain, features Mount St. Helens as one of the five wives of *Enum-klah'*, or Thunder. The wives battled amongst themselves, with Mt. Hood emerging as the victor. The narrator, William Charley, explained the legend as a moral lesson in the pitfalls of plural marriage and the faults of jealousy (Hines 1992:28–29). Gibbs recorded a Klickitat (Xwálxwaypam) version of the legend that also features *Wahx'soom*, and portrays the “Snow Peaks” as quarreling brothers (Clark 1956:152–153). In the Klickitat version, Mount St. Helens is the victor. Gibbs also noted that “in some versions this story is connected with the slide which formed the Cascades of the Columbia.” Indeed, these versions involving the Cascades and so-called “Bridge of the Gods” are among the most published and popularized of the oral traditions regarding *Lawetlat'la*.

A popular version of the legend (Bunnell 1935), attributed to Klickitat sources, is among the first to use the name “Loo-wit” for Mount St. Helens, a shortened derivation of “Loo-wit-lat-kla,” which first appeared in print in 1861 (Loo-Wit Lat-Kla 1861). Another popular published version of the Bridge of the Gods legend that uses the name “Loo-wit” was collected by Lulu Crandall, an historian of The Dalles, Oregon, and initially published in 1953 (Clark 1953:20–22). The source, as indicated by folklorist Ella Clark, may have been “an old woman of the Wasco tribe” (Clark 1952:33), referencing the Kiksht-speaking neighbors of the Klickitat. Clark observed that no other legend of the Indians of the Pacific Northwest has been so often recorded, rewritten, and retold (Clark 1952:29). Balch (1890), Lyman (1910, 1913), Schwartz (1976), Hadley (1979), Hilton (1980), and Williams (1980) present similar, though sometimes embellished versions of the Bridge of the Gods legend, demonstrating *Lawetlat'la*'s role in oral traditions of groups other than the Cowlitz and Yakama.

The more popularized versions of the oral traditions demonstrate an unfortunate debasement and corruption of original forms, as evidenced by the loss of traditional narrative structure, style, and language, and the rendering of the stories into romanticized forms more suitable to a non-indigenous English-speaking audience. The version recorded by Crandall involves the quarreling of two brothers who were the chiefs of the Multnomah and Klickitat people. To promote peace between the two groups, the Great Spirit constructed a rock bridge across the Columbia River. For a long time, the people were at peace, but then again began to quarrel. To punish them, the Great Spirit took away the sun, and they had no fire to keep warm. An old woman, whose name was Loo-wit, had avoided the conflict and still kept a fire in her lodge. The people begged the Great Spirit for fire. He went to the woman, his heart “softened by their prayer,” asked her to share the fire, and offered to grant her a wish. “What do you want the most?” he asked.

“Youth and beauty,” she answered. The Great Spirit then directed her to take her fire to the rock bridge, make it available to people on both sides of the river, and to keep it burning “as a reminder of the goodness and kindness of the Great Spirit.” Loo-wit did as she was told, and was transformed into a “young and beautiful maiden” who stirred the hearts of the Klickitat and Multnomah chiefs. She could not, however, choose between them; the brothers became jealous and warfare ensued between the two groups. The Great Spirit grew angry, destroyed the bridge across the river, and changed the two brothers, Wyeast and Klickitat, into mountains. Crandall's version of the legend concludes with Loo-wit's final transformation:

Loo-wit was changed into a snow-capped peak which still has the youth and beauty promised by the Great Spirit. She is now called Mount St. Helens. Wyeast is known as Mt. Hood, and Klickitat as Mount Adams. The rocks and white water where the Bridge of the Gods fell are known as the Cascades of the Columbia. (Clark 1953:22)

In this version, the transformation of Loo-wit from old to young may represent the geological transformation from “old” (scarred by explosive eruptions), to “young” (a smooth rounded cone) as developed by dome-building extrusive eruptions that returned the peak to conical form. Bunnell’s version (1935:51) relates,

The Great Spirit smilingly told her that he could change her body and physical appearance, but that her mind could not be changed. As this was exactly to her liking, the wish was granted. Again she took her place among the great snow mountains, but, being old in spirit and all her immediate friends and relatives having passed on, she found herself satisfied with her own cold beauty and did not desire other companionship. She withdrew from the main mountain range and settled by herself far to the west, where you may still find her, always aloof and unconcerned—the youngest and most beautiful, yet the oldest of all the snow mountains. (Bunnell 1935:51)

Though it is possible to see how geological events are woven into myth, and that they explain how components of the physical landscape came into existence, the central theme of the Bridge of the Gods myths, across all versions, typically provides a moral compass and a lesson. The events portrayed reveal how people should treat one another, and show how spiritual forces may offer punishment or reward to ensure betterment of society.

This assigning of human form and emotion is an important part of understanding *Lawetlat’la* for the Cowlitz People, and is embedded in the Tribal name, which uses the singular agentive personification suffix *-la* to emphasize that Mount St. Helens is not simply a mountain that emits smoke, but is a “person from whom smoke comes.” Personification allows Tribal members to better relate to the natural behaviors of the mountain, and to connect with it through shared history and common emotional experience.

*Lawetlat’la* is a central identifiable marker through which the Cowlitz people have oriented themselves in time and space. Its creation also established a critical link between the natural and supernatural realms, thus contributing to the Cowlitz cosmology, or perception of reality, both physical and spiritual. Additionally, as the mountain is a place where great spiritual power resides, it remains a means through which the Cowlitz may commune with nature and the forces which originally brought everything into being. *Lawetlat’la* provides a tangible link to the very origins of the Cowlitz people, to the creation of their homeland, their landscape. It connects them to the myth age, to powerful forces at work in that time and ultimately to the Creator.

Aside from explaining origins and teaching lessons about human nature and conduct, the Cowlitz myths regarding *Lawetlat’la* also offer a record of eruptive events. Cowlitz spiritual leader Roy Wilson has related another Coyote story which equates the violence of volcanic activity with the explosive and powerful anger of conflict:

Once in the long ago time, *Xwani* (Coyote) was going up the *Seqiku* (Toutle River), and he heard a great rumbling. He perked up his ear and soon realized that it was *Lawetlat’la* (Mt. St. Helens). He could tell that she was very angry. Soon he heard another great rumbling coming from another direction. He perked up his other ear and soon realized that it was *Takhoma* (Mt. Rainier). He was also very angry. They were having a husband and wife argument and fighting, and he was between them. Then he saw *Lawetlatla* blow her top and knock the head off *Takhoma*. (Wilson 1999:74)

Oral traditions such as these provide an important cultural context to understanding the significance of the 1980 eruption to the Cowlitz Indian Tribe. Cowlitz people strongly identify with their landscape (Fitzpatrick 1986; Roe 2003; Wiggins 2007; Dupres 2010; Irwin 2014). During the Tribe's lengthy federal recognition process, Mount St. Helens was interpreted politically as a powerful symbol of Cowlitz identity (Hilton 1980; Dupres 2010, 2014). The eruption of 1980 and other subsequent smaller eruptions have been linked to the rumbling and explosive power of the Cowlitz people, and the "mountain of resentment" that had grown out of the "actions of the government and our neighbors" (Barnett 2003; Dupres 2014:47–49). Tribal members feel connected to the mountain's enduring legacy, explosive potential, and constant change and rebuilding. Eruptive events are viewed as a natural embodiment and expression of the Tribe's natural inner social turmoil, and reflect the interconnectedness of social, natural, and supernatural realms understood by the Cowlitz.

### *Lawetlat'la and Cowlitz Spirituality*

The term *tamanawas* is used by the Cowlitz to refer to the spirit presence or life force present in all things. The term comes from the Chinook Wawa, the historic trade language used by many Northwest native groups, including the Cowlitz (Wilson 2011:206–208). Everything contains *tamanawas*, but each spirit is different. Some are very powerful and can bestow certain skills, information, or healing. According to traditional Cowlitz belief, high mountains such as *Lawetlat'la* are physical manifestations and sources of *tamanawas* power. Important and spiritually-charged places in the landscape are sites where those who seek may obtain *tamanawas*. Site-based *tamanawas* can transfer power into people who seek the spirit for knowledge or medicinal purposes (Wilson 2010, personal communication to John Hand). Site-based *tamanawas* can also assist in making the *tamanawas* of other beings (animals, plants, or even non-living things such as rocks) available to the seeker. According to Roy Wilson, the main function of the mountain is to transfer that power to the people (2010, personal communication to John Hand). *Lawetlat'la* therefore serves as an important spiritual identity placeholder for the Tribe, linking them to the traditional spiritual practices of their ancestors.

The practices of some Cowlitz groups have been described as similar to the Yakama idea of the spirit quest (Blukis Onat and Hollenbeck 1981:509). People could enlist the help of non-human spiritual entities by traveling to remote mountain locations, places of power and the home of special beings that inhabited the higher elevations (Hajda et al. 1995:28). Referring apparently to the practices of the Lewis River Táytnapam, with respect to *Lawetlat'la*, one nineteenth century observer reported:

When an Indian boy wished to be received into the council of the brave of his nation, he would ascend the mountain peak as far up as the grass grows, and there prove his bravery by walking to and fro, in the presence of the Spirit which governs the mountain, until morning. His return to his people was hailed with every demonstration of delight. Old men and brave warriors greeted him and welcomed him into their secret councils. He was no longer a *tenas* [Chinook Wawa: "small"] man, but a great brave. (Loo-wit Lat-Kla 1861:14)

Another anecdote provided by this source and attributed to John Staps, an Indian man from the Lewis River area, tells of a "*Tamanawos*," or spirit, who "retired to the hills" to consult the "*Sah-ha-ly Tie*" [Chinook Wawa, approximate meaning "Great Spirit"], fasting for seven days (1861:25). Spirit quest activities continue among tribal members, today, but the practice is

considered very personal and private, and inappropriate for general discussion. Tribal Chairman William Iyall has indicated that high peaks and mountain areas remain important for this purpose (Iyall W. 2010, personal communication to Rick McClure).

Neighboring tribal groups, including the Yakama, also understood the spiritual significance of *Lawetlat'la*. While camping at the crest of the Cascade Mountains each summer, William Yallup, Sr., chief of the Rock Creek (Kamiltpah) Band of the Yakama, “always saluted each of the four snow capped peaks (Mt. Adams, Mt. Rainier, Mount St. Helens, and Mt. Hood) before he mounted his horse and rode back to camp. He truly believed in the spirits of the mountains” (Gory 2004:51). This practice shows how the *tamanawas* of the mountains were revered and respected not just by the Cowlitz, but by other groups whose homelands included portions of the Cascade Mountains.

### *Social and Economic Importance*

Historically, many traditional practices associated with seasonal resource gathering were carried out in the vicinity of the mountain. Among these were huckleberry harvesting, elk hunting, fishing, and gathering of mountain goat wool, beargrass, cedar bark, cedar roots, and medicinal plants. While these activities may not necessarily have taken place on the mountain itself, *Lawetlat'la* was regarded as a key element and constant backdrop to these cultural experiences. Patty Kinswa-Gaiser, a prominent elder of the Cowlitz Tribe, recalls spending time gathering cedar and huckleberries around Spirit Lake, just north of Mount St. Helens, with multiple generations of women from her family of the Kinswa lineage (Kinswa-Gaiser 2010, personal communication to John Hand). For tribal members like her, the mountain has both cultural and personal importance. She also states that “when the Cowlitz people are troubled they would either go to the river or to the mountain to let their grief out” (2010, personal communication to John Hand).

Additionally, trails passing near the mountain were important travel routes for the Cowlitz as they came to the area seasonally to gather resources, meet with neighboring tribes, and conduct vision quests. Tribal Council member Mike Iyall, former Director of Natural Resources for the Tribe, views *Lawetlat'la* as a symbol of both spirituality and community because the Cowlitz “could go there to communicate with God” and would use the trail system to access rivers, resources, and attend gatherings (Iyall, M. 2010, personal communication to John Hand).

In the social setting, *Lawetlat'la* functioned like a road sign along the social corridor that was the trans-montane trail network surrounding the mountain. *Lawetlat'la* served as a principal landmark for Cowlitz people, neighboring tribes, trade partners, and distant family relations. It was a landmark by which neighboring peoples identified the Cowlitz and their traditional territory, as well.

### National Register Eligibility and the Listing Process

The large and dynamic body of oral traditions and extensive ethnohistoric data involving *Lawetlat'la*, summarized in the National Register nomination, clearly demonstrates the importance of this place with respect to Tribal identity. On this basis, *Lawetlat'la* was listed in the National Register of Historic Places as a TCP under criterion “a” for its clear association with the traditional beliefs and practices of the Cowlitz Indian Tribe and Yakama Nation regarding origins, cultural history, and nature of the world (McClure, Hand and Burke 2012). Those beliefs form a

link to the past, and are thus obviously important in maintaining the cultural continuity of the tribal community.

In addition to meeting the criteria of cultural and/or historical significance (criteria a, b, or c), National Register eligibility is also contingent upon the integrity of the property. Bulletin 38 *Guidelines* recommend assessment of two key aspects of integrity: physical condition and relationship to community. To qualify for listing, a TCP must retain both. In considering the first of these, we concluded that the integrity of condition remains at a high level. Although the landscape of Mount St. Helens was physically altered by the 1980 eruption, the environment remains essentially natural, and has not been compromised by man-made development, construction, or other intrusions. The mountain, managed as a National Volcanic Monument under Forest Service administration, is now generally visited only for hiking, mountain climbing, and research purposes. The volcano is being allowed to regenerate as naturally as possible without the influence of human disturbance.

While the 1980 eruption altered the physical form of *Lawetlat'la*, the event itself is seen by Tribal people as manifestation of the mythic character of the quarreling mountain as remembered through the oral traditions. The spiritual integrity of Mount St. Helens has been preserved, as several Cowlitz myths and its very name tell of the mountain's eruptive history. When the volcano erupted in 1980, it was interpreted to symbolize the anger felt by natives for the unfair treatment of the people and their land (Wilson 1999:75). The mountain today symbolizes the continuity of Cowlitz tribal identity, community, and the changing environment through which the Cowlitz have survived. Modern volcanic activity validates traditional knowledge passed down through generations of Cowlitz people in myth. The dynamic geology of *Lawetlat'la* is, indeed, an expression of its cultural value.

Our assessment of integrity also concluded that the relationship of the TCP to the Cowlitz Indian Tribe remains strong, and is today manifest in various ways, symbolically and otherwise. The official emblem of the Tribe depicts the smoking volcano as the backdrop (Fig. 4). The emblem is prominently displayed on the tribal office buildings, as well as on the clothing worn by tribal members at cultural events celebrating their heritage. The placement and orientation of tribally-owned buildings also reflects the importance of the mountain. For example, the Cowlitz St. Mary's Mission and Elder Housing, near Toledo, Washington are situated in full view of the mountain. Architectural plans for proposed development on newly established Cowlitz reservation land purposefully align buildings to maximize views of the mountain. Principal myths about *Lawetlat'la* are still being told and recorded (see Wilson 1998, 1999), and hunting, resource-gathering and both community and personal spiritual ceremonies are still carried out in the vicinity of the mountain. These practices demonstrate the traditional significance associated with the mountain is still alive in the culture today. Thus, the completed nomination asserted that the integrity of relationship between place and community remains strong.

A completed National Register nomination (McClure et al. 2012) was sent to the Washington Department of Archaeology and Historic Preservation for review in late 2012, and subsequently submitted to the Governor's Advisory Council on Historic Preservation. Federal agencies may submit nominations directly to the Keeper of the National Register; we opted to use the alternate process that includes consideration by the Council for listing at the state level. On 21 February 2013 the Council approved listing *Lawetlat'la* in the Washington State Register of Historic Places, and recommended submission to the Keeper of the National Register. Following National Register staff review, the nomination was approved and *Lawetlat'la* was formally listed in the National Register as a TCP on 11 September 2013.



Fig. 4. The official Cowlitz Indian Tribal emblem, depicting the smoking volcano as the backdrop.

At the national level, TCP listings have been infrequent. Of more than 80,000 properties in the National Register of Historic Places as of 2014, *Lawetlat'la* is one of only 23 TCPs actually listed. While the question of why so few TCPs have been listed is a bit beyond the scope of this case study, the experiences of the authors offer at least two simple explanations; undoubtedly there are others. First, for federal agencies at least, properties that have been found eligible to the National Register, either by SHPO consensus or by formal determination through the Keeper of the National Register, are managed the same as listed properties. The extra work of a formal nomination and listing process offers the property no greater protection. Second, in the case of TCPs, and especially those associated with archaeological sites or spiritual beliefs and practices, there are often concerns about confidentiality and site protection coupled with a sense that National Register status may result in greater public awareness of the property.

These were not concerns in the case of *Lawetlat'la*. The statements of agency and Tribal leaders in response to this listing underscored the unique value of the National Register designation to each and emphasized the cooperative nature of the application: Janine Clayton, Gifford Pinchot National Forest Supervisor, remarked, "Although Mount St. Helens is well-known around the world for its status as an active volcano, the Forest Service has profound respect for the cultural significance of the area. This formal recognition further validates our deep and long-standing relationships with our tribal partners" (USDA Forest Service 2013).

Dr. Allyson Brooks, State Historic Preservation Officer and DAHP Director, emphasized the State's responsibility to protect and preserve historic and cultural resources as assets for the future, noting, "Recognizing significant cultural Native American places in Washington has been a priority for this agency. This is the second Traditional Cultural Property listing in Washington State and one of the very few Traditional Cultural Property listings nationwide. Washington is proud to be in the forefront of recognizing tribal places and history" (USDA Forest Service 2013).

Finally, Cowlitz Tribal Council Chairman William Iyall used the listing to relate the persistence and behavior of the Cowlitz People with that of the mountain, saying, “The listing of *Lawetlat’la* as a Traditional Cultural Property honors the long relationship between the Cowlitz People and one of the principal features of our traditional landscape. For millennia, the mountain has been a place where Tribal members went to seek spiritual guidance. She has erupted many times in our memory, but each time has rebuilt herself anew. She demonstrates that a slow and patient path of restoration is the successful one” (USDA Forest Service 2013).

In retrospect, both tribal and agency officials agree that frequent interactions between Gifford Pinchot National Forest personnel and Tribal members during the period of nomination preparation served to strengthen the overall working relationship between the Forest Service and the Tribe. It is important, however, to acknowledge that concerns were raised by the scientific community, and particularly by researchers with a vested interest in ongoing geological and biological studies within the boundaries of the TCP. They were concerned with how the listing would affect access to research areas, whether National Register status would somehow interrupt long-term studies, if research proposals would require another level of agency review, and if full government-to-government consultation with the Cowlitz Tribe would be required for every proposed action within the TCP boundary. This dialogue, however, has resulted in greater mutual understanding aimed at the development of a cooperative management strategy that respects the scientific, recreational, *and* cultural values of this important place.

## The Future: Cooperative Management of a TCP

Since the formal designation of *Lawetlat’la* as a National Register-listed TCP, Cowlitz Tribal leaders have met on several occasions with Forest Service staff and with curriculum developers from the Mount St. Helens Institute (a private, non-profit science educational organization). These meetings discussed cooperative management of the TCP and opportunities for educational outreach, including guided hiking trips to the TCP (Fig. 5). Federal agency direction (FSM 2364.41a, 41f) calls for development of a management or treatment plan oriented toward protection of cultural values contributing to the significance of the property. Gifford Pinchot National Forest and Tribal staff have proposed a multi-disciplinary methodology to develop management standards and guidelines for the plan and a cooperative management approach to meet objectives. Standards and guidelines will incorporate those already set forth in the 1995 *Mount St. Helens Land Management Plan*, 2000 *Gifford Pinchot National Forest Land Management Plan*, and 1996 National Park Service’s *Guidelines for the Treatment of Cultural Landscapes*, currently under revision. In addition to addressing objectives for protecting and enhancing cultural values, the plan, as proposed, will set forth consultation protocols, and include a consideration of future projects and uses within the boundaries of the TCP. Both parties have also suggested that the plan address the status of *Lawetlat’la* as a Sacred Site under Executive Order 13007.

The management plan relies on partnership opportunities as part of its implementation strategy, particularly those programs, projects, and ongoing activities involving public education or natural/cultural resource monitoring, protection, and restoration. Some educational opportunities are already in development through existing interpretive and educational outreach programs of the Mount St. Helens National Volcanic Monument and the Mount St. Helens Institute, including public lectures, adult science education programs, and field seminars. One very simple effort at public education involved the addition of a cultural awareness statement, authored



Fig. 5. Cowlitz Tribal members, Forest Service staff, Mount St. Helens Institute staff, and authors on the SW flank of *Lawetlat'la* for field seminar during the summer of 2014. Photo by Ray Yurkewycz (Mount St. Helens Institute).

by the Cowlitz Indian Tribe, to the climbing permits required to ascend the mountain. In 2014, nearly 17,500 climbers carried this message with them in the text of their permits:

Cultural Awareness: The area of Mount St. Helens above treeline is a Traditional Cultural Property of Cowlitz and Yakama Tribal groups. For thousands of years, the Mountain has been a central place in the culture and mythology of the Tribes, where resources were gathered and young people were sent to test themselves. It is a place charged with powerful energy. When you cross above the Loowit Trail into the region where the climbing permit is required, please conduct yourself in a manner that is respectful of both Tribal interests and the Mountain.

Other plan opportunities will likely address access and co-management of traditional natural/cultural resources. For example, mountain goats are a culturally-relevant species for the Cowlitz Tribe, hunted for meat, horns, and wool. A population of mountain goats has recolonized the mountain, and the Tribe and Forest Service have launched a close partnership to survey the mountain goat population. As Cowlitz and Yakama families traditionally ascended to high-elevation areas in late summer to collect huckleberries, beargrass, and other montane resources,



there are many possibilities for similar cooperative efforts that blend science and traditional culture.

Given the nature of the TCP, it is particularly important that the strategies developed to protect cultural values also consider contemporary spiritual practices by Tribal people. For Indian people, *Lawetlat'la* is a place charged with spiritual power, where the boundary between the physical world and the spiritual world grows thin. Traditional use of the mountain included personal, individual *tamanawas*-seeking visits. Solitude and seclusion were essential elements of this practice. A sensitive treatment of traditional spiritual practices is essential, particularly with regard to issues of access and conflicting uses. Recent years have seen renewal of many traditional ceremonies and activities in the Cowlitz community. It is the hope of many Tribal members that this trend will continue, and a renewed interest in traditional spiritual practices will include opportunities for private visits to the upper slopes of the mountain.

## Conclusions

The nomination and listing of *Lawetlat'la*/Mount St. Helens to the National Register as a TCP was a voluntary endeavor, designed to meet agency objectives under Section 110 of the National Historic Preservation Act, as well as cultural resources management objectives of the Cowlitz Indian Tribe. The process was not associated with, or driven by, a federal undertaking or action that would trigger Section 106 consultation. At the national level, and at the regional level, such cases are rare. What, then, are the benefits of this designation, and how will it make a difference in future management?

For the Cowlitz Indian Tribe, in particular, state, federal agency and public recognition of the cultural significance of Mount St. Helens acknowledges the Cowlitz relationship to landscape, their persistence, and a desire to be involved in management decisions that involve a place of important traditional cultural value. It is a distinct hope of the Cowlitz that the TCP becomes a focus for increasing interactions between the Tribal community and the natural and spiritual world. These interactions do not need to occur within the designated boundaries of the TCP, or even within the boundaries of the Mount St. Helens National Volcanic Monument. As a constant backdrop to Tribal events and activities, *Lawetlat'la* remains an important factor to reaffirm and revitalize the relationship between the Tribal community and their cultural landscape.

At the most basic level, the NRHP listing helped the Forest Service meet its own goals and objectives regarding stewardship of heritage resources and compliance with the NHPA. Indeed, Section 110 of the NHPA directs federal agencies to nominate historic properties under their jurisdiction. More important, however, was the growth of a healthy working relationship between the tribe and the federal agency that arose from the spirit of collaboration among project participants. The strength of that relationship has routinely manifested itself, both in terms of formal government-to-government consultation, and in the regular interactions between Forest Service personnel and staff of the Cowlitz Tribe. The trust inherent within that relationship is the foundation for future discussions regarding co-management opportunities of mutual benefit to both partners, including those involving the TCP.

Finally, it will be obvious to most readers that *Lawetlat'la*/Mount St. Helens is not unique as an important sacred site or candidate for National Register listing on the basis of traditional cultural significance. As we have seen in the oral traditions associated with *Lawetlat'la*, other volcanos figure prominently in origin stories. Among these, *Pahto*, Mt. Adams, is considered sacred to the Yakama people. *Takhoma*, Mt. Rainier, is considered sacred by the Muckleshoot,

Nisqually, and Puyallup. Wyeast, Mt. Hood, is considered sacred to the Confederated Tribes of Grand Ronde. Each mountain is tied to its own body of oral traditions, each equally important to those Tribes. We offer this case study as an example of one approach in recognizing and managing places of traditional cultural significance. As appropriate, we encourage others to consider the value and benefits of formal designation for similar cultural landscape features in their areas. However, the greatest and most lasting value, from our perspective, can be measured in the relationships built and trust garnered by working together.

#### ACKNOWLEDGMENTS

The authors would especially like to thank William Iyall, Chair of the Cowlitz Indian Tribe, and dAVE burlingame, Cultural Resources Department Director of the Cowlitz Indian Tribe, for their encouragement and support of this project. We also thank John Hand, Student Conservation Association intern, for his initial work, and Dr. Jeffrey Walker, Forest Service Regional Archaeologist, for providing funding for completion of the nomination. We are grateful to Cheryl Mack for her review of several draft versions of this article.

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## METAL AND PRESTIGE IN THE GREATER LOWER COLUMBIA RIVER REGION, NORTHWESTERN NORTH AMERICA

**H. Kory Cooper, Kenneth M. Ames, Loren G. Davis**

### ABSTRACT

Excavations at the late prehistoric-early historic Chinookan sites of Meier and Cathlapotle in the Greater Lower Columbia Region recovered several hundred metal artifacts. Portable X-ray fluorescence (XRF) was used initially to quickly determine metal type. Then a sample of copper artifacts was subjected to another round of XRF analysis to identify the presence of native copper and, or, chronologically sensitive copper metals. No native copper artifacts were identified and the lack of Muntz metal, a specific type of brass patented in the 1830s, corroborates the dating of material from both sites as no later than the early historic period. Meier and Cathlapotle were important sites for the indigenous working of trade copper, some of which was likely destined for Native communities further inland. This trade copper was a highly valued prestige good in the Plateau and Pacific Northwest and it moved rapidly through Native trade networks in advance of other non-Native trade goods and continued to be used for personal adornment and incorporated into burials into the nineteenth century.

### Introduction

Several hundred copper and iron artifacts were recovered from the Meier and Cathlapotle archaeological sites (Fig. 1), two Chinookan sites occupied from approximately A.D. 1400–1820 and A.D. 1450–1833, respectively (Ames, Smith, and Bourdeau 2008). Compositional and metallographic analyses of copper artifacts from archaeological contexts in North America have been used to identify such material as either native or smelted copper, and identify specific copper alloys. These analyses, in turn, have informed discussions of the chronology of copper metal-bearing sites and contexts and provided a foundation for discussing when and how foreign trade metal was integrated into Native American culture and technology (e.g., Osborne 1957; Stapp 1983, 1984, 1985; Hancock et al. 1994, 1995; Ehrhardt 2005; Anselmi 2008). Because copper artifacts from prehistoric contexts in the Pacific Northwest and Plateau have previously been identified as native copper (see list in Hayden and Schulting 1997:56), and both sites were occupied before and after contact, one goal of the analysis was to determine whether native copper artifacts were present at these sites. Native copper is naturally occurring copper metal, often greater than 99.99% pure (Wayman 1989). Copper smelted from ores in the eighteenth and nineteenth centuries has significantly more non-metallic inclusions and a coarser grain size than native copper, and as a result it can be distinguished from native copper using either trace element analysis or metallography (Wayman et al. 1985:369). Additionally, studies in eastern North America (Hancock et al. 1994, 1995) have found the presence of certain types of copper and copper alloys useful as chronological markers for subdividing the proto-historic and historic periods.

The identification of copper from Meier and Cathlapotle as either native or smelted trade metal, and the type of smelted copper or copper alloys present, adds to our understanding of when and how these metals moved through prehistoric, proto-historic, and historic trade networks. This study does not attempt to source trade copper to its origin, neither the location of the ore, nor where it was smelted.

## Regional Background

The Greater Lower Columbia River Region (GLCRR) (Hajda 1984; Boyd, Ames, and Johnson 2013) encompasses the final 200 miles of the Columbia River and adjacent portions of the Pacific coastline (Fig. 1). This region was one of several interaction spheres comprising the Northwest Coast culture area (Hajda 1984; Suttles 1990; Ames and Maschner 1999). Hajda defined it using local and regional patterns of social and economic interaction. At contact (AD 1792), the GLCCR was occupied by members of several ethno-linguistic groups. Speakers of Chinookan languages were the most numerous (Hajda 1984; Silverstein 1990) with large, comparatively dense precontact populations estimated at 34,000 people (Boyd 1990, 1999). Most were concentrated on the major rivers and tributaries, particularly along the Columbia River's estuary and in the Wapato Valley (see below). Chinookan social organization and economy had much in common with other Northwest Coast societies (Hajda 1984; Silverstein 1990). The household was the basic socio-economic unit, and the village or town the maximal unit. Households lived in large post and beam plankhouses of western red cedar (*Thuja plicata*). Society was divided into two broad classes, free and slave (Donald 1997; Hajda 2005, 2013). Free people were subdivided into a chiefly elite and commoners. Chiefly status was based on heredity, wealth and widespread social and economic ties (Hajda 1984, 2013). The slave population in the late eighteenth and early nineteenth centuries may have been 25% of the total (Mitchell 1985; Ames 2008).

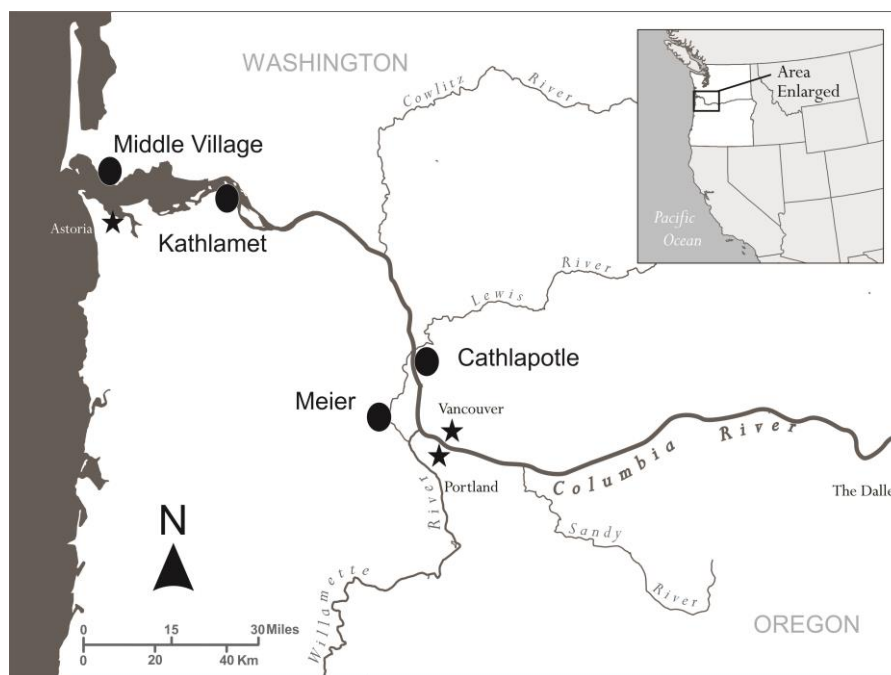


Fig. 1. Map of the Lower Columbia River Region showing the location of archaeological sites.



Contact began ca. 1775, with the first documented exploratory voyages along the coast (Hajda 1984; Gibson 1992). By the early 1790s American fur traders were operating at the mouth of the Columbia River (Howay 1990 [1941]; Gibson 1992;). The maritime fur trade brought the GLCRR into an “internationalized ocean basin” (Igler 2004) and connected it to a mercantile and colonial system spanning the world. Competition among Spain, Great Britain and Russia (Cole and Darling 1990; Gibson 1992; Lightfoot, Schiff, and Wake 1997; Igler 2004) fueled exploration. By the 1790s the United States replaced Spain as Britain’s main competitor in the GLCRR. Between 1785 and 1841, an average of twelve vessels operated annually on the Northwest Coast (Gibson 1992) with at least one probably entering the Lower Columbia River (Robert Boyd, pers. comm.). Vessels sailed from the GLCRR to Canton, South America, Hawaii, and elsewhere (Igler 2004). Before 1811, the fur trade was entirely maritime, with ships dependent on Native people for furs and fresh provisions. The Lewis and Clark expedition spent the winter of 1805–1806 near the river’s mouth. In 1811, Fort Astoria, the first permanent Euro-American base in the GLCRR (Franchere 1967; Jones 1999), was established. The Hudson’s Bay Company (HBC) in 1824 placed the headquarters for its entire Columbia Department at Fort Vancouver, in the Wapato Valley. The region became part of United States territory in 1848. By then, epidemics had decimated the GLCRR’s original people. Contact-era epidemics were not everywhere as severe as even recently thought (e.g., papers in Larsen and Milner 1994; Baker and Kealhofer 1996). However, they devastated the GLCRR (Boyd 1999). The effects differed within the region, with the Wapato Valley worst hit. Population decline there probably exceeded 90% between 1792 and 1832.

## The Archaeological Sites

The Meier and Cathlapotle sites are located in the Wapato Valley (aka Portland Basin) portion of the GLCRR; essentially in the greater Portland, Oregon—Vancouver, Washington metropolitan area (Fig. 1). The Meier site (35-CO-1) is on the western edge of the Wapato Valley. Excavations between 1987 and 1991 exposed a large (30x14 m) plankhouse, exterior midden deposits and activity areas (Ames et al. 1992; Smith 2006, 2008; Ames, Smith, and Bourdeau 2008). Chronological control is provided by nineteen radiocarbon dates and temporally sensitive artifacts (Ames et al. 2011). The house was constructed about AD 1400 and abandoned by perhaps 1820. No Euro-American accounts mention the site. Accessible by boat via small channels, it is about 6 km from the Columbia and 3 km from the nearest major waterway. It contains a variety of industrial trade goods including iron and copper, and ceramics dating to the early fur trade era (Banach 2002; Kaehler 2002; Cromwell 2011).

Cathlapotle (45-CL-1) is near the Columbia River on the U.S. Fish and Wildlife’s Ridgefield Wildlife Refuge (Ames et al. 1999; Sobel 2004; Ames et al. 2008) near Ridgefield, Washington, about 29 km below Vancouver, Washington. It was one of the Wapato Valley’s major Chinookan towns with population estimated as high as 900 (Boyd and Hajda 1987; Ames 2008). The site contains the remains of six very large plankhouses arrayed in two rows paralleling a small tributary of the Columbia River. Two structures and associated exterior deposits were intensively sampled between 1991 and 1996 (Ames et al. 1999; Sobel 2004; Smith 2008). The village was established in its present location ca. AD 1450 and abandoned ca. 1833 (Ames and Sobel 2010). It appears frequently in Euro-American accounts from 1792 (Vancouver 1926; Sobel 2004) until its abandonment and was deeply involved in the fur trade (e.g., Jones 1999). Lewis and Clark visited 29<sup>th</sup> March 1806, writing lengthy accounts (Moulton 1990). The site has a rich assemblage of fur-trade era trade goods (e.g., Banach 2002; Kaehler 2002) including ceramics contemporary with

those from Meier (Cromwell 2011). The initiation of the fur trade at the site is archaeologically distinct. Trade goods appear abruptly about 70 cm below surface in deposits 2 m deep. The sequence of trade goods across the site is consistent, allowing separation of precontact and contact-era deposits. This sequence is generally replicated at the Meier site. The research program at both sites centered on the political economies of large households, including the relationships between social status and household production (e.g., Ames 1996; Sobel 2004; Smith 2008), and on how these households and communities engaged in and responded to the fur trade. Cupreous artifacts were of particular interest and it was important to distinguish trade metal from native copper because the latter could be heirlooms and hence precontact markers of high status.

Banach (2002) classified the copper artifacts from both sites and analyzed their spatial distributions. The Meier-Cathlapotle assemblage contained copper sheets, rolled beads, tubes, rings, bracelets, rods, projectile points and unidentifiable pieces. Copper was concentrated within the houses at both sites, around hearths (fabrication?), under sleeping platforms, and in the house cellars (Ames, Smith, and Bourdeau 2008). The relative status of household members does not appear to directly affect the spatial distributions of the copper objects themselves (Banach 2002) although copper working may have occurred primarily in lower status areas of houses. At Cathlapotle, copper sheets and beads were also concentrated in a midden area in front of House 1 and it is thought this may be an exterior fabrication area.

## Previous Studies of Copper Artifacts in the Region

Artifacts of copper, presumably native, have also been recovered from Late Prehistoric sites in the Plateau region (Galm 1994; Schulting 1994; Hayden and Schulting 1997). But several of the examples listed by Hayden and Schulting (1997:56) from the southern Plateau, primarily the Columbia River Valley, may in fact be protohistoric trade metal. In some cases the original investigators of these sites identified artifacts as being made of native copper based on an impressionistic visual examination (Smith 1910:95; Krieger 1928:13; Butler 1959:9) or questionable interpretation of ambiguous or unreported analytical results (Strong 1960:56; Combes 1968:171; Bergt 1978:93). In other instances the context of the copper was noted to overlap the Late Prehistoric and Protohistoric periods (Butler 1959:16), or the investigators offered no opinion as to the source or age of the copper (Skinner and Copp 1986).

One of the first scholars to take an interest in protohistoric copper burial goods in the Plateau was Osborne (1957). He provides a detailed discussion of the possible origins of this material and incorporated compositional (Kroll 1957) and metallographic (McLeod 1957) analyses of copper artifacts in his study. McLeod (1957) studied five copper tube beads and three flat pieces of copper from the McNary site microscopically and confirmed they were industrial smelted copper, as opposed to native copper, that had been rolled due to the amount of impurities present and the elongated arrangement of inclusions. Kroll (1957) analyzed copper beads from the McNary Site spectrographically and determined they were not recent, i.e., no later than the 1880s based on the lack of purity that is possible with more recent copper products thanks to the use of electrolysis. Yet the beads were not pure enough to be considered native copper.

Building on the work of Osborne and colleagues, Stapp (1984) performed the first large-scale regional study of protohistoric copper artifacts in the Plateau. Using XRF to analyze hundreds of artifacts from protohistoric burials he identified over ten different types of relatively pure smelted copper sheet using trace elements. Though many brass (copper and zinc) artifacts were also present it was not possible to develop different brass types based on the trace element results. The different

types of copper sheeting identified are believed to relate to different origins, i.e., different sources of copper ores and, or, different smelters. However, the different copper types varied at multiple spatial scales between burials, sites, and regions such that it was not possible to offer a definitive explanation for their distribution.

According to Stapp (1983, 1984) the most likely origins for industrial copper traded into the Northwest Coast include Britain, Germany, Russia, Spain, Mexico, China, and eastern North America. However, very little copper was being produced in North America in the late eighteenth century (Mulholland 1981). Additionally, Britain, the number one copper producer in the world at this time, was using both domestic and foreign ores and metals, e.g., Germany (Jopling 1989; Day 1991). Smelted copper was also traded into the region from Chile (Howay 1990 [1941]). Stapp (1983, 1984) was unable to match his three copper types to any specific source, but his work demonstrated the potential for doing so.

In addition to the XRF analysis, Stapp's (1984) review of the archaeological evidence found the following. Most of the burials containing copper artifacts were infants or adult females. The richest burials with respect to copper were found along the upper Columbia, in the Snake and Clearwater Rivers region. Most of this copper found upriver along the Columbia River and tributaries was acquired via intermediary trade and exchange from the sailing vessels engaged in the fur trade and probably dates to the mid-1790s, after trading began at the mouth of the river (Stapp 1984).

Just as Stapp (1984:75) was unable to compare his results with those of earlier studies, we did not attempt to look for the various copper types he identified among the material at Meier and Cathlapotle. The results of a study performed to assess the inter-laboratory reproducibility of quantitative XRF results obtained from historic coppers alloys (Heginbotham et al. 2011) does not encourage attempting such comparisons even though Stapp (1983, 1984) also used XRF. In the inter-laboratory study nineteen XRF instruments from fourteen institutions were used to analyze twelve metal samples following ASTM (American Society for Testing and Materials) standard E1601, Standard Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method. Although the reproducibility of results for copper, zinc, and tin were better than for elements with lower detection limits, the overall ability to reproduce comparable results between labs was "relatively poor" (Heginbotham et al. 2011:252). As a result, though Stapp's (1983, 1984) research made some interesting initial findings that have yet to be pursued further, this study did not attempt to identify the different copper trace element profiles he identified.

## XRF Analysis of Meier and Cathlapotle Metal

After consultation with the U.S. Fish and Wildlife Service, Confederated Tribes of Grand Ronde, and the Chinook Indian Nation only non-destructive analysis was approved, which means we were unable to remove samples for metallography. X-ray fluorescence was considered to be the best option to obtain data for such a large collection non-destructively. The metal artifacts from Meier ( $n = 194$ ) and Cathlapotle ( $n = 331$ ) were first analyzed using a portable NITON XL3t x-ray fluorescence (XRF) instrument at Oregon State University in order to identify major metal types, e.g., iron, copper, or copper alloy. It was believed that these collections might contain native copper, but if so, probably few in number. As a result, all metal artifacts in both assemblages were subjected to this initial screening instead of sampling.

The NITON results showed that approximately half of the Cathlapotle metal artifacts are copper-based and the other half iron. Approximately one-third of the 200 metal artifacts from Meier

are copper-based and the rest iron. One pewter (tin-lead alloy) object was recovered from each site. The Cathlapotle collection contains more examples of brass (copper and zinc) and leaded brass than Meier but most of the copper-based material from both sites is unalloyed smelted copper of varying purity. None of the brasses have large amounts of zinc, excepted for two Chinese coins. For example, Muntz metal, patented in 1832 by George Muntz specifically for use in sheathing ship hulls, was a copper:zinc alloy with anywhere from 37–50% zinc, though the most common ratio was 60:40. Its use became more common after 1850 (Day 1991). The lack of this metal supports the abandonment of both villages earlier in the nineteenth century. The NITON results also demonstrated that the vast majority of smelted copper specimens have high enough levels of a number of trace elements such as arsenic, iron, nickel, and antimony to confirm they are not native copper. Nine of the Cathlapotle artifacts, six tapered rods (45CL1-46188a-f) (Fig. 2) and three tube beads (45CL1-13507, -6029, -28034) (Fig. 3) were high enough in copper (over 99% Cu) to warrant further investigation to determine if they might be native copper.

A sample of 51 copper metal artifacts (Meier  $n = 16$ , Cathlapotle  $n = 35$ ) were subjected to a second round of XRF analysis using a Fischerscope XDAL X-Ray at the Science Applications International Corporation office located in the Purdue Research Park Northwest Indiana. Because the initial analysis revealed nine copper artifacts from Cathlapotle with similar results indicating they were made of relatively pure copper, a characteristic of native copper (Wayman 1989), this second round of analysis was performed to confirm the presence or absence of native copper at these two sites. Archaeological and geological native copper specimens from Alaska, which previously

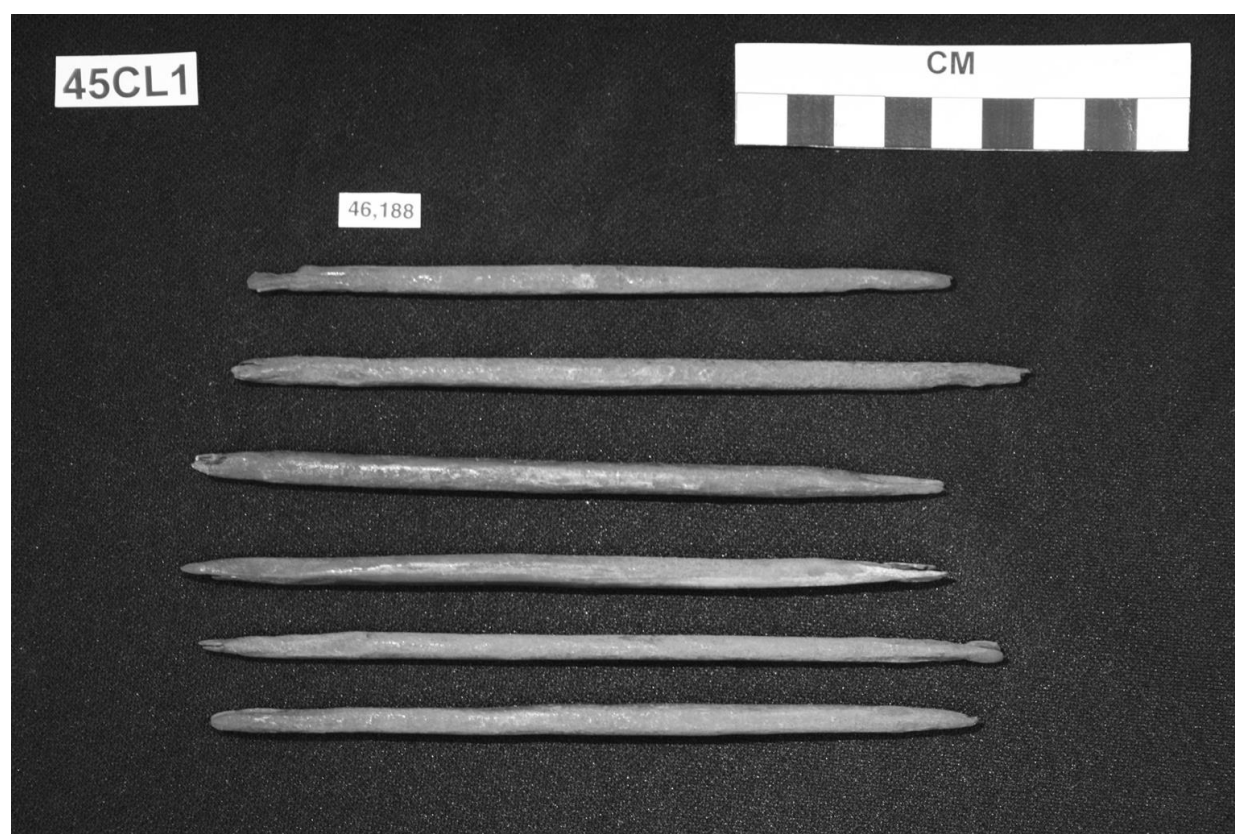


Fig. 2. Copper rods from Cathlapotle (catalog #46188a-f). Mean is 99.1% copper, based on ppm.



Fig. 3. Rolled copper bead from Cathlapotle (catalog # 6029). It is 98.9% copper, based on ppm.

had been analyzed using Instrumental Neutron Activation Analysis (INAA) and Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) (Cooper et al. 2008) were analyzed for comparative purposes, not in an effort to identify the source of artifact copper.

Each sample was subject to bulk analysis for 100 seconds at 50 keV, 300 mA, using a 0.6mm spot size. The Fischerscope XDAL has a micro-focus tungsten tube with Be window and high energy resolution PIN semiconductor diode detector. Quantitative results were calculated using fundamental parameters and instrument software (WinFTM® V.6). All of the results are shown in Table 1. Target artifact surfaces were gently scraped with a stainless steel dental instrument in order to analyze clean metal, but artifacts were not scrubbed or polished. Thus, the elevated iron in some of the results is likely due to the effects of corrosion and presence of excavation sediment. To demonstrate the effectiveness of the Fischer XDAL, European Commission Community Bureau of Reference (BCR-691) standards were analyzed (Ingelbrecht, Adrianes, and Maier 2001). First reported on in Cooper and Bowen (2013), these results are shown in Table 2 along with published data on these standards. Though the use of fundamental parameters in lieu of an empirical calibration is insufficient for archaeological provenance work that relies on comparing trace element signatures, it is sufficient for determining the presence or absence of elements (Shackley 2011). We believe the results shown in Table 2 demonstrate the effectiveness of the Fischer XDAL in identifying and differentiating between smelted copper and copper alloys containing various amounts of tin, zinc, and lead using fundamental parameters.

As seen in Table 1, the copper results for the high purity copper artifacts from Cathlapotle overlap with the archaeological and geological specimens of Alaskan native copper. However, analyses of eighteenth and nineteenth century industrial copper, specifically sheet copper used for ship sheathing, have produced results ranging from 99%–100% copper by weight (Craddock and Hook 1990; Atauz et al. 2006), overlapping with the purity of native copper. More importantly, the Cathlapotle material contains several times more arsenic than the Alaskan native copper. There is no overlap in the amount of arsenic between archaeological and geological specimens of Alaska native copper with the highest purity copper artifacts from Meier and Cathlapotle. Arsenic is commonly found in native copper (e.g., Broderick 1929; Franklin et al. 1981; Rapp et al. 2000),

TABLE 1. X-RAY FLUORESCENCE RESULTS IN WT. %. FISCHER X-DAL.

Catalog#/ID	Description	Material	Cu	Ni	Fe	Zn	As	Se	Ag	Sn	Sb	Au	Hg	Pb
<i>Alaskan Geological Native Copper</i>														
Dan Creek	geological	native Cu	100.3	0.39	nd	nd	0.21	0.17	nd	nd	0.12	nd	nd	nd
Kletsan	geological	native Cu	100.2	0.07	0.07	nd	0.02	0.01	nd	nd	nd	nd	nd	nd
Chititu Creek #6	geological	native Cu	100.1	nd	nd	nd	nd	0.19	0.06	nd	0.29	nd	0.27	0.21
Chititu Creek #7	geological	native Cu	100.0	nd	nd	nd	0.03	0.30	0.07	nd	0.36	nd	0.34	0.23
<i>Alaskan Archaeological Native Copper</i>														
75AMU-1-453	bar	native Cu	99.7	nd	nd	nd	0.16	0.24	0.07	nd	0.23	nd	0.26	0.08
75AMU-1-476	sheet fragment	native Cu	99.7	0.04	nd	0.16	0.18	0.21	nd	nd	0.16	nd	0.16	0.11
75AMU-1-1089	sheet fragment	native Cu	100.0	nd	nd	nd	0.09	0.15	0.15	0.03	0.17	nd	0.24	0.17
GUL077/76-41	awl	native Cu	101.7	nd	nd	nd	nd	nd	nd	nd	nd	0.38	nd	0.07
GUL077/76-64	blank	native Cu	99.3	0.18	0.20	nd	nd	0.05	0.06	nd	0.04	nd	0.16	0.08
UA95-65-0208	blade	native Cu	100.1	nd	nd	nd	0.11	0.03	nd	0.15	0.16	nd	0.14	0.09
UA96-62-0229	projectile point	native Cu	99.8	nd	nd	nd	0.01	0.18	0.10	0.04	0.23	0.08	0.20	0.12
UA96-62-0230	sheet fragment	native Cu	99.7	nd	nd	nd	0.01	0.26	0.02	nd	0.27	nd	0.35	0.28
UA96-62-0234	worked nugget	native Cu	99.9	nd	nd	nd	0.22	0.24	0.04	nd	0.31	nd	0.35	0.07
<i>Cathlapotle Artifacts</i>														
45CL1-46188a	rod	smelted Cu	99.4	nd	nd	nd	0.81	0.22	0.07	nd	0.31	nd	0.22	0.33
45CL1-46188b	rod	smelted Cu	100.5	nd	nd	nd	0.46	nd	0.11	nd	nd	0.33	nd	0.34
45CL1-46188c	rod	smelted Cu	99.2	0.13	0.06	nd	1.06	0.06	nd	0.07	0.07	nd	0.33	nd
45CL1-46188d	rod	smelted Cu	98.7	0.14	nd	nd	1.94	0.06	0.01	nd	nd	nd	0.12	0.11
45CL1-46188e	rod	smelted Cu	99.4	nd	nd	nd	0.97	nd	0.08	0.09	nd	0.42	nd	0.04
45CL1-46188f	rod	smelted Cu	99.3	nd	nd	nd	0.97	0.31	0.15	nd	0.24	nd	0.26	0.21
45CL1-06029	tube bead	smelted Cu	99.4	nd	nd	nd	0.73	0.23	0.19	nd	0.22	nd	0.19	0.26
45CL1-13057	tube bead	smelted Cu	98.8	nd	nd	nd	0.65	0.21	0.05	nd	0.12	nd	0.17	0.92
45CL1-18102	ring	smelted Cu	99.7	nd	nd	nd	0.64	0.22	0.08	nd	0.22	nd	0.05	0.45
45CL1-28034	tube bead	smelted Cu	99.5	nd	0.12	nd	0.62	0.13	0.04	nd	0.19	nd	0.16	0.08
45CL1-15024	tube bead	smelted Cu	96.9	nd	1.31	nd	1.16	0.04	0.22	0.07	0.26	0.37	0.07	nd
45CL1-00264	tube bead	smelted Cu	99.0	nd	nd	nd	0.59	0.25	0.32	nd	0.33	nd	0.13	0.62
45CL1-18175	ring	smelted Cu	99.1	nd	nd	nd	0.44	0.10	0.17	0.03	0.11	0.04	0.12	0.42
45CL1-18164	ring	smelted Cu	96.3	nd	2.43	nd	0.84	0.07	0.08	nd	0.12	nd	nd	1.26
45CL1-26062	tube bead	smelted Cu	97.8	nd	0.47	nd	0.90	nd	nd	nd	0.20	0.39	nd	1.28
45CL1-18084	tube bead	smelted Cu	99.3	0.08	nd	0.01	0.38	0.22	0.10	nd	nd	nd	0.12	0.83
45CL1-27059	tube bead	smelted Cu	99.4	nd	0.23	nd	0.84	nd	0.10	0.06	nd	0.35	nd	0.39
45CL1-00726	tube bead	smelted Cu	101.1	nd	0.01	nd	0.58	0.05	nd	nd	nd	0.17	nd	nd
45CL1-34009	sheet fragment	smelted Cu	99.5	nd	0.09	nd	0.61	nd	0.18	nd	nd	0.15	nd	0.46

TABLE 1. CON'T.

Catalog#/ID	Description	Material	Cu	Ni	Fe	Zn	As	Se	Ag	Sn	Sb	Au	Hg	Pb
<i>Cathlapotle Artifacts</i>														
45CL1-52025A	tube bead	smelted Cu	96.9	nd	0.08	nd	2.05	0.11	0.20	nd	0.27	nd	0.13	1.11
45CL1-41057	tube bead	smelted Cu	98.8	nd	0.65	nd	0.34	nd	nd	nd	0.12	0.76	nd	0.71
45CL1-34078	tube bead	smelted Cu	99.3	nd	nd	nd	0.47	0.25	0.19	nd	0.18	nd	0.23	0.17
45CL1-49116	strip	smelted Cu	98.6	0.04	0.64	nd	0.94	nd	nd	nd	0.22	0.82	nd	0.29
45CL1-00462	sheet fragment	smelted Cu	97.8	nd	0.79	nd	0.71	nd	0.12	0.13	0.06	0.50	nd	0.78
45CL1-42070	sheet fragment	smelted Cu	99.0	nd	0.10	nd	1.37	0.12	0.14	nd	0.16	nd	0.15	0.07
45CL1-33075	tube bead	smelted Cu	98.7	0.02	0.37	nd	0.82	nd	0.04	0.04	0.25	0.74	nd	nd
45CL1-49006	strip	smelted Cu	89.4	nd	7.18	nd	2.14	0.12	0.18	0.02	0.39	nd	0.18	1.07
45CL1-16017	sheet fragment	?	60.4	0.56	21.50	0.42	nd	0.15	2.04	2.61	3.60	3.34	2.01	3.54
45CL1-00727	Chinese Coin	Leaded Brass	61.6	0.07	7.16	12.60	4.00	0.18	0.02	0.89	0.21	nd	nd	14.30
45CL1-00727	Chinese Coin	Leaded Brass	47.1	nd	1.89	43.90	1.33	nd	nd	0.53	nd	0.31	nd	6.69
45CL1-19037	ring	Leaded Brass	56.5	nd	10.40	12.10	1.89	nd	0.15	0.19	0.08	0.33	nd	19.50
45CL1-42033	tube bead	Leaded Brass	87.5	0.06	2.27	4.53	1.25	0.07	nd	nd	nd	nd	nd	6.40
45CL1-04012	sheet fragment	Leaded Brass	91.3	nd	0.40	7.00	0.57	0.14	nd	nd	nd	nd	nd	2.21
45CL1-20006	pendant	Leaded Brass	90.0	nd	0.68	6.45	0.62	nd	nd	nd	0.13	nd	nd	3.50
45CL1-29047	Phoenix button	Brass	91.6	nd	1.69	5.09	0.85	0.19	0.19	nd	0.04	nd	0.20	1.41
<i>Meier Artifacts</i>														
35CO5-02632	tube bead	smelted Cu	98.3	nd	0.16	nd	0.37	nd	0.26	nd	0.32	0.93	nd	0.77
35CO5-02813	tube bead	smelted Cu	98.8	nd	0.24	nd	0.49	nd	nd	nd	0.17	0.49	0.03	0.71
35CO5-10624	ring	smelted Cu	99.8	nd	nd	nd	0.64	nd	nd	nd	0.12	0.47	nd	0.13
35CO5-02520	tube bead	smelted Cu	99.4	nd	nd	nd	0.99	nd	0.07	nd	nd	0.66	nd	0.31
35CO5-11884	wire	smelted Cu	98.0	nd	0.66	nd	0.71	0.14	0.02	nd	0.29	0.47	nd	0.30
35CO5-03827	crochet hook	smelted Cu	97.3	nd	nd	2.45	0.46	0.12	nd	nd	0.16	nd	nd	0.54
35CO5-11627	ring	smelted Cu	95.3	nd	1.73	nd	1.92	nd	nd	0.17	0.31	0.40	0.19	0.20
35CO5-09745	tube bead	smelted Cu	98.3	nd	0.43	nd	0.56	nd	nd	nd	0.18	0.47	nd	1.73
35CO5-10610	strip	smelted Cu	99.2	nd	nd	nd	1.09	0.13	0.12	nd	0.20	nd	0.19	0.23
35CO5-09830	tube bead	smelted Cu	96.9	nd	1.31	0.04	0.83	0.09	0.04	nd	0.50	0.37	nd	0.44
35CO5-11956	triangle band	smelted Cu	98.9	nd	nd	nd	0.78	0.24	0.12	nd	0.31	nd	0.30	0.35
35CO5-01588	sheet fragments	?	79.9	nd	16.90	nd	2.12	0.09	0.11	nd	0.21	0.05	0.22	0.58
35CO5-01418	band	Leaded Brass	92.5	0.01	0.43	4.95	0.59	0.08	nd	nd	nd	nd	nd	3.00
35CO5-01730	tube bead	Leaded Brass	83.2	nd	0.60	9.68	1.32	0.13	nd	0.25	nd	nd	nd	6.65
35CO5-06387	button	ternary alloy	71.1	nd	4.67	11.30	1.69	nd	nd	0.48	0.21	0.11	nd	12.20
35CO5-03661	tube bead	ternary alloy	71.0	nd	2.87	19.10	1.64	0.03	nd	0.27	nd	nd	nd	6.96

TABLE 2. ANALYSIS OF EUROPEAN COMMISSION COMMUNITY BUREAU OF REFERENCE (BCR-691) STANDARDS (INGELBRECHT, ADRIANES, AND MAIER 2001) USING FISCHER X-RAY XDAL (PREVIOUSLY REPORTED ON IN COOPER AND BOWEN 2013), AND MANUFACTURER REPORTED DATA; ND= NO DATA COLLECTED, EITHER ELEMENT WAS NOT ANALYZED FOR OR WAS PRESENT AT OR BELOW THE INSTRUMENT DETECTION LIMIT.

Catalog #	Cu	Ni	Fe	Zn	As	Se	Ag	Sn	Sb	Au	Hg	Pb	Total
<i>Fischer X-Ray XDAL- wt. %</i>													
A. Quaternary Bronze	nd	nd	nd	6.02±0.22	0.194±0.01	nd	nd	7.16±0.21	nd	nd	nd	7.9±0.7	
B. Brass	nd	nd	nd	14.8±0.5	0.099±0.01	nd	nd	2.06±0.07	nd	nd	nd	0.39±0.03	
C. Arsenical Copper	nd	nd	nd	0.055±0.005	4.6±0.27	nd	nd	0.202±0.029	nd	nd	nd	0.175±0.014	
D. Lead-bronze	nd	nd	nd	0.148±0.024	0.285±0.022	nd	nd	10.1±0.8	nd	nd	nd	9.2±1.7	
E. Tin-bronze	nd	nd	nd	0.157±0.025	0.194±0.020	nd	nd	7.0±0.6	nd	nd	nd	0.204±0.018	
<i>Manufacturer's Data – wt. %</i>													
A. Quaternary Bronze	82.0	0.16	0.22	6.07	nd	0.01	0.04	6.73	0.45	0.08	nd	4.33	100.10
B. Brass	81.7	0.26	0.63	14.80	0.12	0.05	0.05	1.96	0.05	0.03	0.06	0.29	100.00
C. Arsenical Copper	94.1	0.04	0.22	0.23	4.38	nd	0.03	0.27	0.36	0.13	nd	0.20	99.96
D. Lead-bronze	85.8	0.41	0.06	0.24	0.08	0.01	0.01	9.27	0.32	0.05	0.03	3.72	100.00
E. Tin-bronze	90.6	0.55	0.34	0.22	0.14	nd	0.04	6.97	0.67	0.13	0.07	0.32	100.04

but Wayman et al. (1985) found that arsenic levels in nineteenth century smelted copper were significantly higher than would be expected in native copper. Thus, there are no native copper artifacts present at these sites as arsenic levels in even the purest smelted copper are sufficiently high enough to separate them from native copper. Additionally, the arsenic results for the high purity copper artifacts from Cathlapotle (0.4–1% by wt.) are similar to those reported for four samples of copper sheathing from early nineteenth century British vessels obtained using atomic absorption spectrophotometry (Craddock and Hook 1990). In short, we believe all of the copper objects from both sites are trade copper.

## Introduction of Trade Metal to the Pacific Northwest

Europeans (e.g., Juan Perez in 1774, James Cook in 1787) believed metal objects in the hands of Native people on the Northwest Coast in the 1770s must have reached the region via overland trade from the east. Long-distance east-west and north-south trade connections in North America pre-dated the arrival of Europeans and may account, in part, for the widespread presence of iron and copper in Pacific Northwest communities in the 1770s. However, explorers in the region during this decade may have been preceded by other less-well documented expeditions and shipwrecks (Keddie 2006). For example, an iron adz blade at Cathlapotle is dated to ca A.D. 1450 (Ames et al. 1999). Shipwrecks originating from Asia could have put metal and other foreign goods in the hands of Native coastal people, including those living along the Columbia River, and their interior trade partners, many centuries before the Maritime Fur Trade (Rickard 1939; Quimby 1985),



though Keddie (2004, 2006) believes the overall impact of Japanese wrecks on Northwest Coast cultures to have been minimal.

Even if long-distance overland trade from the east and Asian derived flotsam and jetsam provided some of the metal seen by Spanish and English explorers on the Northwest Coast in the 1770s, by this time the Russians had been trading metal to Native people along the coast of Alaska for three decades. After the initial Russian voyage of exploration to the coast of Alaska in 1741 fur traders moved through the Aleutians and were trading with Chugach, Eyak, Ahtna Athabaskan, and Northern Tlingit in the Gulf of Alaska by the end of the eighteenth century (Gibson 1976). Russian trading activity in this region could account for the abundance of metal, and other trade goods such as beads, seen by early explorers in the 1770s among Northwest Coast Natives, especially the most northerly groups such as the Tlingit and Haida.

When Cook visited the Nootka in 1778 the demand for metal in exchange for furs was so great crews bartered using a variety of metals such as copper, brass, tin, pewter, and iron, in a variety of forms including buttons, candlesticks, furniture hardware, and kettles (Beaglehole 1967). Because of the high value accorded metal on the Northwest Coast all ships destined for the region soon carried copper sheet like that used for sheathing ship hulls and other metal stock such as iron bars, copper rods, and copper and iron wire, in addition to finished copper, brass, iron, and pewter goods such as pots, pans, basins, kettles, thimbles, buttons, scissors, knives, and other edged tools and weapons (Rickard 1939; Roe 1967; Jopling 1989). According to Lt. Broughton of the Vancouver expedition, peoples on the Lower Columbia possessed “copper swords” in 1792 (Vancouver 1926). The American trading vessel *Columbia*, which traded with Chinook at the mouth of the Columbia River, was carrying approximately 3490 lbs. of sheet copper when it reached the Northwest Coast in 1791 (Howay 1990[1941]).

Chinook oral history tells of a shipwreck believed to have occurred in the mid-eighteenth century (Boas 1894). The ship was described as being covered in copper and was a source of metal for the Chinook, specifically the residents of a nearby Clatsop village who became wealthy trading metal to other Native people (Storm 1990). The British navy began experimenting with the application of copper sheathing to the hulls of ships in 1759. Copper sheathing prevented structural damage caused by wood boring worms and also decreased the drag caused by barnacles and seaweed thereby increasing speed and maneuverability. Its use increased rapidly during the decades after its introduction as metallurgical innovations resulted in improved metal alloys for both sheathing and fasteners (Knight 1973).

## Value of Metal in the Fur Trade

Because Native taste in trade goods varied across time and space in the Pacific Northwest, easy profits were not guaranteed for Euro-American fur trade entrepreneurs. However, within this dynamic context of fluctuating values of furs and trade goods, “copper remained a steady medium of exchange,” and iron also maintained high value (Howay 1990[1941]:41). The desire for copper during the first years of the maritime fur trade was such that ships lacking it were in a weak bargaining position (Howay 1990[1941]). From a Native perspective non-Native fur traders seemed at times to have an endless supply of copper, but fluctuations in production impacted its availability (Day 1991). While in the port of Canton in 1797, Bishop, Captain of the *Ruby*, obtained copper to mend the ships’ sheathing because European copper was “scarce,” and noted in a letter to his supercargo that copper was still “good trade” on the southern portion of the Northwest Coast (Roe 1967:238).

After entering the Columbia River in 1792, the crew of the *Columbia* purchased sea otter furs at the rate of four per copper sheet, one beaver for two iron spikes, and one iron spike for other land furs. In 1793 sea otter pelts and clamons, elk skins used for armor, were obtained in the Columbia River at the rate of two sea otter pelts or four clamons for one 50–60 pound copper sheet. These sheets were the most desired form of copper. Iron was in less demand than previously but clamons could be had for three iron chisels. Clamons from the Columbia River Valley were traded to coastal Native groups further north for sea otter pelts. Available evidence suggests that Cathlapotle was deeply engaged in the production of clamons while the residents of Meier were not (Smith 2008). Natives in the Columbia drainage were still trading for copper in 1807 but a shift to trading furs for foodstuffs and liquor was underway (Ruby and Brown 1976; Howay 1990[1941]). By the end of the eighteenth century the Northwest Coast had been saturated with metal such that Native demand for it had decreased significantly (Rickard 1939; Strong 1960:56; Ruby and Brown 1976; Jopling 1989; Gibson 1992; Keddie 2006).

Trade goods reached the Plateau soon after trade with non-Natives was initiated at the mouth of the Columbia in the early 1790s, or possibly earlier via overland routes to the east. According to Stapp (1984), Native groups on the Lower Columbia allowed relatively small amounts of metal and other trade goods to move upstream. This imposed scarcity kept the exchange value of metal high. The Chinook traveled upriver to exchange “. . . trifling pieces of Copper and Iron” (Roe 1967:118–119) for furs and clamons which were then taken back to the coast and exchanged for additional foreign goods.

Relatively few copper artifacts were recovered from the Middle Village site (Fig. 1), a Chinookan site on Baker Bay (a major anchorage for maritime fur traders) directly across from the modern city of Astoria, Oregon, the site of Ft. Astoria/George, the major Anglo-American fur trading post on the Northwest Coast ca. 1811–1813. Middle Village appears to have been a summer plankhouse village occupied between ca. A.D. 1792–1820 (Wilson et al. 2009). Altogether 95 cupreous artifacts were recovered as part of a numerically and taxonomically rich assemblage of trade goods including ceramics and very large glass beads. Copper beads (N = 18) were the most common copper artifact, along with fragments of copper sheets. The excavators identified a copper working area at the site based on high artifact densities within one of the houses. Interestingly, the highest numbers of copper ornaments were associated with a different, perhaps more substantial house, suggesting possible status differences between fabricators and consumers. As noted above, copper was also worked at Meier and Cathlapotle, but there are no examples of pendants like those recovered from burials in the Plateau supporting Stapp’s (1984) suggestion that those objects were created from imported trade metal to suit regional tastes. Middle Village appears to have been primarily a trading and perhaps sturgeon fishing locality. The assemblage of traditional domestic and economic artifacts is small compared to its rich assemblage of trade goods, which Hajda and Sobel (2013) suggest it received in exchange for provisioning fur traders.

In contrast to Middle Village, many metal artifacts were recovered from the Chinookan site of Kathlamet Village (Fig. 1), including 236 copper tube beads. This site was occupied into the mid-nineteenth century and would have been an important link in the trade connecting communities in the upper and lower Columbia River valley during the late 18th and early 19th centuries (Minor and Burgess 2009). Trade metal may have passed through the hands of residents of this site on its way to Cathlapotle and Meier. In addition to furs and clamons destined for coastal trading vessels, the Chinook and Clatsop continued to obtain pre-contact trade items from the interior, primarily food stuffs such as salmon and roots, in exchange for metal and other goods (Ruby and Brown 1976). By at least the early nineteenth century, metal trade goods from the coast had reached the Nez Perce in the far interior Plateau where copper and brass bracelets and arm bands were popular (Lewis 1965[1814]).

Bishop, Captain of the *Ruby*, noted in 1796 that the coastal Chinook wore brass rings on their fingers and wrists and the adult daughters of Chief's wore "a load of copper ornaments and beads about their necks" (Roe 1967:126). Given the active role of Chinook, Clatsop, and other Northwest Coast Native women in early nineteenth century fur trade negotiations (Littlefield 1988), the female desire for metal in the form of pots, kettles, edged tools, objects of adornment, and raw stock used for tools and adornment should be kept in mind when examining the large quantity of metal trade goods at Meier and Cathlapotle. Many of the finished copper products traded to Native people such as pots and kettles were not used as originally intended, but were instead cut up and used for "symbols of prestige" decorating both people and homes (Ruby and Brown 1976:63). Similar use of finished European copper goods as a source of highly valued raw material by Native Americans has been noted for the Protohistoric and Historic periods in eastern North America (e.g., Miller and Hamell 1986; Moreau and Hancock 1999; Ehrhardt 2005; Anselmi 2008).

## Discussion

On the Northwest Coast and adjacent interior, prehistoric examples of copper that are well-dated or have good contexts are exclusively from burials or other ritualized contexts (e.g., Matson and Coupland 1995; Blake 2004; Ames 2005; Cybulski 2014). Many copper artifacts have also been recovered from Protohistoric and Historic burials in the Plateau, especially the Columbia River Valley. Most of this material probably dates to the mid-1790s. Burials with the greatest number of copper artifacts in the Columbia River valley are found in the upper region. Tube beads are one of the more common forms and have been found in the burials of men, women, and children in interior Washington (Stapp 1983, 1984, 1985; Schulting 1994; Hayden and Schulting 1997). The lower Columbia has produced more copper artifacts, but from a variety of contexts. The large copper assemblages from Cathlapotle, Meier, and the Middle Village sites were recovered from domestic contexts (Banach 2002; Wilson et al. 2009) and provide important new insight into the movement of trade metals during the maritime fur trade.

Because copper was used for personal adornment and incorporated into burials in different parts of the Pacific Northwest both before and after Euro-American contact, the presence of copper alone, without more detailed analysis, is not sufficient for determining if a burial or site is Prehistoric, Protohistoric, or Historic. Strong (1960) noted that beads and bangles made from trade sheet copper had been recovered from cremation and burial features containing no other trade goods such as beads or buttons. The rapid inclusion of large amounts of copper in burial rituals shows how quickly it was integrated into indigenous ideology and value systems as a way to display wealth and prestige (Stapp 1983, 1984). As a result, it traveled farther and faster through preexisting Native trade networks than other non-Native trade goods. "The Copper is Speared," a Kathlamet myth referring to copper that Boas (1901) collected in 1894 and related here in brief tells of a chief with two daughters in a village where people saw a thing out on the ocean that shone like the sun. The people tried to shoot it but could not hit it and eventually gave up. In secret, the chief's daughters took his bow and arrows and harpoon shaft and got very close to hitting the shining thing on the ocean. The people noticed and asked who it could be that almost hit it but did not recognize the girls who disguised themselves as men by putting their hair up. The younger of the two girls eventually hit the thing and they speared it and put it in their canoe. They brought it to their house and put it under their bed. When they later showed it to their father he had to close his eyes because it was shining. The people of the village were gathered together and they cut up the shining thing and

distributed it amongst the people. This story may be further evidence of the rapid integration of a new and highly valued material into Chinookan culture, rather than indicating great antiquity.

## Conclusion

Industrial goods including smelted iron, copper, and a variety of copper alloys were being traded into northwest North America in the latter part of the eighteenth century in large quantities, drawing Native people into the fur trade. Substantively, our analysis of large samples from two major residential sites suggests that native copper objects were either absent or very rare in the GLCRR and upriver in the interior Plateau immediately prior to contact. The majority of trade copper found archaeologically likely entered the region in the late 18th and very early 19th centuries.

It should be noted here that Cathlapotle, Meier, and Middle Village all contain copper working areas, suggesting the skill was already present or rapidly acquired post-1792. Though we were not able to build on Stapp's research investigating the origin of industrial smelted copper found in protohistoric Plateau burials, we were able to address Stapp's (1984:143) questions concerning where artifacts were made. Though pendants were apparently made by Plateau inhabitants from copper sheet acquired in trade (Stapp 1984) more recent archaeological evidence suggests tube beads and other objects found in burials in the Plateau may have been fabricated out of sheet copper in communities downriver such as Meier, Cathlapotle, Kathlamet, and Middle Village.

The presence of large amounts of copper in post-contact residential deposits indicates major changes as a consequence of the influx of trade copper. Most of the items discussed here were recovered within houses (as opposed to exterior deposits such as middens or sheet middens) but not exclusively in high status areas (Banach 2002). Thus, while valued, they were not obviously or solely high status, or high prestige items. It is important to note that the fur trade era deposits at these two sites encompass blocks of time between roughly 30 and 45 years in length. What we are seeing is modal behavior. Thus copper may have started out as a prestige marker ca. 1792 but that value may have declined rapidly as copper, and other trade goods, became widely available.

## ACKNOWLEDGMENTS

The Meier and Cathlapotle excavations were done as part of the Wapato Valley Archaeological Project by Portland State University Field Schools. We thank the Confederated Tribes of the Grand Ronde for their interest in the Meier project and the Chinook Nation, particularly former tribal chair, Gary Johnson, for their active interest, involvement, and support of the Cathlapotle and Station Camp Projects. The excavations and analyses were funded and/or assisted by the Friends of the Wapato Valley, Jean and Ray Auel, U.S. Fish and Wildlife Service, National Endowment for the Humanities, the National Park Service, National Science Foundation, Portland State University, Simon Fraser University, University of Michigan, University of Missouri–Columbia, and the University of Southern Illinois. We thank the Confederated Tribes of the Grand Ronde, The Chinook Nation, The Confederated Tribes of Warm Springs, and the Confederated Tribes of Siletz Indians for their strong interest and permission to conduct the analyses. Dennis Fritz (SAIC) graciously provided access to the Fischerscope X-Ray XDAL and Ron Glasser (Fischer Technology, Inc.) provided valuable input on the

capabilities and limitations of this instrument. Cooper's participation in the preparation of this manuscript was supported by a Purdue Research Foundation Summer Faculty Grant. Any errors, of course, are entirely ours.

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# ARCHAEOLOGICAL FEATURE PRESERVATION IN ACTIVE FLUVIAL ENVIRONMENTS: AN EXPERIMENTAL CASE STUDY FROM THE SNOQUALMIE RIVER, KING COUNTY, WASHINGTON STATE

**J. Tait Elder, Patrick Reed, Alexander E. Stevenson, and M. Shane Sparks**

## ABSTRACT

This experimental study considers how archaeological features preserve on landforms that are regularly surface-exposed in active stream channels. Rivers figure prominently in Native American settlement patterns in the Pacific Northwest of North America. Archaeologists and geoarchaeologists alike understand this process, but many of the surveys conducted do not explicitly consider the archaeological sensitivity of buried relict channel deposits and the historic channel migration zone when designing field investigations. To conduct our experimental study, we placed four simulated hearth features comprised of a variety of materials at various locations along the Snoqualmie River at the end of the dry season. The features were then revisited four times over the next 91 days during the height of the rainy season to assess their condition. Our findings corroborate the expectation that the preservation of archaeological features located on in-channel landforms is generally poor. The goal of this study was to provide a useful reference point for developing subsurface archaeological investigations in fluvial environments. Our findings strongly indicate that such investigations should be focused on the interface between relict channel deposits and floodplain deposits, but not on relict channel deposits.

## Introduction

In the Pacific Northwest, anthropologists have long recognized the link between humans and rivers, and the importance of rivers to ethnographic lifeways (e.g., Smith 1940; Zenk 1976). This recognition has led to the establishment of models that characterize precontact settlement as focused on rivers. Rivers are also highly active geomorphic agents that continuously erode, transport, and redeposit sediments. As a result, rivers not only affect the way in which people inhabit the landscape but they also affect how the physical remains of human activities preserve along them.

Geoarchaeologists have long recognized the relationship between fluvial geomorphic processes and the distribution of archaeological sites across the landscape (e.g., Gardner and Donahue 1985; Gladfelter 1985, 2001; Huckleberry 1985; Ferring 1986; Freidel 1989; Martinez and Martinez 2011). Specific expectations about archaeological preservation for various fluvial landforms have been generated based on well documented physical processes and relationships (e.g., Guccione et al. 1998; Gladfelter 2001; Clevis et al. 2006). Many of these expectations are, in part, based on the understanding that the potential for archaeological site preservation is greater in areas located outside both the active channel and the historic channel migration zone.

Despite this body of research, few cultural resources studies in the region explicitly consider the archaeological sensitivity of buried relict channel deposits, and even fewer explicitly take the historic channel migration zone into account when designing subsurface archaeological investigations. We suspect that this is, in part, a result of project specific factors driving field investigation methods, but that it also could be due to a lack of training of some practitioners to consider how geomorphic processes affect archaeological site preservation. As a result, it is our intent to present a simple basis for considering the potential for encountering archaeological sites in fluvial environments. To do so, we present an experimental study that directly considers how archaeological features (i.e., non-portable constituent of many archaeological sites) preserve on infrequently inundated in-channel landforms. Such landforms should have the highest likelihood of precontact use within an active channel.

Our study consisted of setting-up four simulated hearth features at various locations on an apex bar along the Snoqualmie River, a river along which has evidence of precontact habitation and resource collection by the Snoqualmie people (Ballard 1929; Hilbert et al. 2001) and that has geomorphic attributes comparable with many of the major rivers in the region (Collins and Montgomery 2011). The features were revisited several times over three months—during the height of the rainy season—to assess their condition. The entire contents of two features, and the light fraction of a third, were transported downstream of their original location and out of the study area.

## Snoqualmie River and its People

The Snoqualmie River is located in the Puget Lowland, which sees heavy rainfall in early spring and late autumn (Franklin and Dyrness 1988). During these periods, the Snoqualmie River is commonly filled to bankfull stage and undergoes occasional overbank flooding. During much of the year, however, unvegetated in-channel landforms are regularly exposed to the open air. The river flows approximately 46 miles from its headwaters in the Cascade Mountains to the Snohomish River. On its journey the river rapidly decreases in elevation until it flows over Snoqualmie Falls (River Mile [RM] 41). Below the falls, the river maintains a shallow gradient until it empties into the Snohomish River. Our study was performed on an apex bar in the river channel just north of Carnation, Washington near RM 22 (Fig. 1) where the river exhibits a sinuous morphology and has a gravelly bedload in its lower reaches like many Puget Sound rivers (e.g., Green River, Puyallup River, Snohomish River, Stillaguamish River, Skagit River).



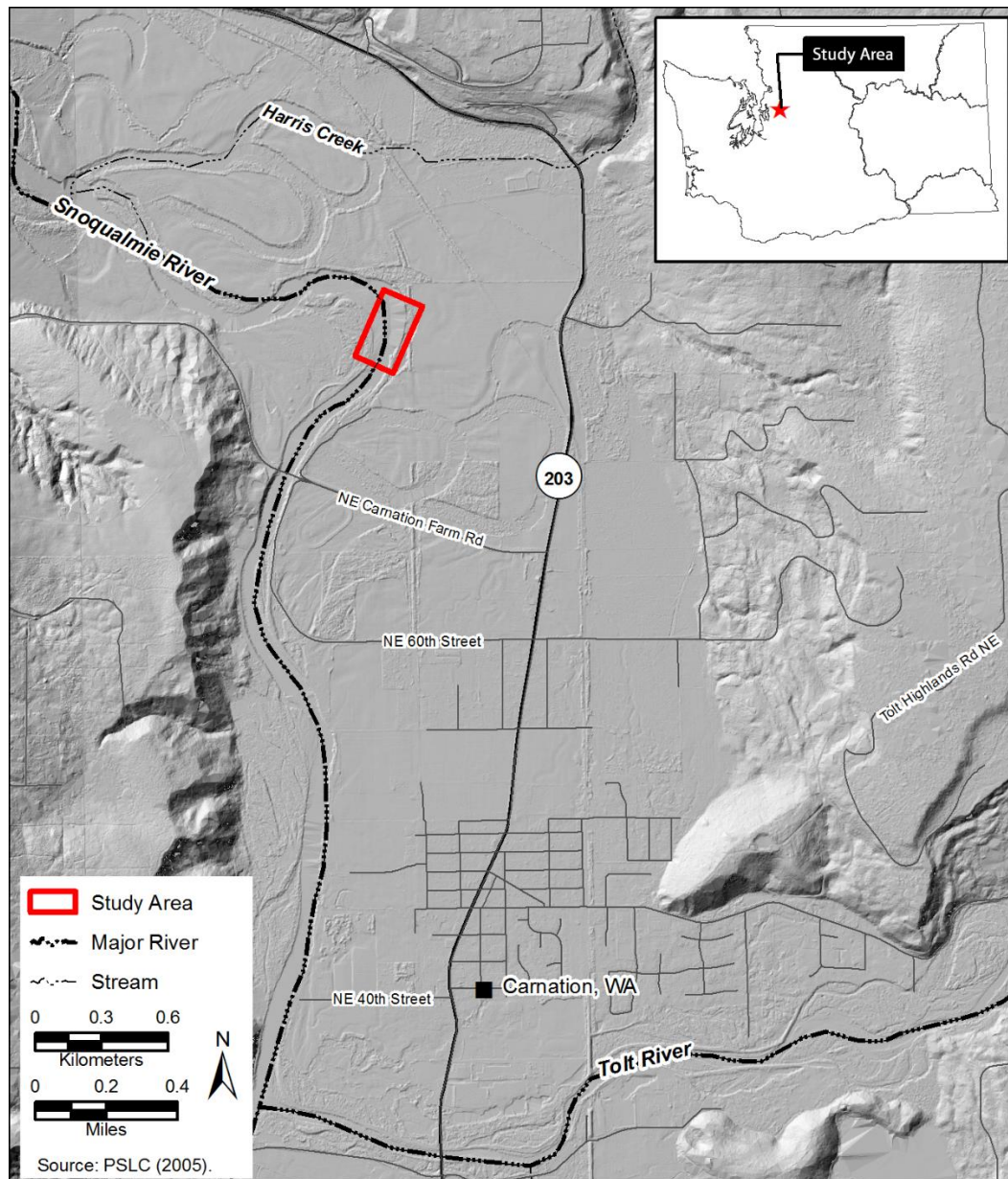


Fig. 1. Study area overview.

The study area vicinity was traditionally inhabited by the Snoqualmie people (Haeberlin and Gunther 1930). As late as the mid-nineteenth century, the Snoqualmie people had numerous winter settlements along the edge of the Snoqualmie River valley and floodplain (Ballard 1929; Hilbert et al. 2001). Many of these settlements were located near portions of the river where there was easy access to salmon and other food stuffs. Temporary fishing and fish processing camps were located along the edges of streams and were used for collection and processing before these resources were transported back to nearby villages. Ethnohistoric accounts indicate that in-channel fishing facilities, including fish screens and traps had to be

rebuilt on an annual basis because they would be destroyed during yearly high-water events (Smith 1940). Based on this information, it can reasonably be inferred that the apex bars and other unvegetated landforms along the channel were used seasonally for resource collection and processing activities.

## Fluvial Processes

The following is a brief summary of how fluvial processes transport, erode, and deposit particles. The purpose of this summary is to frame how fluvial forces are anticipated to influence archaeological feature preservation. This summary was developed using several sources, including Walker and Cant (1984), Leopold, Wolman, and Miller (1995), Collinson (1996), and Charlton (2007).

Streams facilitate the downslope movement of particles through the flow of water. Combined, flow rate and the cross-sectional area of a channel (which is a proxy for water volume) define a channel's discharge at a given moment. Discharge defines the size (i.e., mass relative to its surface area) of a particle that can be transported. Once a particle is in motion, the discharge required to keep the particle in motion is less than that required to initiate particle movement, but a large enough drop in discharge will result in deposition of the particle. Importantly, the size of particles that a stream can transport can vary widely with variations in discharge in a given area. Since high-energy discharge events are most frequently confined to the active channel, the largest particles in the system are typically located within the active channel and in areas where the channel once inhabited. In instances where channel migration has occurred, these deposits may be buried under fine sediments deposited during overbank flooding events.

With this framework in mind, we anticipate that the potential for in-situ preservation of archaeological deposits is a function of mass relative to the surface area (or specific gravity) of the individual constituents that comprise the archaeological deposit, in combination with the magnitude of the stream discharge events that they are exposed to. For example, we expect that a lithic scatter located on a floodplain subject to periodic low-energy alluvial forces would be more likely to preserve in-situ than if it were on an in-channel gravel bar subject to periodic high-energy alluvial forces.

## Methods

To test our expectations, we replicated fire hearths because they would be the most likely feature form to be encountered in settings similar to the study area. Our hearths contained a variety of materials designed to closely reflect the physical properties of artifacts such as lithics, bone, and charcoal. We used proxies such as bright colored Portland cement (lithic artifacts) and aquarium gravel (bone) so that they would not be mistaken for precontact artifacts. The simulated lithic artifacts closely reflected documented physical properties of culturally created artifacts (specific gravity of 3.1 to 3.15, ranging from 2 to 4 cm in width and weighing between 2 and 16 g). We used the large cobbles that were widely available within the study area to serve as rock rings to encircle the hearth features. To aid in relocating features

and displaced feature elements over the course of the study, we decided to make the constituents of each hearth feature brightly-colored (except for the locally procured cobbles) and to coordinate colors by hearth feature.

We placed the hearth features during a period in which the water level was near its lowest point of the season, in areas where the water level was highly likely to rise in the near future. This placement would increase the likelihood that the hearth features would be exposed during the subsequent summer and fall, and in turn, be accessible for inspection. Once constructed, each feature was photographed, mapped with a Trimble GPS unit, and its elevation was taken using a surveyor's level. In addition to this information, the sediment size range in a two meter radius of each feature was recorded and photographed.

During the two months that followed construction of the hearth features, we regularly checked stream gauge 12149000 on the United States Geological Survey (USGS) water information system website ([waterdata.usgs.gov](http://waterdata.usgs.gov)). The stream gauge is located approximately 650 meters south (upstream) of the study area where channel elevation was similar to where the features were placed. For ease of analysis, we normalized feature elevations across the study area based on an average stream gradient of 0.07 percent (Bethel 2004).

We revisited the hearth features following each high flow when water levels were low enough to safely access the study area. For the purpose of this study, the term *high flow* will refer to an event in which stream height exceeded 48 feet above mean sea level (AMSL) at the stream gauge. This elevation was selected because it is higher than the surface elevation of at least one of the hearth features. The condition, contents, and types of modification to each of the hearth features were recorded during each revisit, and the spatial distribution of displaced—but visible—feature constituents were noted and mapped. To determine the spatial distribution of displaced feature constituents, we inspected the ground surface along 30 meter transects that extended downstream of each hearth feature

## Results

We revisited the features on three occasions over a three-month period between November 2012 and January 2013 (Table 1). During this time, Features 1 and 2 were subject to approximately 22.5 days of cumulative inundation, Feature 3 was subject to no inundation, and Feature 4 was subject to 0.25 days of cumulative inundation. Fig. 2 depicts the normalized surface elevation (feet AMSL) relative river surface elevation over the course of the study.

During the study period, Features 1 and 2 were totally destroyed and their constituents transported downstream and out of the study area, Feature 4 was subject to minor deflation and removal of light artifacts, and Feature 3 remained unmodified. Table 2 summarizes the observations from each field visit in order to demonstrate the rate at which the simulated features underwent modification. Fig. 3 depicts how each of the features changed over the course of the study. Photographs of Feature 3 were not collected because no change to the condition of this feature was observed.

During the first field visit on 11 November 2012, Features 1 and 2 were still largely intact and contained the full range of artifact types, although both showed signs of deflation in that charcoal, sands, some aquarium gravels, and some lithic flakes were no longer located within, or within 30 meters of, either feature.

TABLE 1. FEATURE ATTRIBUTES

Feature	Color	Normalized Elevation (ft. AMSL)	Position	Local grain size (diameter)
Feature 1	Red	48	Upstream, below sparse vegetation line	5 to 15 centimeters
Feature 2	Green	48	Downstream, below sparse vegetation line	5 to 10 centimeters
Feature 3	Blue	52	Apex, below sparse vegetation line	3 to 7 centimeters
Feature 4	Orange	53	Apex, above sparse vegetation line	3 to 7 centimeters

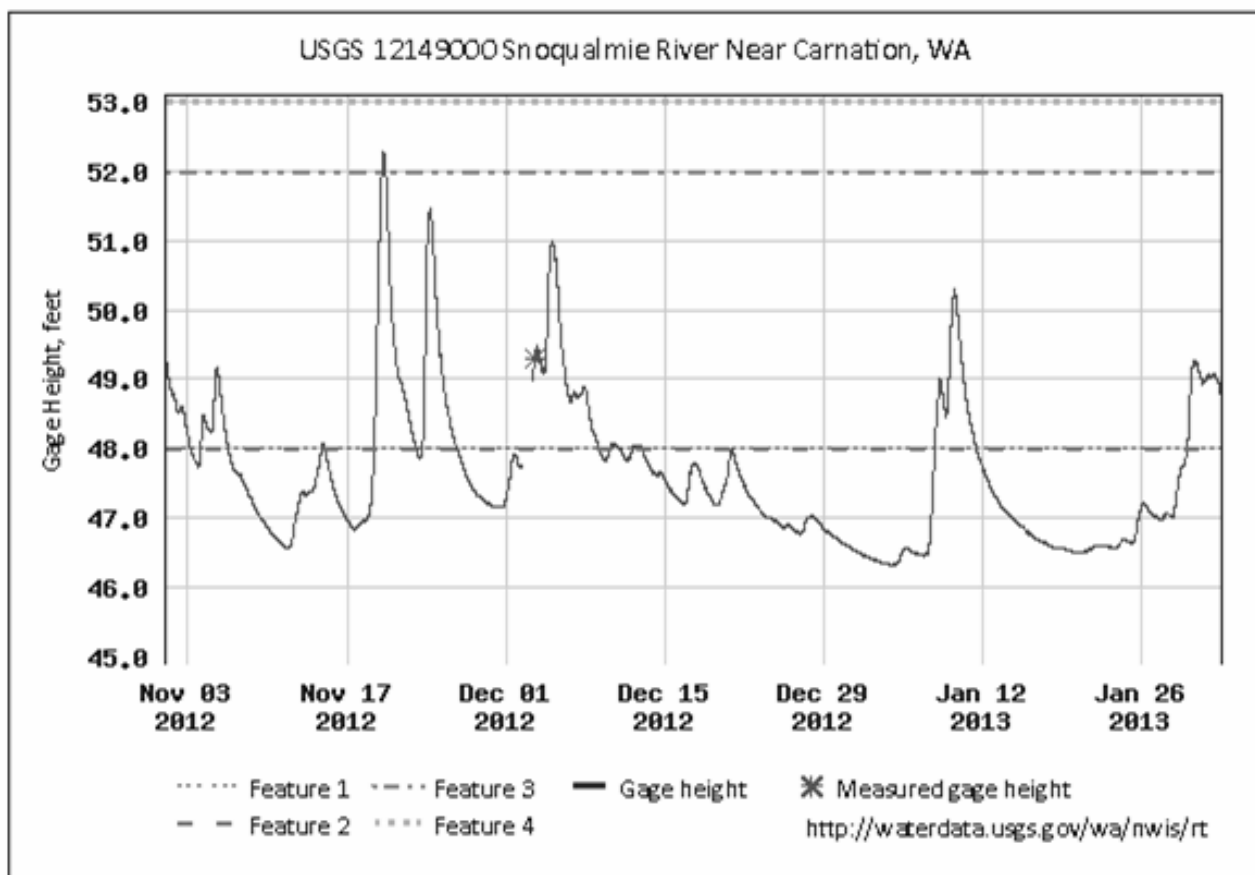


Fig. 2. Feature normalized surface elevation relative to river surface elevation.

TABLE 2. SUMMARY OF OBSERVATIONS FROM EACH FIELD VISIT

		11 November 2012	15 December 2012	30 January 2013
Feature 1	#Days Inundated	2.5	9.5	22.5
	Condition	Minor deflation, absence of some charcoal flecks, aquarium sand, and small lithics.	Major modifications. Only two artifacts remained within hearth and cobble ring began migrating downstream.	Total removal.
Feature 2	#Days Inundated	2.5	9.5	22.5
	Condition	Minor deflation, absence of some charcoal flecks, aquarium sand, and small lithics.	Major modifications. Only one artifact remained within hearth and cobble ring began migrating downstream.	Total removal.
Feature 3	#Days Inundated	0	0	0
	Condition	Unmodified.	Unmodified.	Unmodified
Feature 4	#Days Inundated	0	0.25	0.25
	Condition	Unmodified.	Minor deflation, absence of some aquarium sand and charcoal.	No change.

TABLE 3. HIGH FLOW FREQUENCY, DURATION, AND MAXIMUM ELEVATION FROM NOVEMBER TO JANUARY BETWEEN 2008 AND 2013.

Period	High Flow Duration	High Flow Events	Max High Flow Elevation
2008–2009	25.5 days	6	63 ft.
2009–2010	56.5 days	8	53 ft.
2010–2011	16.5 days	9	53 ft.
*2011–2012	39 days	11	60 ft.
**2012–2013	22.5 days	7	52 ft.

\*Streamflow data incomplete for this period.  
 \*\*The year in which the study took place.

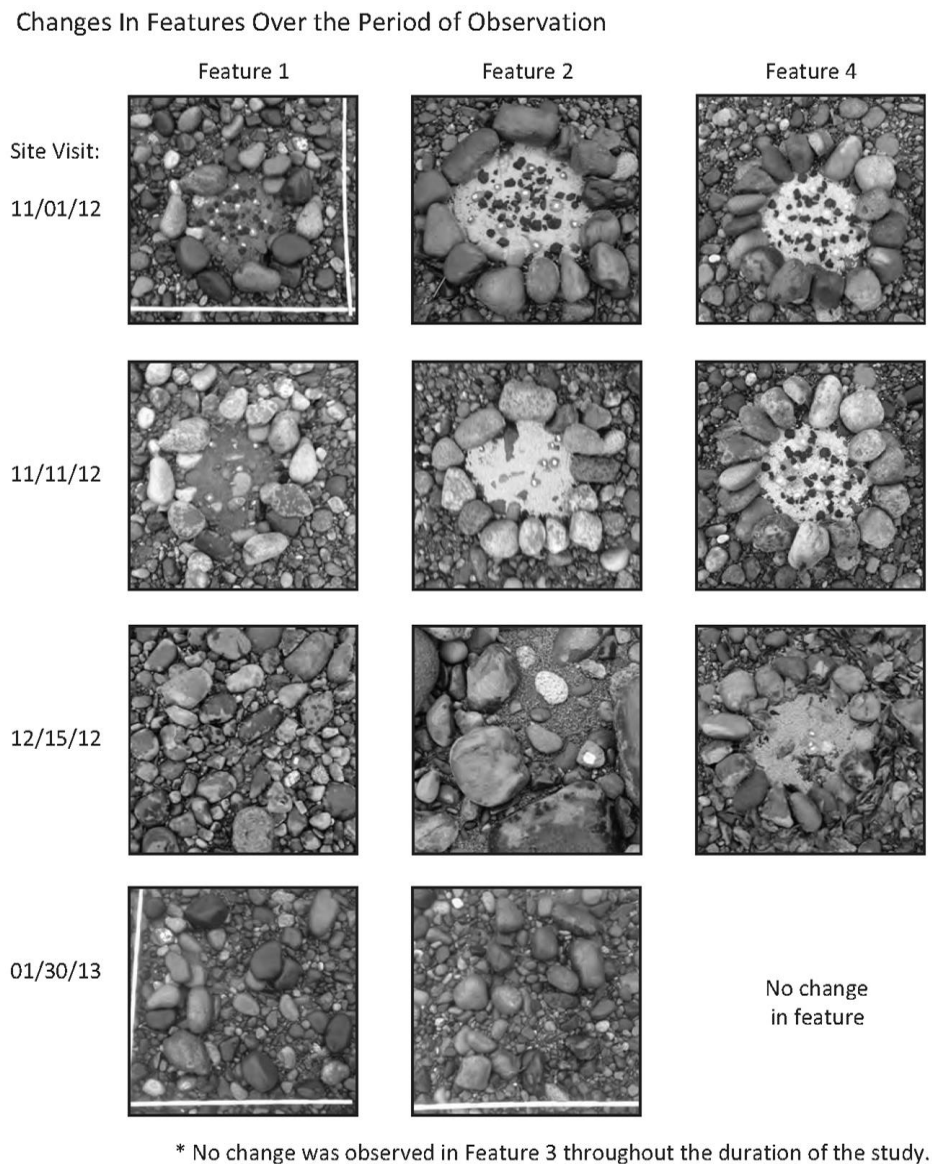


Fig. 3. Overviews of each feature at various periods over the course of the study.

During the second field visit on 15 December 2012, nearly all of the lithic artifacts associated with Features 1 and 2 had been displaced and the cobbles that comprised the hearth circles for both features had begun to move out of alignment and downstream of their original location. Only two lithic artifacts from Feature 1 and one lithic artifact from Feature 2, and sparse aquarium gravel were located in the original feature location. These lithic artifacts ranged from medium to large (i.e., 9 to 16 g) in size and were wedged between the spaces of larger and more immobile gravels. Although all of the lithic artifacts and most of the aquarium gravel remained in Feature 4, much of the lighter items (charcoal and aquarium sand) had been displaced. No change to the condition of Feature 3 was observed.

During the third field visit, Features 1 and 2 were no longer intact and contained only a few displaced cobbles and trace amounts of the aquarium gravels. A pedestrian survey of the apex bar downstream of Features 1 and 2 resulted in the relocation of one lithic artifact from Feature 1 and three lithic artifacts from Feature 2. With the exception of one artifact from Feature 2, the relocated artifacts were located between 5 and 20 m downstream of their original locations. It is important to note, however that any artifact transported greater than 30 m downstream would not have been identified in our study. A single lithic artifact (10 g) from Feature 2 had become wedged between the spaces of larger and more immobile gravels and remained in the approximate location of the feature.

High flow frequency, duration, and maximum elevation over the period between November 2012 and January 2013 were comparable to those for the same period during the previous four years (Table 2), indicating that the results of the study were not the result of anomalously high flow.

## Conclusions

Our study conclusively demonstrates that archaeological features situated on in-channel landforms, and whose individual constituents are smaller and have a lower specific gravity than the largest mobile particles in the river channel, are unlikely to preserve through a single wet season unless they are located at an elevation that is infrequently flooded and subject to low-energy water movement when they are flooded. Such an environment would typically accumulate fine sediments over time and become a floodplain; a landform type that is well-documented as having the potential to contain intact and buried archaeological sites. This study also provides a high resolution picture of the role of time in archaeological feature preservation (i.e., as duration of inundation increases, the likelihood of preservation decreases) on such landforms. Importantly, this study not only applies to active stream channels, but also to relict channel deposits that underlie the current floodplain.

Looking forward, we hope that this study can provide a useful point of reference for developing approaches to subsurface archaeological investigations. Our findings strongly indicate that such investigations should be focused on the interface between relict channel deposits and floodplain deposits at the point where the vast majority of the particles are sand-sized or smaller; or in floodplain deposits, which tend to be comprised of sand- and silt-sized particles. Besides indicating which deposits in a fluvial system have the greatest potential to contain intact archaeological sites, our findings could also be used to make landscape-level predictions based on the historic location of a given stream channel. For example, if there is evidence that a stream channel has migrated across a portion of a floodplain during the twentieth and twenty-first centuries, then it can be assumed that any archaeological sites that predate the period of channel migration and located within the channel migration zone would have been destroyed. Therefore, archaeological investigations could be limited in such areas and focused on landforms with greater potential to contain intact archaeological sites.

## ACKNOWLEDGMENTS

We thank Virginia Butler, Steven Mullen-Moses, Philippe LeTourneau, Danny Gilmour, Steve Seville, and Melissa Cascella for their comments and insights on earlier drafts of this manuscript. Thank you to King County Division of Parks and Recreation and the Snoqualmie Tribe for permitting this study. Thank you, also, to our anonymous reviewers for their comments and insights. Their comments on our original manuscript and conversations with Darby Stapp strengthened our paper and provided much needed focus. Any errors herein can only be blamed on the authors.

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## SEALS AND SEA LIONS IN THE COLUMBIA RIVER: AN EVALUATION AND SUMMARY OF RESEARCH

**Deward E. Walker, Jr.**

### ABSTRACT

In this article we summarize and provide an analysis and interpretation of selected published sources of information pertaining to pinnipeds (marine mammals that have front and rear flippers). Particular attention is given to traditional tribal relationships with and uses of seals and sea lions. In addition to tribal interviews conducted between 1964 and 2015, we rely on existing literature and research to demonstrate traditional Columbia River tribal hunting of pinnipeds.

### Introduction

The member tribes of the Columbia River Inter-Tribal Fish Commission (CRITFC) rely heavily on fish runs. “The average fish consumption rate of Umatilla, Yakama, Nez Perce, and Warm Springs tribal members is approximately nine times greater than the average consumption rate estimated for the general U.S. population (CRITFC 1994:59). Members of these tribes harvest about 88 percent of their fish themselves or get it from “their families, friends, ceremonies, or tribal distributions” (CRITFC 1994:62). The importance of fish, and especially the importance of salmon, to the tribes for subsistence, economic, and cultural purposes cannot be overstated: “the fishery resource is not only a major food source for tribal members, it is also an integral part of the tribes’ cultural, economic, and spiritual well-being” (CRITFC 1994:12–13). These tribes depend on salmon in the Columbia River.

The Columbia River system (Fig. 1) drains some 259,000 square miles in the United States and Canada. The basin includes eastern Washington, northern Idaho, and western Montana. Its tributaries include the Snake River, which drains western Wyoming, southern Idaho, eastern Oregon, southeastern Washington, and parts of Utah and Nevada. The Kootenai River is another main tributary, as is Clarks Fork (Craig and Hacker 1940:136–137). Adult salmon and other migratory fish use the Columbia River to move “from the ocean to the smaller tributaries and upper reaches where they spawn” (Craig and Hacker 1940:136). Along the Columbia and its tributaries are many traditional tribal fisheries (Fig. 2).

Salmonid predation at Bonneville Dam has increased from approximately zero in 2002 to more than 5,000 fish in 2010 (Brown et al. 2011:1). Between 2002 and 2007, observers noted an average of eighty-three pinnipeds (marine mammals such as seals and sea lions that have front and rear flippers) at Bonneville Dam; between 2007 and 2010 that number increased to 124 (Stansell et al. 2010:iv). Between 2008 and 2010, pinnipeds took some 4,000 to 6,000 salmonids per year.

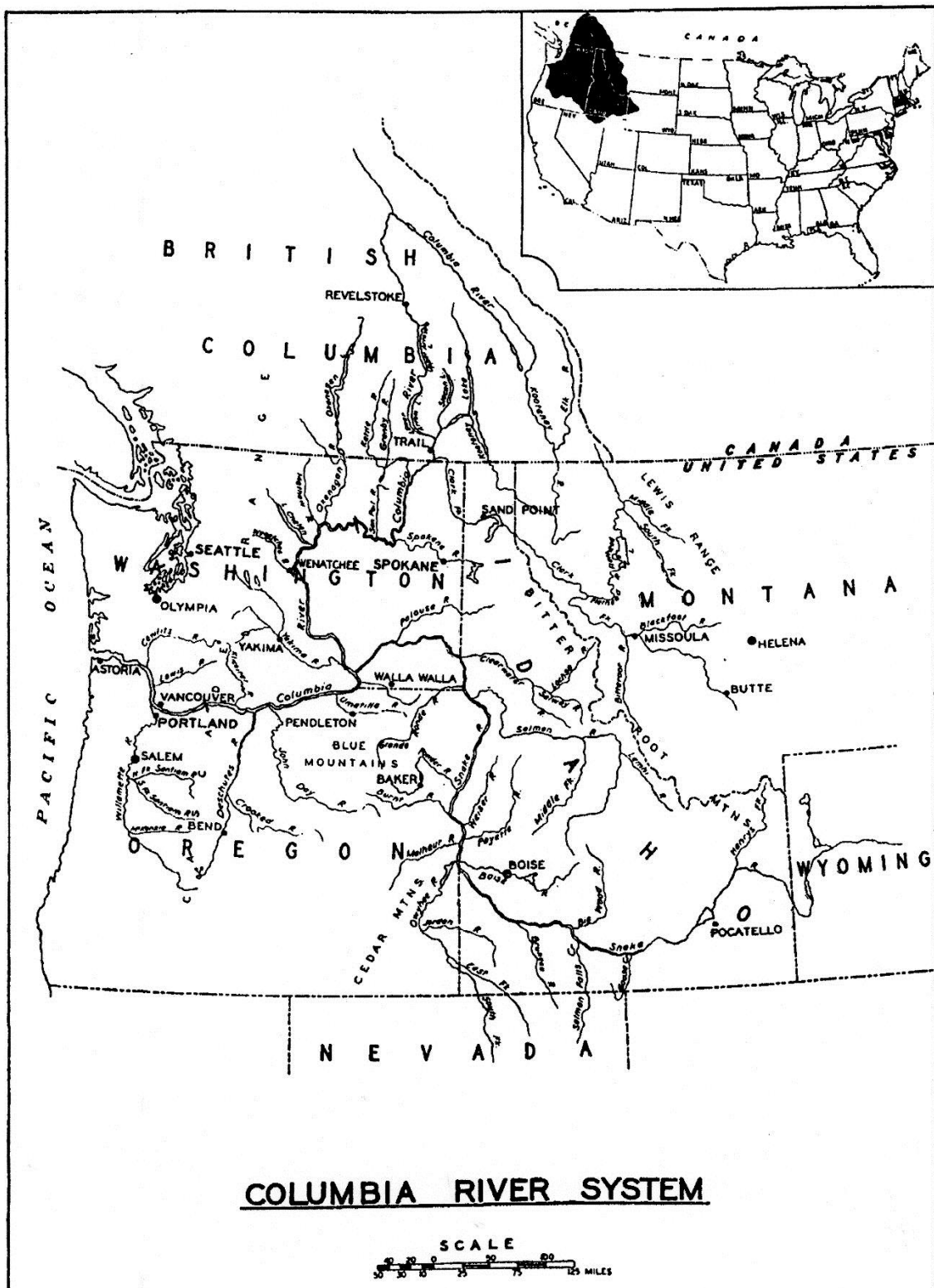


Fig. 1. Columbia River system (original in Craig and Hacker 1940:135).

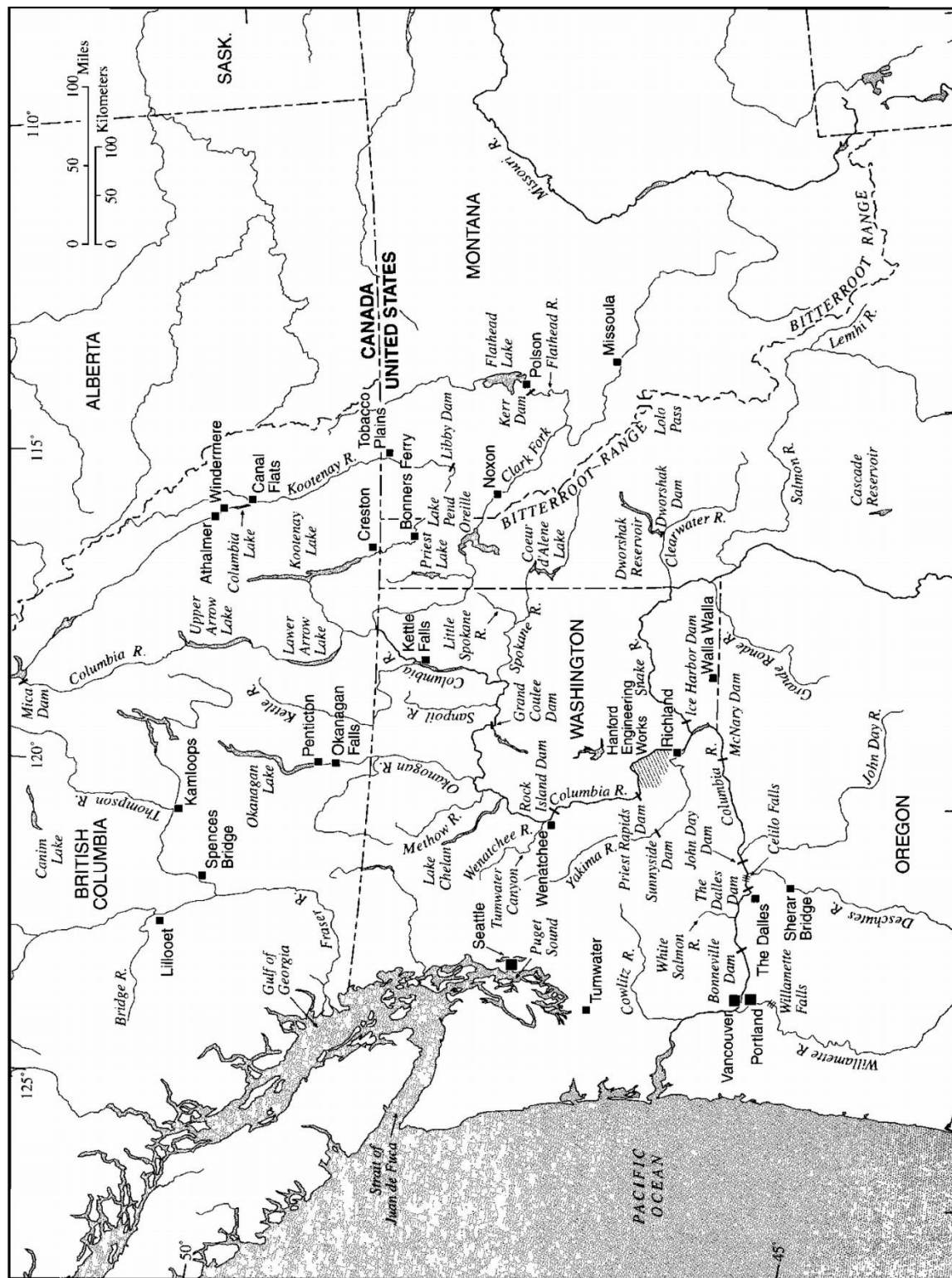


Fig. 2. Traditional fishing sites of the Plateau (original in Hewes 1998:621).

In the 2010 January-to-May run alone, “an estimated 6,081 adult salmonids (2.2% of the run) were consumed.” Stansell et al. (2010:iii) note that between 2008 and 2010, pinnipeds took some 4,000 to 6,000 salmonids per year within a ¼ mile of Bonneville Dam. Salmonids are likely more vulnerable to pinniped predation near Bonneville Dam as a result of limited fish-ladder entrances that concentrate fish, making hunting easier; however, additional significant predation also occurs throughout the lower 145 miles of the Columbia River. In fact, Hatch (2012:8, 9) estimated that from 2002 through 2012, California sea lion predation totaled approximately 33,030 salmon, which “averaged 10.6% of the Endangered Species Act (ESA)-listed component of the run and was as high as 18.4% of the listed spring Chinook salmon.”

Other salmonids “were caught by pinnipeds but escaped and swam away with unknown injuries (3.3%, 2.3%, and 2.6% of total salmonid catch escaped in 2008, 2009, and 2010, respectively)” (Stansell et al. 2010:iii). The seals and sea lions are also taking Pacific lamprey (*Lampetra tridentata*), white sturgeon (*Acipenser transmontanus*), and other fish on which the tribes have traditionally and continue to depend such as American shad (*Alosa sapidissima*), northern pikeminnow (*Ptychocheilus oregonensis*), and bass (*Centrarchidae*) (Stansell et al. 2013:4). Stansell et al. (2010:iii-iv) note that “Lamprey comprised 1.4% of the total observed catch from 2008 to 2010, although lamprey catch is probably underestimated.” Predation of white sturgeon, mostly by Steller sea lions, increased “every year since 2006, averaging 2.5% of observed catch before 2008 and 16.0% the last three years.” Numbers of sturgeon taken increased from 315 in 2006 to 1,879 in 2010 (Stansell et al. 2010:iv). In 2011 “Steller sea lion predation on white sturgeon in the waters below Bonneville Dam” was noted as increasing. Between 7 January through 23 February, Steller sea lions were seen taking 1,136 white sturgeon, as compared to 1,100 during the entire winter-spring season of 2010 (CBWFWB 2011a). This is in combination with a general decreasing of the white sturgeon population from averages of 131,400 during 1998–2007 to 91,100 during 2008–2010 to a projection of 77,000 in 2011. Five populations of salmonids preyed upon are protected under the ESA.

## Methodology

Between 1964 and 2015, Walker Research Group, Ltd. has been engaged in long-term investigations of tribal fishing in the Columbia River, its many tributaries, and riverine and lacustrine systems in western North America. This research has addressed questions of traditional, pre-contact, recent, and contemporary tribal exploitation of aquatic resources, including fish, shellfish, large and small mammals (including seals and sea lions), and has also supported the reserved, ongoing fishing rights of various tribes. Such research can be found in the following papers and reports:

- Comparison of Contemporary and Heritage Fish Consumption Rates in the Columbia River Basin. With Barbara L. Harper. *Human Ecology*, 43(2):225–236.
- Columbia Basin Heritage Fish Consumption Rates. With Barbara L. Harper. *Human Ecology*, 43(2):237–245.
- Shoshone-Paiute Reliance on Fish and Other Riparian Resources. For the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation. Technical Report, 2014–2015.
- Tulalip Fishing Sites. For the Tulalip Tribes. Technical Report, 2014–2015.

- Yakama Hunting, Fishing, and Gathering in the Lower Snake River Intertribal Resource Area. For the Yakama Nation. Technical Report, 2011.
- Traditional Fishing Practices among the Northern Shoshone, Northern Paiute, and Bannock of the Duck Valley Indian Reservation: A Progress Report. *Northwest Anthropological Research Notes*, 44(1):53–62. 2010.
- Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Fishing below Bonneville Dam: A Preliminary Summary of Research and Interviews. For the Confederated Tribes of the Umatilla Indian Reservation. Technical Report, 2009.
- The Yakama Nation and the Wenatshapam Fishery: A Report Prepared for the Yakama Indian Nation. Technical Report, 2008.
- The Confederated Salish-Kootenai Tribes of the Flathead Indian Reservation, Montana, and Fishing and Water Rights. For the Confederated Salish-Kootenai Tribes of the Flathead Indian Reservation. Technical report, 2008.
- The Klamath Treaty of 1864 and the Klamath Indian Fisheries and Water Resources. For the Klamath Tribe. Technical Report, 2005.
- Literature Review of the Significance of Fishing to the Klamath Indian Tribe, Oregon and California. Prepared for the Native American Rights Fund. Technical Report, 2004.
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- Lemhi Shoshone-Bannock Reliance on Anadromous and Other Fish Resources. *Northwest Anthropological Research Notes*, 27(2):139–160. 1993.
- *State of Idaho v. Bruce Baldwin, Rulon March, and Stanley Baldwin*. Investigation of Shoshone-Bannock fishing in the Rapid River Region of Idaho. Case Nos. CR3171, CR3172, and CR3173, (Expert Witness). 1992–1994.
- Productivity of Tribal Dipnet Fishermen at Celilo Falls: Analysis of the Joe Pinkham Fish Buying Records. *Northwest Anthropological Research Notes*, 26(2):123–135. 1992.
- *The State of Idaho v. Dianne C. (David) Coffee*. In the District Court of the First Judicial District of the State of Idaho, in and for the County of Boundary, Magistrate Division, CV M-2941. Conducted research and offered testimony on behalf of Coffee concerning Kutenai traditional and contemporary hunting, fishing, and gathering practices in Northern Idaho and adjacent areas, (Expert Witness). 1973.
- The 1968 Seattle Session on Indian Hunting and Fishing Rights, American Anthropological Association Annual Meeting. *Northwest Anthropological Research Notes*, 2(2):1–43. 1968.
- Mutual Cross-Utilization of Economic Resources in the Plateau: An Example from Aboriginal Nez Perce Fishing Practices. *Washington State University, Laboratory of Anthropology, Report of Investigations*, No. 41. 1967.
- *The State of Oregon v. Jesse Greene*. In the Circuit Court of the State of Oregon, in and for the County of Sherman, Case No. 3350. Conducted research and offered testimony on behalf of Jesse Greene and the Nez Perce tribe concerning Nez Perce traditional fishing, acculturation, and contemporary fishing on the mid-Columbia River (Preachers Eddy), (Expert Witness). 1967.

Research methods have included reviews of comparative, historical, and ethnohistorical data, direct observation, and in-depth interviews of tribal fishermen and other tribal cultural experts. The first goal of this research has been to determine the fishing, hunting, and related practices in place at the time of the 1855 treaties and subsequent to 1855. Routine questions have been explored with tribal respondents concerning these practices that included the following topics:

- locations of usual and accustomed (U&A) fisheries
- techniques of catching and processing catch
- tribal groups using U&A fisheries
- types of fish species taken
- seasons for various species taken
- numbers taken of various species
- distribution of catch
- sale of catch
- hunting, gathering, and pasturing livestock when fishing and other activities at U&A sites of various types
- intertribal cross-utilization of fisheries
- causes of salmon decline
- effects of state and federal regulation on fishing.

This research has been conducted as a basic investigation as well as for several tribes and agencies. I have been assisted by elders and cultural resource personnel from various tribes in the Columbia Basin, especially those in the four mid-Columbia tribes: Nez Perce, CTUIR, Yakama, and Warm Springs. Table 1 lists the names and tribal affiliations of the tribal members who have been aware of and described to me pinniped hunting on the Columbia River and its tributaries.

In cooperation with tribal members, our ethnographic research focuses on three topics:

- Topic 1: Traditional tribal uses of aquatic species focusing primarily on pinnipeds of the Celilo/Cascade Forks part of the Columbia River.
- Topic 2: Traditional tribal procurement techniques for marine mammals and their subsistence and cultural significance based on oral histories provided by contemporary Columbia River tribal members from the four CRITFC tribes.
- Topic 3: Ethnohistorical, ethnographic, and archaeological research concerning the impacts of pinnipeds on salmon and other aquatic resources of the Columbia River.

In this article we summarize and provide an analysis and interpretation of selected published sources of information on pinnipeds, including traditional tribal relationships with and uses of them. In addition to tribal interviews between 1964 and 2015 we rely on existing literature and research to demonstrate traditional Columbia River tribal hunting of pinnipeds.



TABLE 1. INTERVIEWEES WHO NOTED SEALS AND SEA LIONS DURING COLUMBIA BASIN FISHING INTERVIEWS, 1964–2015.

Name	Tribe	Name	Tribe
Alec Williams	Nez Perce	Sam Cash Cash	Umatilla/Nez Perce (Cayuse)
Allen Slickpoo	Nez Perce	William Burke	Umatilla/Nez Perce (Cayuse)
Caleb Carter	Nez Perce	Alphonse (Frenchy) Halfmoon	Umatilla/Nez Perce (Cayuse)
Charlie Williams	Nez Perce	Ron Halfmoon	Umatilla/Nez Perce (Cayuse)
Corbett Lawyer	Nez Perce	Charlie Jackson	Umatilla/Nez Perce (Cayuse)
David Jackson	Nez Perce	Harold Culpas	Warm Springs
Elizabeth Wilson	Nez Perce	Nelson Walulahtum	Warm Springs
Harrison Lott	Nez Perce	Verne Jackson	Warm Springs
James Miles	Nez Perce	Wilson Meanus	Warm Springs
Jesse Greene	Nez Perce	Alec Saluskin	Warm Springs
Jim Green	Nez Perce	Eagle Selatse	Yakama
Jim Reynolds	Nez Perce	Joe Meninick	Yakama
Johnny Woods	Nez Perce	Roger Jim	Yakama
Joseph Pinkham	Nez Perce	Robert Jim	Yakama
Samuel Slickpoo	Nez Perce	Virginia Beavert	Yakama
Samuel Watters	Nez Perce	Henry Thompson	Yakama
Saul Webb	Nez Perce	Louie Sohappay	Yakama
Alice Barnhart	Umatilla/Nez Perce (Cayuse)	Levi George	Yakama
Antone Minthorn	Umatilla/Nez Perce (Cayuse)	Jim Alexander	Yakama
Clarence Burke	Umatilla/Nez Perce (Cayuse)	James Selam	Yakama
Gilbert Conner	Umatilla/Nez Perce (Cayuse)	Joe Jay Pinkham	Yakama
Ike Patrick	Umatilla/Nez Perce (Cayuse)	Abe Showay	Yakama
Jay Minthorn	Umatilla/Nez Perce (Cayuse)	Samuel Sturgis	Yakama
Percy Brigham			

## Pinniped Predation

### *Pinniped Ranges*

Stanley et al. (1996:368) describe harbor seal (*Phoca vitulina*) distribution as “one of the broadest geographic distributions of any pinniped, stretching from the east Baltic, west across the Atlantic and Pacific Oceans to southern Japan.” While some may travel great distances to feed on annual migrations, “harbor seals are generally believed to be philopatric” at least to several hundred kilometers, “returning to the same areas each year to breed.” Stanley et al. also suggests that harbor seals in the Atlantic and Pacific may “have been colonized from west to east with the European populations showing the most recent common ancestry.”

The Steller sea lion (*Eumetopias jubata*) ranges from “the central California coast to the Bering Sea, the Kamchatka Peninsula in the Soviet Union, the Kurile and Commander Islands, and the western Pacific waters as far south as Hokkaido and Northern Honshu in Japan (Haynes and Mishler 1991:2). In 1996, within this range, lay “approximately 27 rural communities with a 1985 population of about 67,000 (many of whom are of Alaska Native ancestry).” Some of these communities continue to make traditional use of sea lions “for subsistence food and raw materials;” other communities do not, “although they have done so in the past” (Haynes and Mishler 1991:2–3).

California sea lions (*Zalophus californianus*) “are the most abundant pinniped, and have the broadest distribution of any pinniped in Mexico. . . . California sea lions range throughout temperate and subtropical waters off the western coast of North America, from southern Canada to the south of Mexico, including the Gulf of California. They utilize three breeding areas along the Pacific Coast: 1) the U.S. from Canada to the U.S.-Mexico border; 2) western Baja California from the U.S.-Mexico border to the tip of Baja California; and 3) the Gulf of California. The animals from each breeding area are considered to be different stock. In 1983 there were 145,000 animals; in 2002 the U.S. population alone was estimated at 237,000 to 244,000 animals, a growth of 5.4% to 6.1% per year” (Szteren, Auriolles, and Gerber 2006:370). The U.S. population of California sea lions has been increasing over the last 15 years (Szteren, Auriolles, and Gerber 2006:369).

### *Pinniped Increases*

McKechnie and Wigen (2011:133) point out that until 1970, the Canada Department of Fisheries and Oceans supported “population control” programs to reduce pinniped (especially harbor seals, which were seen as competing with humans for salmon, and Steller sea lions) populations. These programs ceased in the early 1970s with the advent of marine mammal protections. Braje and Rick (2011:297–298) point out that before 1973, when the Marine Mammal Protection and ESA were passed, marine mammals were also managed for commercial harvest. Since 1980, however, commercial hunting of marine mammals has been discontinued and “direct threats to the populations in U.S. waters have been largely eliminated,” with management focusing on reducing hunting of marine mammals as well as accidental catching by commercial fishing. Without the decimation of commercial hunting, sea lion numbers have exploded: “North Pacific seal and sea lion populations now number in the hundreds of thousands” (Braje and Rick 2011:298). Since 1970, harbor seal populations alone have increased from 10,000 animals to 105,000 animals (Moss and Losey 2011:133). This is an increase of roughly 2,300 animals per year.<sup>1</sup> Braje and Rick assume that, with an adequate food supply, most pinnipeds are repopulating along the Pacific Coast, “establishing rookeries and, perhaps, recovering to ‘prehistoric levels’” (2011b:298). Moss and Losey (2011:167) also note that “recent biological studies demonstrate range expansion of some species subsequent to the Marine Mammal Protection Act of 1972.” For example, California sea lions do not seem to breed in the Oregon area, but they do winter there, as well as in Washington and British Columbia. They arrive in August, “with numbers peaking in September and October” (Moss and Losey 2011:171). According to Scordino (2010:i),

Assessments indicated the Washington and Oregon harbor seal populations were at their optimum sustainable population (OSP) levels. Population assessments initially demonstrated that California sea lions had reached OSP, but continued exponential

<sup>1</sup> 105,000-10,000 = 95,000. 2011-1970 = 41. 95,000/41 = 2,317.

growth indicated from the 2006 to 2008 pup counts suggest the population is not yet at OSP. Additional surveys are needed to affirm California harbor seal status.

The numbers of pinnipeds such as California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), and harbor seals (*Phoca vitulina*) in the Columbia River are increasing and are now negatively impacting the salmon runs in the Columbia River on which tribes depend. For example, Lyman<sup>2</sup> (2011:24) notes that “California sea lions have been observed for the past decade or so preying upon salmon and steelhead—two economically valued fish—below Bonneville Dam on the Columbia River.” Increasing numbers of California sea lions are being found up rivers “as they congregate during salmon runs and herring and smelt spawning” (Moss and Losey 2011:171). “During the 1980s and 1990s, one to two California sea lions (*Zalophus californianus*) were reported annually at the dam during fishway inspections” (Brown et al. 2011:1); since the turn of the [twenty-first] century an increasing number of California sea lions have been “assembling to feed on spring chinook salmon and steelhead headed upstream to spawn” (CBWFWB 2013; see also Stansell et al. 2013:17, 23). In 2001, there were “six California sea lions observed at one time, and by 2002 the U.S. Army Corps of Engineers (USACE) estimated that thirty California sea lions were foraging at the dam for salmonids (*Onchorynchus* spp.), many of which are listed under the Endangered Species Act (ESA)” (Brown et al. 2011:1).

The number of Steller sea lions seen at the dam has also been steadily increasing, from zero in 2002 to three in 2003 and 2004; four in 2005; eleven in 2006; nine in 2007; thirty-nine in 2008; twenty-six in 2009, and doubling to seventy-five in 2010 (CBWFWB 2011b:2). In 2012 more Steller sea lions than California sea lions were seen at Bonneville Dam; Steller sea lions also consumed more salmonids than California sea lions for the first time since observation began. In fact, in 2012, “Steller sea lion predation on both salmonid and sturgeon was higher than for any previous year” (CBWFWB 2012), and Steller sea lion consumption of both salmon and steelhead “continued its upward trend during the late winter-spring of 2013” (CBWFWB 2013; see also Stansell et al. 2013:17, 23).

At the turn of the twenty-first century, workers at Bonneville Dam<sup>3</sup> also began noticing an increase of California sea lions ascending the Columbia to feed on the salmon searching for the fish ladders below the dam (CBWFWB 2011b:1, 2). A fish ladder is a series of pools designed to allow fish to ascend from one to another upriver, as they would normally make their way through rapids. However, fish ladders create “a traffic jam for the migrating fish, which often spend hours or even days at the base of the dam searching for the fish ladder to get upstream” (Schneider 2013:150). The fish are particularly vulnerable to seals and sea lions at the fish ladder entrances.

Some argue that seals and sea lions are taking unnatural “advantage of the artificial structure of the dam;” Fidelia Andy, former chairwoman of CRITFC and vice-chairwoman of the Yakama Nation’s Fish and Wildlife Committee, pointed out that “Sea lions patrol the entrance to, and even inside, the Bonneville fish ladder, thereby eliminating any normative predator/prey relationship” (in Schneider 2013:152). Possibly supporting Andy’s observation, in 2010 Stansell et al. recorded one California sea lion, number C287, taking “the most fish in one day at Bonneville Dam since we began observing in 2002”: twelve Chinook. Using an average Chinook weight of 6.6 kg per fish (about 14.5 pounds), twelve Chinook comes to about seventy-nine kg or roughly 175 lbs of salmon in one day. Hewes (1973:134) points out that one pound of salmon equals about 1,000 calories, so calorie-wise, using Hewes’ 1,000 calories/lb, this resulted in C287 ingesting 175,000 calories: again,

<sup>2</sup> R. Lee Lyman is a Professor and Chair of the Department of Anthropology at the University of Missouri, Columbia.

<sup>3</sup> “Bonneville Dam is the first dam upstream from the mouth of the Columbia River at river kilometer (rkm) 235” (Stansell et al. 2010: 2).

in one day. Using Hewes' numbers of 2,000 calories per capita, this means that in one day C287 ate enough to feed eighty-seven people. Over the next month C287 took 195 Chinook, of which he kept 162; he also took three steelhead and four unknown fish, of which he kept four (the others were stolen by Steller sea lions). "This averages out to about 6.7 kg of fish per day taken, or 5.5 kg per day consumed" (Stansell et al. 2010:30). Again, using Hewes' numbers, C287 ate enough each day to feed sixty people per day on nothing but fish. If fish accounts for only half of a person's diet, this number doubles to 120 people. The amount eaten by C287 is also about triple what an average male California sea lion in captivity eats. Stansell et al. (2010:30) note that while not every California sea lion eats this many fish, "it does give us an indication of how unusual a situation pinniped predation at Bonneville Dam has become when compared to natural or captive consumption studies, and what some CSL are capable of consuming."

However, McMillan (2008) notes that seals and sea lions may have historically eaten somewhere between 5–15 million salmon and steelhead annually (depending on how many fish they consumed or lethally injured per day), and yet there remained enough salmon and steelhead to supply the tribal fisheries throughout the Columbia Basin<sup>4</sup> as well as the abundant populations of bears (grizzly and black), wolves, coyotes, cougars, bobcats, lynx, ospreys, eagles, mergansers, American dipper, cormorants, terns, loons, herons, and on and on, that all subsisted in part on differing life histories of salmon and steelhead within the Columbia Basin.

Historical periods, however, did not include commercial and sport fishing that have, at the very least, laid a heavy toll on salmon and other fish resources of the tribes. Historically, as well, the tribes hunted seals and sea lions that were present at their fisheries, whether as a means to reduce competition, as an additional subsistence resource, or for both these and possibly other reasons.

Since 2002, not only have sea lion numbers in the Bonneville Dam tailrace increased steadily, they have arrived "at the dam progressively earlier in the year" (Keefer et al. 2012:1237) and staying later (Brown et al. 2011:1). For example, between 2003 and 2007, Wright, Tennis, and Brown (2010:63) "tracked the movements of 14 river-type sea lions from as early as 14 November to as late as 9 August." Based on a 9-year study, Keefer et al. (2012:1240–1241) note that "Pinnipeds were observed progressively earlier in the year through time." Brown et al. (2011:1) also note that since 2002 the "minimum number of California sea lions has ranged from approximately 50 to 100 animals, with animals generally arriving earlier and occurring over a longer period each year."

Early-arrival fish may be more at risk for predation. Keefer et al. (2012:1237) note that predation rates were "substantially higher for early-timed than for late-timed salmon populations. The most at-risk group included Snake River and upper Columbia River Chinook salmon listed as endangered under the U.S. Endangered Species Act." Steller sea lions have discovered the "all-you-can-eat banquet" of thousands of white sturgeon that have recently begun overwintering below the dam (CBWFWB 2011a:1, 2). During winter months, more salmon may be consumed by seals and sea lions than are passing the dam: "Numbers of salmonids observed to be consumed exceeded the number of salmonids counted passing Bonneville Dam in nine of fifty-nine (15%) winter observation weeks" (Keefer et al. 2012:1244). Schneider points out that while sea lions may consume some 4% of the total run of salmon each year, "their impact on spring runs is significantly higher. If a run is wiped out, it is gone forever—which is exactly what happened to the Spring

<sup>4</sup> Fisheries were traditionally maintained "on the mainstem and all of the principal tributaries, including the Deschutes, John Day, Umatilla, Walla Walla, Snake, Clearwater, Salmon, Yakima, Wenatchee, Methow, Okanogan, Sanpoil, Spokane, Pend Oreille and Kootenai Rivers" (Scholz et al. 1985:10).

Chinook run on Lake Washington: sea lions hanging out at the fish ladder on Ballard Locks effectively wiped out the entire run” (Schneider 2013:152).

It must be noted that the foregoing numbers are just the animals that have been observed from the face of the dam, not the animals that may actually be at Bonneville or consuming salmon further downstream in the Columbia River out of sight of the dam and observers. Stansell et al. (2013:1) point out that the U.S. Army Corps of Engineers (USACE) uses surface observations “to evaluate the seasonal presence, abundance, and predation activities of pinnipeds.” However, it must be noted that while surface observations are useful, seals and sea lions “can consume smaller prey underwater, so all consumption estimates and associated impacts . . . should be considered minimum estimates” (Stansell et al. 2013:2). Further, observations are mostly carried out in daylight; only occasional night observation activities are practiced because “nighttime predation is very difficult to observe and therefore is still largely an unknown factor that we most likely are underestimating” (Stansell et al. 2013:4). In 2013 some twenty-nine hours of nighttime observations were made over nine nights using night-vision binoculars. However, glare “from dam lighting, power tower lighting, highway lights, and poor weather conditions all combined to make viewing at night difficult. Predation by SSL [Steller sea lion] tends to be fast, quiet, and typically farther downstream than CSL [California sea lion] predation, so we could be missing more nighttime predation than in the past” (Stansell et al. 2013:16). In 2013, some “3,247 hours of daytime observations” were conducted between 4 January and 31 May; in this period pinnipeds caught and ate some 2,275 fish of several species (Stansell et al. 2013:6). Before 2013, observations were made between January and the end of May, “to focus on the spring Chinook salmon passage season,” but, as noted, in recent years Steller sea lions have been seen at Bonneville Dam as early as August, so a program of observations in the fall and early winter was begun, which supplied more information on Steller sea lion predation on white sturgeon and other fish (Stansell et al. 2013:2).

Furthermore, the Columbia is not the only river in which seals and sea lions prey on salmon (Table 2). Virtually any river on the Pacific Coast that hosts a salmon run may be a viable area for seals and sea lions. Scordino<sup>5</sup> (2010:i, 3) noted that “salmonids are a common prey species for Pacific harbor seals and California sea lions in many west coast rivers/estuaries and even in open marine waters.” Roffe and Mate (1984) describe the feeding habits of California sea lions, Steller (or Northern) sea lions, and Pacific harbor seals in the Rogue River in Oregon. Lyman (1989:70–71) discusses the presence of pinniped remains at the Umpqua River, the Pistol River, and the Mattole River, all in Oregon. Giwargis (2014) and Yancey (2014) note a sea lion pup some 1½ miles from the San Joaquin River in California. Another sea lion was seen in Old Sacramento along the Sacramento River in 2010 (News10 Staff, KXTV 2012). Yet another was spotted, again in 2012, at the confluence of the Sacramento and American Rivers in Sacramento (*The Sacramento Miner* 2012).

Scordino investigated pinniped predation on salmonids in several rivers, including “rivers draining into Hood Canal [including the Quilcene, Dosewallips, Duckabush, Hamma Hamma and Skokomish Rivers], Ozette River, Columbia River, Alsea River, Rogue River, Klamath River, Mad River, and San Lorenzo River; and at Bonneville Dam, Willamette Falls,” and several marine areas. Salmon predation was observed at all river mouths as well as about “0.5 kilometers upriver in the Duckabush River” (Scordino 2010:5). On the Duwamish River at Seattle, Washington, observations were conducted at the river mouth and upstream. California sea lions and harbor seals were both observed, but only the California sea lions were seen taking salmon (Scordino 2010:9). On the

<sup>5</sup> At the time of his writing, Joe Scordino was retired from the NOAA/National Marine Fisheries Service—Northwest Region.

Snohomish River, haul-out sites were seen “at Smith Island in the lower Snohomish River area and . . . on log booms at the Everett Naval Base” (Scordino 2010:9–10).

TABLE 2. SOME RIVERS AND CREEKS WITH DOCUMENTED PINNIPED PREDATION (SCORDINO 2010).

Alsea River	Pistol River
Carmel River	Quilcene River
Columbia River	Rogue River
Dosewallips River	Sacramento River
Duckabush River	San Joaquin River
Duwamish River	San Lorenzo River
Eel River	Scott Creek
Hamma Hamma River	Skokomish River
Klamath River	Smith River
Mad River	Snohomish River
Mattole River	Umpqua River
Ozette River	

Between late February and early June 2001, one California sea lion was seen in the main stem lower Snohomish River, and harbor seals were observed both in the mainstem river and the sloughs. They were not then observed taking salmonids (Scordino 2010:10).

Harbor seals have been reported upstream on the Ozette River on the Olympic Peninsula. Scats from harbor seals, California sea lions, and Steller sea lions were found “within about six kilometers of the mouth of the Ozette River” (Scordino 2010:12). An underwater camera at an upriver weir near Lake Ozette “also provided information on pinniped-scarred fish, predation on sockeye by harbor seals and river otters, and movements of seals in and out of Lake Ozette.” In 1998, the camera at the weir showed harbor seals “passing through the weir at least eight times and on one occasion with a sockeye in its mouth” (Scordino 2010:14).

At Willamette Falls, “206 kilometers upriver from the mouth of the Columbia River at Oregon City, Oregon,” California sea lions have been observed since April 1975 “when two sea lions were reported taking salmon and hindering fish passage at the fish ladder” (Scordino 2010:23). The next sightings were in the late 1980s; sea lions were sporadically sighted near the falls “until 1995 when California sea lions began occurring almost daily from February through late May.” In 1995 a California sea lion reportedly first entered one of the fish ladders to eat spring Chinook salmon (Scordino 2010:23). Between 1997 and 2003 three to ten sea lions were seen at the falls in any given year (Scordino 2010:23–25).

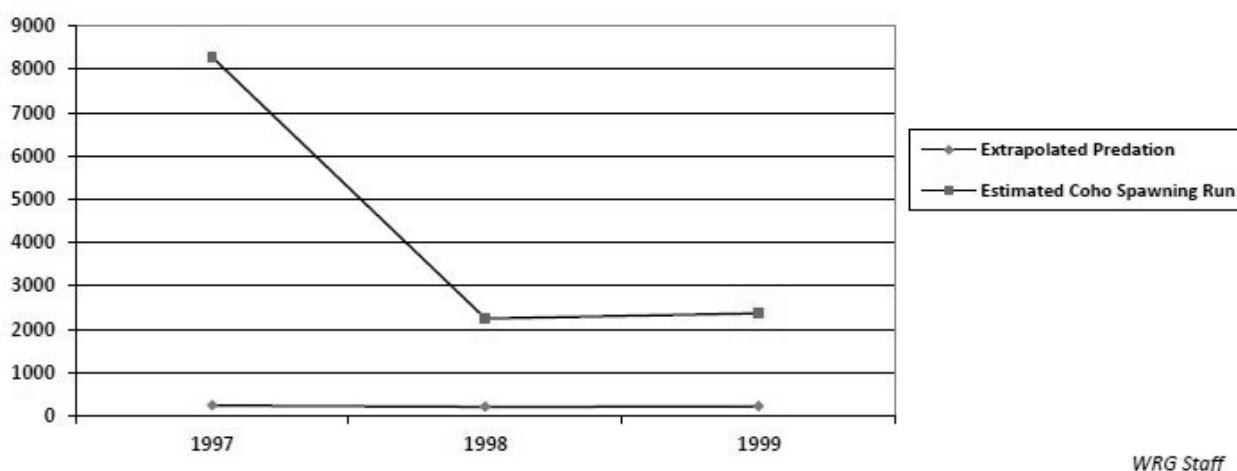
In 2000, in the Alsea River, which enters the Pacific Ocean at Waldport, Oregon, ODFW marked 62 harbor seals; 23% were sighted at least once in the river. In 2002, 59 harbor seals were caught and marked. Twenty-three seals were found in the Alsea River at least once; “these 23 seals made 593 trips upriver totaling 5,067 hours. . . . seven of the seals accounted for 94% of the total hours. Seventy-three percent of the total hours spent upriver occurred at night” (Scordino 2010:30). The 23 marked seals spent most of their time in the river and were there far more at night than in the day (Scordino 2010:30).

The Umpqua River has been examined for cutthroat trout as well as salmonid predation (Scordino 2010:31). In 1997 a harbor seal was seen at Half Moon Bay, about 1.5 kilometers upriver from the mouth of the Umpqua River, “diving and surfacing repeatedly while consuming a coho salmon” (Scordino 2010:31). Harbor seals were also seen at River Mile 14 (Brady Bar), and River Miles 16 and 18. Interestingly, there was a lack of cutthroat trout remains in harbor seal scats from Half Moon Bay and Windy Cove, the two upriver haul-out sites, although observations were limited to only one year (Scordino 2010:32).

On the Rogue River in southern Oregon, California sea lions can be found in the river from fall through spring. There is a Steller sea lion rookery at Rogue Reef (about four kilometers upriver from the mouth of the Rogue River); “Steller sea lions occurred in the Rogue River in the spring, summer and fall” (Scordino 2010:32). In 1996 “California sea lions, harbor seals and Steller sea lions were observed foraging in the Rogue River” (Scordino 2010:33). In 1997 two upriver surveys “starting at RM 35 and ending at the mouth” found most of the pinnipeds in the lower 16 kilometers of the river, “except for a single harbor seal at River Mile 24 on one occasion” (Scordino 2010:33). In 1998 “Most of the predation events were in the lower three kilometers of river” (Scordino 2010:33). It is not known how many of the salmonids taken were ESA-listed coho salmon. As can be seen in Fig. 3, pertaining to the Rogue River, Scordino’s numbers show that predation on salmon by pinnipeds remains relatively constant no matter what the run may be. This will have a great impact especially on years in which there are smaller runs: such as was the case in 1998 and 1999.

On the Smith River in northern California, observations were conducted in the lower 1 to 1.5 km of the river in 1999 and 2001. Harbor seal predation on pinnipeds was observed during both years (Scordino 2010:35).

In the Klamath River, the Yurok Tribal Fisheries Program (YTFP) “conducted investigations on pinniped predation on fall-run Chinook salmon” in the lower 3 km of the Klamath River from 1997 to 1999. In 2,813 hours of surface observations, “YTFP observed a total of 1,366 salmonid predation events.” In 1997 California sea lions were the primary pinniped predator, but harbor seals and Steller sea lions were also seen (Scordino 2010:37). Although upriver predation was not investigated, Scordino (2010:38) did conclude that the YTFP study “confirmed that salmonids were common prey of both harbor seals and California sea lions in the Klamath River.”



WRG Staff

Fig. 3. Extrapolated salmonid predation by pinnipeds, Rogue River, 1997–1999 (Scordino 2010:33–34).

Salmonid predation by pinnipeds was also seen at the mouths and lower portions of the Mad River, Eel River, Scott Creek, the San Lorenzo River, and the Carmel River (all in California) (Scordino 2010:39, 40, 42, 43, 47). It is important to note that these water courses were all studied within 2 km of their mouths. There may be undocumented pinniped predation on salmonids and other fish farther upriver.

### *Mitigation Efforts at Bonneville Dam*

Mitigation efforts such as sea lion exclusion devices (SLEDs), floating orifice gates (FOGs), harassment of seals and sea lions from land and boats, acoustic devices, and capture and permanent removal of specific returning sea lions have proven somewhat effective or ineffective in keeping sea lions out of the fishways, depending upon the goal. For example, Brown et al. (2011:7) note that below Bonneville Dam, “Overall, the 2011 field season was successful from a research standpoint but unsuccessful from a management standpoint.” While the “GPS-phone tags and river-wide pinniped surveys provided an unprecedented level of information on pinniped abundance, distribution, and foraging behavior in the Columbia River,” being unable to remove the animals and a lack of effective non-lethal deterrent methods meant that management was severely hampered.

Stansell et al. (2010:22) also noted that “hazing activity temporarily moved some sea lions out of tailrace areas, but the animals typically returned and resumed foraging shortly after hazers left the area.” Brown et al. (2011:7) also found that boat-based deterrents “only cause a short-term disruption in foraging behavior and fail to deter the majority of sea lions from the dam.” Over a period of nine years, Keefer et al. (2012:1245) also found that “Harassment efforts, begun in full in 2006, did not substantially slow the trend of increasing total sea lion presence, although the California sea lion removals did probably reduce abundance of this species temporarily.” In 2013 Stansell et al. again noted that hazing from boats “temporarily moved some sea lions out of tailrace areas, but the animals typically returned and resumed foraging shortly after hazers left the area” (Stansell et al. 2013:21).

Haul-out traps were useful in marking and tagging sea lions, “but lack of removal authority for most of the [2011] season required the release of numerous (ten to fifteen) California sea lions eligible for removal,” which proved to be a major setback. Telemetry, GPS, and surveys were good research tools but did nothing to deter sea lions (Brown et al. 2011:8). Acoustic deterrent devices (ADDs) also seem not to have the desired effect on the mammals: ADDs were installed at most fishway entrances in 2010 but, as “in all previous years, pinnipeds were observed swimming and eating fish within 20 ft. of some of the ADDs” (Stansell et al. 2010:22). The ADDs have little deterrent effect; happily, they also do not seem to adversely affect the fish, either (Stansell et al. 2010:22). In fact, in 2010 Stansell et al. (2010:31) recommended that their use be discontinued. GPS, ADDs, and Critter Cam applications on California sea lions continued in 2013; two Steller sea lions were also fitted with Critter-Cams and tracking devices, but this proved ineffective. “One Critter-Cam was recovered off the coast of southern Washington and the other never found,” and both sea lions abandoned the Bonneville area immediately after release for the ocean. “Little useful footage of relevance to the Bonneville studies was seen” from Steller sea lions (Stansell et al. 2013:21).

On the other hand, Stansell et al. (2010:21) note that “In 2010, SLEDs and FOGs were installed at all operating main fishway entrances . . . There were no sea lions observed inside the fishways, nor did any observers note any sea lions attempting to get through the SLEDs or FOG barriers in 2010 despite significant predation activity near dam structures” In 2013, SLEDs and FOGs were re-deployed at various locations around Bonneville Dam Powerhouse I and Powerhouse II between 31 January and 18 March and were effective: “no pinnipeds were observed entering the



fishways during the 2013 season” (Stansell et al. 2013:4). Again, observers saw no “sea lions attempting to get through the SLEDs or FOG barriers in 2013 despite significant predation activity near dam structures” (Stansell et al. 2013:20). Furthermore, hundreds of concrete blocks were deployed in 2010 “along the PH2 tailrace Cascades Island west end shoreline concrete apron in 2010 (where the pinnipeds prefer to haul out) in an attempt to prevent the pinnipeds from hauling out and getting comfortable staying near the dam” (Stansell et al. 2010:21). Almost no pinnipeds hauled out onto the concrete apron in 2010. In 2013, “no pinnipeds hauled out on the PH2 tailrace concrete apron along Cascades Island . . . (barring a few single short-term events), preferring instead to rest in pods near the shoreline of Tower Island or near the traps.” The blocks on the aprons seem to have encouraged the seals and sea lions to use Tower Island instead of Cascade Island (Stansell et al. 2013:20).

Stansell et al. (2010:25) note that from 2008 to 2010, thirty-eight California sea lions were removed from “the population of ‘Bonneville’ animals.” While this removal “failed to reduce the overall salmonid consumption estimate,” the animals removed did account for “34% (3,118 of 9,275) of all the salmonid catch events attributed to specific individuals (and 42% of those individuals on the removal list)” (Stansell et al. 2010:27).<sup>6</sup> In other words, those thirty-eight California sea lions were at Bonneville for more days and ate more salmon than the rest of the identified California sea lions. “Consumption estimates and presence metrics for 2008, 2009, and 2010 undoubtedly would have been higher if these select sea lions had they not been removed . . . perhaps by as much as 1,000 or more over the past two years” (Stansell et al. 2010:27, 28). Further, “We know from observations of branded CSL seen at Bonneville Dam over the years, that if they do not return in consecutive years, they are unlikely to return at all” (Stansell et al. 2010:27).

Conversely, Keefer et al. (2012:1247) noted that all the California sea lions that had been tagged with satellite transmitters in the lower Columbia River and trapped at or previously observed at the dam subsequently revisited it.” In fact, Keefer et al. noted “repeat visits by many individual animals.” For example, an average of 56% of easily identifiable California sea lions “was present in consecutive years and others were recorded in as many as eight years” (Keefer et al. 2012:1247). Further, these repeat-visit California sea lions “captured disproportionately high numbers of salmonids at Bonneville Dam in most years.” These mammals were present for longer and “probably developed selective foraging behaviors,” which was demonstrated by the sheer size of two California sea lions that weighed in at 660 and 522 kg<sup>7</sup> when captured, “the largest California sea lions ever recorded (typical adult males weigh 200–400 kg<sup>8</sup>)” (Keefer et al. 2012:1247).

From 2003 to 2007, Wright et al. (2010:60) fitted transmitters onto fourteen male California sea lions that have consumed fish at Bonneville Dam or Willamette Falls in order to compare their movements with twelve animals “of unknown foraging history” in the river. They found that all fourteen California sea lions that had utilized Bonneville or Willamette Falls returned to those areas, whereas none of the twelve did. Travel between the mouth of the Columbia River and Bonneville Dam, some 130 miles, took the sea lions between 1 and 1.9 days. They stayed at the dam between 2 and 43 days. Their results showed “that not all California sea lions in the Columbia River prey on salmonids at Bonneville Dam or Willamette Falls,” although “factors influencing recruitment into the upriver salmonid-foraging subpopulation are unknown.”

Schneider (2013:152) notes that “Proponents of the sea lion removal (including tribal and state representatives) point out that the overall sea lion population is at an historic high, and has

<sup>6</sup> These rates are complicated by “the increasing presence and salmon predation by [Steller sea lions] at Bonneville Dam” (Stansell et al. 2010:28).

<sup>7</sup> 1,455 and 1,150 lbs respectively.

<sup>8</sup> 440 and 881 lbs respectively.

actually exploded in recent years” to what the Washington Department of Fish and Wildlife (WDFW) biologists consider to be carrying capacity. From the early 2000s, when the sea lions were first seen at Bonneville, to 2009, “there has been a 382 percent increase in the number of salmon being eaten by sea lions.”

Even if it works, removal does not preclude new animals from taking old animals’ places. For example, even though forty sea lions were removed from Bonneville Dam in 2008 to 2010, this effort lost ground in 2011: “Tangible gains made in 2008–2010 were potentially reversed by allowing the pool of experienced, predatory sea lions to increase unchecked in 2011” (CBWFWB 2011b). Stansell et al. (2010:28) had expected to see a decline of California sea lions (and thus salmon predation) in 2010 because of the removals:

However, this was not the case, as many new CSL ventured up to Bonneville Dam this year, if only briefly. It may be that removing 11 to 15 animals each year is not enough to prevent substantial recruitment of new individuals and increased predation, and that it would take more additional measures (e.g. the removal of about 30 individuals) each year to see and document a significant reduction in CSL numbers and salmonid predation.

In April 2014, “Stansell noted that less than ten percent of the California sea lions observed at Astoria this year are branded, while the past couple years it has been around thirty-fifty percent” (CBWFWB 2014b). However, twice the usual number of sea lions were seen at Astoria in 2014, indicating that while removed animals are not returning, “there are a lot of new recruits to the Astoria basin, likely brought in by the strong smelt run up the Columbia River this year” (CBWFWB 2014b).

In 2010, Stansell et al. suggested the use of more traps, since the traps currently being used are often full of mostly Steller sea lions, leaving little room for California sea lions; loosening the criteria of needing to document seeing a California sea lion take a salmonid and/or seeing it at Bonneville for 5 days; putting a California sea lion on the list to be removed sooner; or examining other methods of removal (Stansell et al. 2010:28).

It is also important to note that seals and sea lions are being seen upstream of Bonneville Dam. Stansell et al. (2010:29–30) noted that observations were also conducted “in the forebay of Bonneville Dam when we knew pinnipeds were upstream of the dam.” Other sightings were made by Army Corps of Engineers’ “employees and biologists between Bonneville and The Dalles dam” at river mark 308. One California sea lion was “observed using the navigation lock to pass upstream into the forebay on May 16, 2009”; he stayed there until he was caught nearly 10 months later. In addition, several other sightings were made “from the tailrace of The Dalles Dam, Drano Lake (rkm 261), the mouth of the Wind River (rkm 249),<sup>9</sup> and the forebay (especially near the fishway exits) of Bonneville Dam.” Portland State University students also observed California sea lions at Willamette Falls Locks in 2009 and 2010 (Stansell et al. 2010:30). Other upstream sightings were made at the boat ramp at Stevenson, Washington, and Eagle Creek and the Bridge of the Gods near Cascade Locks, Oregon (Stansell et al. 2010:45).

### *Effects of Pinniped Predation on Tribes*

The increasing level of predation on salmonids needs to be examined for its effects on the tribes who rely on salmonids as a resource. As Schneider (2013:156) points out, salmon between the mouth of

<sup>9</sup> Near Home Valley, Washington.

the Columbia and Bonneville Dam “are mostly caught by sports fishermen and smaller commercial operations.” Tribal fisheries are generally restricted to areas upstream of Bonneville (see also *U.S. v. Oregon 2008–2017 Management Agreement*), so those fisheries most impacted by the increase of pinniped predation are those of the tribes. “The groups working to end the sea lion program often fail to mention that the sea lions have the greatest impact on the tribal fisheries” (Schneider 2013:156).

This article next investigates the tribal hunting of pinnipeds and reliance on them as a traditional resource, a right reserved to the tribes in several treaties. We examine this through a review of historical documents as well as through interviews of tribal members, especially tribal fishermen, and other cultural experts.

## Traditional Tribal Uses of Seals and Sea Lions

Rights of hunting and fishing at usual and accustomed places are reserved in the Treaty with the Wallawalla, Cayuse, Etc., 1855, to the Umatilla:

That the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians, and at all other usual and accustomed stations in common with citizens of the United States, and of erecting suitable buildings for curing the same; the privilege of hunting,<sup>10</sup> gathering roots and berries and pasturing their stock on unclaimed lands in common with citizens, is also secured to them. (Kappler 1904:694–695)

The Treaty with the Yakima, 1855, reserves the same rights to the fourteen bands and tribes that make up the Yakama Nation:

The exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places, in common with the citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land. (Kappler 1904:699)

This treaty language is the foundation of the recent enactment by the Yakama tribe of a regulation allowing tribal take of California sea lions in Zone 6 of the Columbia River, if necessary, to defend Yakama tribal members’ fishing gear or catch. This regulation clearly indicates the tribe’s traditional understanding that marine mammal hunting is reserved in the treaties.

In the Treaty with the Nez Perces, 1855, similar language is used to reflect the Nez Perces’ reserved rights:

The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land. (Kappler 1904:703)

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<sup>10</sup> The Court in *State of Idaho v. Tinnio* determined that “to hunt” also meant “to fish.”

Finally, the Treaty with the Tribes of Middle Oregon, 1855, reserved to the groups now known as the Warm Springs Tribe the rights to hunt and fish at all usual and accustomed places using virtually the same language as that found in the Umatilla, Nez Perce, and Yakama treaties:

That the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians; and at all other usual and accustomed stations, in common with citizens, of the United States, and of erecting suitable houses for curing the same; also the privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands, in common with citizens, is secured to them. (Kappler 1904:715)

### *The Traditional Presence of Seals and Sea Lions in the Columbia River*

The presence of seals and sea lions in the Columbia River is not a twenty-first-century phenomenon. Lyman et al. have established the ancient presence of seals and sea lions in the Columbia River before the time of contact with Euroamericans by examining archaeological collections from sites downstream of Celilo Falls that contain bones and teeth of seals and sea lions: “These remains represent pinnipeds procured from the Columbia River rather than ones traded inland from the coast” (Lyman et al. 2002:1). They state specifically that “Harbor seals were in the lower Columbia River between about 10,000 and 6,000 yr ago, and also after 1,000 yr ago” (2002:1). Lyman et al. (2002:1, 2) reviewed published and unpublished sources and data on faunal remains recovered from archaeological sites along the Lower Columbia River from near the confluence with the Snake River in Washington State to the mouth of the Columbia (Fig. 4), and based on the location of 19 sampled sites (9 sites downstream and 10 sites upstream of Celilo), the number of sea mammal remains identified, and the age of the remains, they conclude that seals and sea lions “did not occur upriver farther than Celilo Falls.” However, our review of the present evidence inclines us to disagree with this statement from Lyman. It must be noted that Lyman et al. did not consider post-impoundment presence of sea lions or speak with the tribes on this issue. There are tribal memories who suggest that there were seals and sea lions above Celilo Falls.<sup>11</sup> One Nez Perce fisherman claimed a sighting of sea lions above the John Day and The Dalles dams, but we have not been able to locate other examples of such sightings. Further, because Lyman did not find evidence of pinnipeds in the Columbia River above Celilo does not mean there is no evidence to be found. If seals and sea lions were hunted in their capacity of competing with the tribes for salmon resources, the tribes may not have used them at all but simply discarded them after they were killed, leaving no remains to be found. It is also possible that remains could have been washed away by floods, or that the seals and sea lions were processed at locations other than those Lyman et al explored. For our purposes, Lyman et al. did find that pinnipeds are still found “significant distances upstream of salt water” (Lyman et al. 2002:4). Their results clearly show a traditional presence of seals and sea lions in the Columbia River.

During the author’s graduate research with him, Luther Cressman (Cressman et al. 1960:15–16) identified 6 bones he considered to be from phocids at sites WS-1 and WS-4 near Fivemile Rapids, about five miles east of The Dalles.<sup>12</sup> Cressman et al. (1960:71) note that “at Fivemile Rapids they took not only fish for food but land animals and marine mammals from the river.” In fact, the earliest use of the Five Mile site at The Dalles, “and this is probably true for the whole

<sup>11</sup> Celilo Falls was inundated by The Dalles Dam in 1957.

<sup>12</sup> This is about 200 miles up the Columbia River from its mouth (McMillan).

stretch of the river, was not for fishing but for hunting. The animals hunted were fox, a member of the cat family, muskrat, beaver, marmot cervid (elk or deer), a canid (probably coyote), and seal” Cressman (1977:134). At Fivemile Rapids one bone was in Feature 25, Level 30, along with stone, bone, and antler artifacts and about 40 grams of ochre (Cressman et al. 1960:63). The others were found in the roadcut of WS-4 between levels 20 and 36. These represented about 7% of the total, but within their specific levels, they represented between 16.7 and 33.2% of the totals. Similar representations were made by beaver and canid bones (Cressman et al. 1960:77). The three strata containing the phocid remains were deposited between 9,800 and 6,000–7,500 years ago; these remains “represent the oldest remains of sea mammals on the Columbia River known to us [and] establish that phocids were in the river during the first 4,000 years of the Holocene epoch that began 10,000 yr ago” (Lyman et al. 2002:2) and are “the farthest upstream of any pinniped remains yet reported from an archaeological context” (Lyman et al. 2002:3). Other sites reveal pinniped remains from as recently as 1300–1800 AD to 1900 AD (Lyman et al. 2002:2).

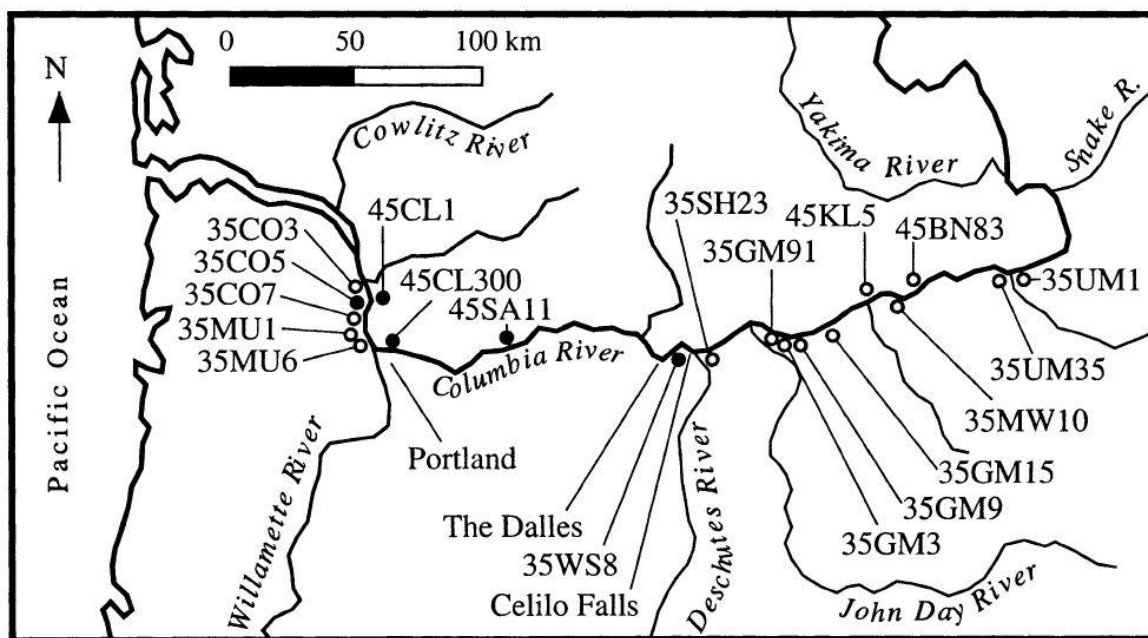


Fig. 4. Lyman et al. (2002) study area. Approximate locations of archaeological sites and modern cities. Open circles represent sites with no pinniped remains; filled circles represent sites containing pinniped remains.

In the journals of the Corps of Discovery, on 22 October 1805, John Ordway noted seeing “a number of large Sea otter [actually seals] below the falls in the whorl pools and eddys” (The Journals 2005:10/22/05). In fact, on 23 October 1805, Clark took a shot<sup>13</sup> at a harbor seal, which he mistook for a sea otter, at Celilo. He noted there were “Great Numbers [of them] about those rapids” (The Journals 2005:10/23/05). On 24 October 1805, near what is now Horsethief Lake, Patrick Gass also noted the presence of harbor seals (which he also mistook for sea otters): “In our way down to

<sup>13</sup> “Like for Audubon, this was the primary means for collection of animals from which to make detailed descriptions, which was another primary purpose of the expedition -- to collect and describe the flora and fauna” (McMillan 2008).

day we saw a great many sea otters swimming in the river, and killed some, but could not get them as they sunk to the bottom” (The Journals 2005:10/24/05). On 25 October 1805, at Rock Fort at The Dalles, Clark again noted “Great numbers” of seals “about those narrows and both below and above” (The Journals 2005:10/25/05). On 1 November 1805, Clark again noted “great numbers” of seals, this time below the Cascades (The Journals 2005:11/1/05). Lewis and Clark also named a rock in the Columbia River “Phoca Rock” for the abundant harbor seals that frequented it (The Journals 2005:11/2/05 and Footnote 12). Phoca Rock is some 100 miles up the Columbia River from the ocean.

On 10 January 1806, at Fort Clatsop, Ordway noted “Several villages along the coast of different tribes which lived mostly on whail [sic] meat, and fish, Some Seals” (The Journals 2005: 1/10/06). On 23 February 1806, still at Fort Clatsop, Lewis wrote that he had “reason to believe . . . that there are several species of the seal on this coast and in the river” and described some of them:

the skins of such as I have seen are covered with a short coarse stiff and glossy hair of a reddish bey [sic] brown color” or sometimes spotted black and white (The Journals . . .). Clark’s description for February 23, 1806, is roughly similar, noting the presence of *Phosia*, or seals, “from the Great Falls of the Columbia to the mouth.” Clark adds that “the flesh of this animal is highly prized by the natives who Swinge [sic] the hair off and then roast the flesh on Sticks before the fire” (The Journal . . .). Also on February 23, 1806, Lewis noted that harbor seals are “found here in great numbers, and as far up the Columbia river as the great falls [Celilo] above which there are none.” On March 25, 1806, Lewis noted a “party of Cathlahmahs about 10 in number who had established a temporary residence for the purpose of fishing and taking seal. They had taken a fine parcel of sturgeon and some seal. They gave us some of the flesh of the seal which I found a great improvement to the poor Elk. (The Journals 2005:2/23/06)

David Thompson also mentions seals in his journal. For example, on 12 July 1811, he was at the “head of The Dalles” and noted that at a small, sandy bay near “the carrying place” of The Dalles they had “the pleasure of seeing many grey-colored Seals [possibly *Phoca richardi* Gray, or Richard’s Harbor Seal], they were apparently in chase of the Salmon, we fired several shots at them to no purpose” (Tyrell 1916:497). On 14 July at the Cascades of the Columbia, Thompson again writes that they were “amused with the Seals playing in the River” (Tyrell 1916:500). Tyrell notes that Thompson’s “portage was on the north side of the river, and he must have re-embarked in very swift water. His camp for the night was nearly opposite Cape Horn” (Tyrell 1916:500), which is near Phoca Rock.

John Townsend (1839:252–253) also noted the presence of seals on the Columbia:

We see great numbers of seals as we pass along. Immediately below The Dalles<sup>14</sup> they are particularly abundant, being attracted thither by the vast shoals of salmon which seek the turbulent water of the river. We occasionally shoot one of them as he raises his dog-like head above the surface, but we make no use of them; they are only valuable for the large quantity of oil which they yield.

Lyman et al. also note that seals, particularly harbor seals “were observed in the Columbia River from its mouth to Celilo Falls, 324 km upstream [about 200 miles], during the nineteenth and

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<sup>14</sup> “He is describing here the area downstream of Celilo about 10 miles” (McMillan 2008).

early twentieth centuries” (2002:1). George Brown Goode also writes that harbor seals ascended “all the larger rivers, often to a considerable distance above tide-water,” such as the Saint Lawrence (on the east coast of the U.S.), from which they reach the Great Lakes. Harbor seals were also seen in Lake Champlain and in Lake Ontario near Cape Vincent.” They are “also known to ascend the Columbia River as far as The Dalles (above the Cascades<sup>15</sup> and about two hundred miles from the sea), as well as the smaller rivers of the Pacific coast, nearly to their sources.” In fact, the “Dog River,<sup>16</sup> a tributary of the Columbia, takes its name from a dog-like animal, probably a Seal, being seen in the lake whence the stream rises” (Brown, in Goode 1884:57). Ray (1938: 113) also notes that the “hair seal (*Phoca richardii richardii*) was . . . found far up the Columbia.” Nelson Wallulatum of the Wasco tribe noted on a journey up the Columbia that “Just upstream from The Dalles Dam, at river mile 197, was the island where seals had pups”<sup>17</sup> (Ulrich 1999:181).

Moss and Losey (2011:170) note that harbor seals “are the most abundant and geographically widespread pinniped in Oregon today.” Goode (1884:57) describes harbor seals as ranging from “Southern California northward to Bering’s Strait,” where they were abundant. Harbor seals do not migrate and do not have designated rookeries as they “reproduce everywhere they occur” (Brown, in Moss and Losey 2011:170). Even though the animals are skittish of humans, 101 haul-out sites have been identified in Oregon in “pocket beaches and rocks” near the coast but also “on sandspits within bays and river mouths.” Moss and Losey contend that harbor seals may be more optimal to hunt than other sea mammals because they prefer waters in bays and estuaries that are safer for them to travel than the open ocean; because they are smaller, making them easier to transport and butcher; and because they are abundant (Moss and Losey 2011:171).

Other scholars also discuss the presence of other seals in the Columbia and its tributaries. Weed (1936) reported a male Steller sea lion was found on a stem of the Willamette River 150 km upstream of the Columbia River mouth in the 1930s. Scheffer and Sperry (1931) collected a harbor seal 25 km upstream of the mouth in the late 1920s and Bailey (1936:335) reported that harbor seals were observed “by many travelers in the Columbia River up to The Dalles” (308 km from the mouth) after the Corps of Discovery expedition. (Lyman et al. 2002:1)

McMillan (2008) notes that:

At Celilo Falls, The Dalles, at the Cascades of the Columbia (today’s Cascade Locks), and at the entry of the Washougal River [Lewis and Clark] saw particularly large concentrations of these mixed species [seals and sea otters] of seal-like animals that undoubtedly included both California and Stellar’s [sic] sea lions along with harbor seals, and very likely some northern fur seals as well whose historic distribution is now known to be much further south than once considered (to California).

For Lewis and Clark to be impressed by the abundance of an animal, which was remarked numerous times regarding the “seals” they saw (particularly so at Celilo Falls), it would have meant animals in the thousands.

It is important to note that other scholars disagree with McMillan’s estimation of “animals in the thousands.” For example, Lyman (in Wright 2011) points out that the McMillan paper was not peer-reviewed. Further, according to Lyman, McMillan has no empirical basis on which to “estimate that

<sup>15</sup> Today’s Cascade Locks.

<sup>16</sup> Possibly the Hood River.

<sup>17</sup> Rookeries.

these men meant ‘100 [pinnipeds] per mile with concentrations of 1000s’ at places where salmon congregate.” Certainly McMillan provides none in his paper. Lyman also notes that, based on the relative scarcity of “pinniped remains (regardless of species) in Columbia River archaeological sites,” pinnipeds were not abundant, and certainly not as abundant as McMillan suggests, in the Columbia River:

But given that prehistoric people would have been in direct competition with pinnipeds for the salmon at Celilo and other prime fishing spots, I strongly believe we should find lots more pinniped remains than we have to this point in time if pinnipeds were as abundant as McMillan suggests they were. (Lyman in Wright 2011)

However, Lyman (in Wright 2011) also notes that:

to estimate total abundance of pinnipeds for the lower Columbia based on 100 individuals per mile over 200 river miles seems to me to be exceptionally ecologically naïve. No organism, plant or animal, has such a uniform density across such a large area. A couple thousand pinnipeds seems to me a reasonable guess, and I emphasize that it is at best an archaeologically and ecologically informed guess.

That Steller sea lions can ascend fish ladders was recorded in February 1936 during a sighting of a sea lion in the Willamette River, nearly 100 miles from the ocean. For several days the animal stayed in the Oregon City area, catching fish, before ascending the fish ladder:

At Oregon City there is a large falls harnessed to run paper mills. The strange marine visitor was found at the foot of this natural barricade the next morning. Crowds gathered to watch the sea-lion coast on the top of the murky water, gaze curiously at his audience, and then slip noiselessly from sight. Soon he would reappear with a fish in his cavernous mouth.

But, on the twenty-first, “Sergeant Finnegan” discovered the 200-foot fish ladder at the side of the falls. Like the good explorer he was, he started to climb in order to find what the upper river was like. It took him a half hour to surmount the watery cataract. Reaching the upper river, the sea-lion headed upstream toward the state capital. (Weed 1936:343)

Two days later a farmer found the sea lion in his field. The sea lion had swum up the Pudding River and then taken to land. “When found, the sea lion had progressed nearly two miles. In the course of his wanderings he had flattened three hog-tight fences with his 1,200-pound bulk” (Weed 1936:343–344). Eventually, after much sight-seeing by locals, the Fish and Game Commission was called. They hauled the animal in a truck the hundred miles back to the Pacific, where the sea lion was released (Weed 1936:344). Weed’s account included a photograph of the sea lion (Fig. 5).

Another sea lion, a California sea lion pup that was named Hoppie, was found in April 2014 by ranch hands in the San Joaquin Valley: “the sea lion pup had hopped close to a mile from the San Joaquin River before he was discovered at Mape’s Ranch, about eight miles west of Modesto—near the boundary of the San Joaquin River National Wildlife Refuge” (Giwargis 2014). Yancey (2014) notes that “Hoppie likely travelled through a side channel of the San Joaquin River, moved overland through riparian forest on the San Joaquin River [National Wildlife Refuge], along the edge of a refuge crop field, and finally along a dirt road bordering an orchard where he was rescued,”



ending up about 1½ miles from the river and about 100 miles from the Pacific Ocean. “Sea lions are quite mobile on land compared to seals” (Yancey 2014). Hoppie is not the only sea lion to be found that far from the sea: “In February 2004, a 321-pound sea lion named Chippy was found lounging on a police cruiser and rescued by California Highway Patrol officers” in the same area (Giwargis 2014). In 2012 another sea lion was spotted in Old Sacramento after having swum up the Sacramento River in California: “Sea lions are frequent visitors to Old Sacramento, swimming up the Sacramento River from the San Francisco Bay and feasting on fish and other delicacies along the way” (News 10 Staff, KXTV 2012).

Pearson (1969:2) points out that from 1924 to 1933 bounties were paid on both harbor seals and sea lions in Oregon. “The records of these payments . . . indicated that harbor seals were present in every major estuary from Brookings to Astoria. However, the major concentration apparently was in the Columbia River estuary”:

Oregon State Game Commission “Resume of control activities and observations on harbor seals for 1956 through 1965” (unpublished), Alsea, Winchester, and Tillamook Bays were listed as problem areas. At various times the Oregon State Game Commission had received complaints of “excessive numbers of seals and possible predation on fish” in these bays.

The bounty on seals in Oregon was discontinued in 1933 but another bounty system began in 1935. The Oregon Fish Commission used the seal fund to hunt, kill, or catch seals in the Columbia River. Bounties ranged from \$5 in the late 1930s to \$25 in the 1960s. Numbers of seals killed presented for bounty ranged from more than 300 per year for 1941–1942 to 14 in 1967 (Pearson 1969:4, 7). This is not indicative of all seals killed, however. Using Imler and Sarber (1947), who estimate that some 40% of seals shot will sink, Pearson (1969:7) assumes that “the number of seals presented for bounty represents only 60% of the seals actually killed. This would imply that the number of seals killed in the Columbia River ranged from over 500 in 1941–42 to a low of 23 in 1967.” The decrease between the 1940s and 1960s also indicates that lethal methods do, in fact, deter sea lions from utilizing the areas in which they are hunted.



Fig. 5. “Sergeant Finnegan,” a sea lion (Weed 1936:343).

### *Tribal Use of Seals and Sea Lions*

Tribal use of seals and sea lions by Columbia River tribes is long-standing. As discussed, archaeological sites downstream of Celilo Falls have revealed the bones and teeth of harbor seals and other phocids and pinnipeds “procured from the Columbia River rather than ones traded inland from the coast” (Lyman et al. 2002:1).

Haynes and Mishler (1991:11–12) describe historic uses of Steller sea lions in the Aleutian Islands, including how they were butchered. The Columbia River tribes and other Pacific Coast tribes traditionally butchered seals and sea lions in similar ways and put them to similar uses:

1. Kill and bring in the sea lion. Split open the belly and lay back the ribs. The first step is to remove all the intestines. Be careful not to cut useful parts and ruin them.
2. Carefully cut the skin up the length of the bottom of a boot from the head to the shoulder. This will be used for making boots. This thickest part of the skin (about 1 in. thick) will be used and dried for soles.<sup>18</sup>
3. Take off the remaining skin, cutting around the flippers and feet. This will be used for the outside covering of bidarkies [kayaks].
4. Take feet and flippers off. Save all skin on these for using on the soles of boots. The rubbery part of the flipper makes a gripping surface.
5. Remove the arm with the shoulder. Use this for dried meat. This part of the sea lion is the heaviest and contains the most meat of any part.
6. The breast and ribs are salted down for food.
7. The back part of the ribs is cut along the spine. All leg parts are removed with these and used in cooking. If killed in May, the blubber is 4 in. thick.
8. The blubber is salted down for eating with dry fish. It is also melted for oil. Blubber is taken from the meat. Each chunk of meat is given to a family with the blubber attached since the hide is peeled away without the blubber.
9. Save the stomach. Clean and remove any meat. Turn the stomach inside out, wash, and after returning to original shape, dry it. This is used for storage of oil or other liquids.
10. Cut out the throat clear up to the stomach and remove. This is dried and used for the leg part of the boots.
11. Save all the gut. Clean and dry. This is used for the rain coat. One sea lion will make two average-sized coats. The gut opens up to about 1 1/4-in. width and the strips are sewn together with sinew to make the coat.
12. Long ago when sea lions were being butchered, the first thing to be removed was the thin tissue covering of the heart. This was removed very carefully so as not to tear it. It was rinsed in salt water and stretched over the peak of the wooden hat. While the rest of the sea lion was butchered, this tissue dried sufficiently to be lined with cloth. It was used as a carrying traveling. It was used to hold tea because it was waterproof and pliable bag.
13. Eat the heart after soaking it in salt water. It may be baked, boiled, or eaten raw.
14. Eat the liver from a young sea lion. The liver of big sea lions is bitter to the taste.
15. Save the bladder. This is dried and used for a halibut hook buoy as a float.

<sup>18</sup> Sources from Warm Springs and Yakama also note the use of sea lion skins as burial robes, especially for infants. However, we have been unable to document this use in the available literature, even though there are many more traditional uses that may require ethnographic research.

16. Sea lion whiskers were used to decorate wooden hunting hats. They were also used for pipe cleaners by modern tobacco smokers.

Lyman et al. (2002:3–4) are unsure how the tribes in The Dalles area used pinnipeds. It is not clear if they intentionally or opportunistically hunted seals, although they do note that the traps, harpoons, and nets used to catch salmon could have also caught seals. However, Rick, Braje, and DeLong (2011a:1) note that humans have hunted and scavenged seals and sea lions “for much of the Holocene or earlier” due to the “large amounts of meat, oil, ivory, and other important raw material and dietary resources” that seals and sea lions provide. Faunal remains at archaeological sites also suggest that even earlier use was substantial (Rick, Braje, and DeLong 2011:2). Scott (1941:208) notes that seals and sea lions are one of 8 main classes of food and alludes to their being taken at The Dalles and Cascades:

Salmon pemmican, made mostly at The Dalles and Cascades by women, packed in rush baskets lined with salmon skin, and weighing some 90 pounds, was an article of large commerce. Smelt, in a net strainer before a fire, yielded oil. Eels they caught in traps. Sardines they caught with rakes. Flounder they caught with the feet and hands, when wading. Seals they speared by stratagem; also sea lions. The meat, blood and liver they prized. (Scott 1941:217)

Hewes (1973:134) includes sea mammals in his estimation of Pacific Northwest tribal food consumption. He bases his estimations on a figure of 2,000 calories per day per capita, noting that “The satisfaction of this demand must have been largely up to the fisheries (including sea-mammal hunting), since other natural foods available in the area in quantity are notoriously low in fuel value.” This includes “nearly all the vegetable items” available for use in diets. Aside from acorns and pine nuts, which are really only available in the southern and southeastern portions of the Plateau, bulbs and tubers “such as wapato, bitterroot, camas, clover root, etc., are low in calories, while berries and miscellaneous greens, so necessary for vitamins and trace elements, are negligible sources of fuel” (Hewes 1973:151). It must also be noted that many of these vegetable items require a good deal of labor to process, whereas salmon and sea mammals, while requiring effort to acquire, are relatively easy to process for consumption. Hewes also notes that the “caloric value of the flesh and blubber of sea-mammals . . . is at least equivalent to fat beef, and is probably much higher” (Hewes 1973:134), although he does not mention which sea mammals. He does note that, as well as being a good source of protein, the “organs, flesh, and blubber of seals are an excellent source of vitamins A and C” (Hewes 1947:38).

Moss and Losey (2011) also look at the uses of seals and sea lions by American Indians along the Oregon and Washington coasts at the Netarts, Palmrose, Par-Tee, and Minard sites. While these areas are obviously not along the Columbia River, the uses the tribes put seals and sea lions there may be extrapolated for the CRITFC tribes. At the Netarts site, some 2.5% of the vertebrate remains were marine mammals including, in order of representation, sea otters (380), Steller sea lions (166), harbor seals (124), northern fur seals (31), Guadalupe fur seals (3), and California sea lions (2) (Moss and Losey 2011:175–176). Even though the representation is small within the whole vertebrate remains, Moss and Losey (2011:176) state that “pinnipeds and sea otters were clearly part of a meat diet that included a wide array of species” (It is interesting to contrast these numbers with those of Cressman, who found that phocids represented 7% of the assemblage). Tools include three-piece toggle harpoon assemblages dating within the last 1,000 years as well as “contracting-

stem, narrow-necked chipped-stone projectile points” indicating use of the bow and arrow (Moss and Losey 2011:177).

The Palmrose site, some 15 km from the mouth of the Columbia, and also very near the Par-Tee site, was first occupied around 4,000 BP and abandoned around 800 BP possibly because the estuary filled in (Moss and Losey 2011:178). The site was excavated in the mid-1960s and again in 1988. In the mid-1960s, of the total vertebrate remains, some 29% were of marine mammals, including, in order of representation, sea otters (196), Steller sea lions (179), northern fur seals (105), harbor seals (30), and California sea lions (15). From the 1988 excavation, some 3% of the vertebrate remains were from marine mammals: sea otters, Steller sea lions, northern fur seals, harbor seals, and California sea lions. Other bones indicated that the most abundant fish species were salmonids. Tools included both unilaterally and bilaterally barbed harpoons as well as toggling harpoon valves (Moss and Losey 2011:178).

The nearby Par-Tee site is one of the most extensively excavated sites, with 2,344 units being dug over 10 years. Occupation occurred between 2000 and 1000 BP, with some use being as late as 1800 CE. Marine mammals represented about 34% of the total remains, including sea otters (422), harbor seals (85), Steller sea lions (57), and California sea lions (5) (Moss and Losey 2011:178–179). Tools included bilaterally and unilaterally barbed harpoon heads dating from roughly between 3000 and 1000 BP, single-piece harpoon heads, and toggling harpoons “similar to those used historically for taking salmon, seals, sea lions, and sea otters” (Moss and Losey 2011:179).

The Minard site, located about 1 km from the Pacific, revealed some 20,000 remains, of which about 11% were marine mammal bones: mostly sea otters (780), with harbor seals (256), northern fur seals (255) Steller sea lions (234) and California sea lions (7) also being represented (Moss and Losey 2011:180). Of the fish remains, more than 80% were salmon and flatfish (Moss and Losey 2011:181). Toggling harpoon valves were also recovered as well as points that could be from arrows, spears, or harpoon blades (Moss and Losey 2011:182).

TABLE 3. MARINE MAMMAL REMAINS FROM SITES ALONG THE OREGON AND WASHINGTON COASTS (MOSS AND LOSEY 2011:177).

Species	Latin Name	Minard Site	Palmrose Site	Par-Tee site	Netarts Site
Sea otter	<i>Enhydra lutris</i>	780	196	422	380
Guadalupe fur seal	<i>Arctocephalus townsendii</i>				3
Northern fur seal	<i>Callorhinus ursinus</i>	255	105	32	31
Steller sea lion	<i>Eumetopias jubatus</i>	234	179	57	166
Harbor seal	<i>Phoca vitulina</i>	256	30	85	124
California sea lion	<i>Zalophus californianus</i>	7	15	5	2

From these findings, Moss and Losey conclude that northern fur seals were far more abundant off the Oregon coast in the late Holocene than they are presently. California fur seals, however, were not as abundant as they are now; coupled with the presently “increasing numbers of California sea lions in coastal bays and up rivers,” it is possible that “today this species occupies a

niche that belonged to one or more other pinnipeds in the past” (Moss and Losey 2011:184). Perhaps this species is the northern fur seal. Steller sea lions seem as present today as in the past. Ray (1938:113) notes that “The huge Steller’s sea lion (*Eumetopias jubata*) appeared not only on the rocks of the coast but also in the Columbia river for the entire length of Lower Chinook territory,” which he places as far upriver as Oak Point (Ray 1938:38), some 50 miles from the mouth of the river.

### *Hunting Techniques*

Cressman notes that the harpoon was in use at The Dalles possibly as early as 9,000 years ago (1977:109): “Various kinds of weapons, including presumably the harpoon, were in use at The Dalles . . . well before 9,000 years ago and perhaps at the Fraser Canyon site of comparable age . . . Both sites were used for taking salmon, and at The Dalles seals were also killed.” In fact, “The major difference between the harpoons used for sea mammal hunting and fishing largely a matter of size and arming. The principles are the same—detachable head held by a retrieving line” (Cressman 1977:115). It is also possible that leisters were used to hunt seals:

the leister is represented by some of the small pieces of bone and antler from the Early Level at the Five Mile Rapids site at The Dalles. . . . The specimen occurs at about the time the first seal appears in the fill, and fish were also being taken. It obviously could have been either a part of a leister or the point of a harpoon. (Cressman 1977:115)

Cressman notes that the harpoon replaced the fish spear because the retrieval line made the harpoon more efficient in holding fish as well as sea mammals. Further, the harpoon’s detachable head not only keeps the line attached to the prey, it maintains the injury given to the animal (1977:115). “Smaller unilaterally or bilaterally barbed harpoons . . . were used interchangeably for small sea mammals [such as harbor seals] or salmon” (Cressman 1977:116). Hewes (1947:106–107; 1998:625) notes that “the Tenino, and probably other tribes of the Columbia River living below The Dalles” would sometimes harvest a harbor seal (*Phoca vitulina*) during salmon runs and describes how harbor seals were hunted utilizing a detachable-head harpoon:

The seals were taken from shore, and after the detachable harpoon head was embedded in the animal the line was fastened to a nearby post or tree, to be hauled in when the seal was exhausted. According to . . . informants, these seals formerly congregated on an island in the river from which they could prey on the passing salmon. Seals, and possibly sea lions, were probably fairly common visitors in the lower courses of all the larger rivers of the Pacific coast before the era of intensive commercial sealing and the spread of firearms.

Other scholars discuss the use of the spear to hunt sea mammals (although they may be referring to what Cressman would consider to be a harpoon). For example, Alexander Henry (in Henry, Thompson, and Cous 1897:857) described how the tribes used spears or harpoons to hunt sea lions at Oak Point<sup>19</sup>:

<sup>19</sup> Meany (1920:288) notes that Oak Point, also known as Oakpoint, is “a town on the Columbia River in the southwestern part of Cowlitz County” first mentioned by explorers in 1792. It’s about 50 miles from the mouth of the Columbia.

The natives at Oak point, during the time Mr. Keith was there, killed five very large sea lions. Two canoes being lashed together, they approach very softly and throw their spears, which, are fastened by a long, strong cord, with a barb so fixed in a socket that, when it strikes the animal and pierces the flesh, it is detached from the shaft of the spear, but remains fastened to the cord. This is instantly made fast between the canoes; the animal dives and swims down the river, dragging the canoes with such velocity that they may be in danger of filling, and require great skill in steering. In this manner they are carried down some miles before the animal becomes exhausted with loss of blood, makes for the shore, and lies on the beach, where they dispatch and cut it up.

Mr. Keith bought the flesh of one of these animals, and we had some roasted; it resembles bear's meat. The hair is like that of a horse, in summer of a chestnut color.<sup>20</sup>

Spears were also used widely to capture salmon. The slip-point spear in particular could also have been used to harvest seals and sea lions:

As originally constructed by the Indians, [the slip point spear] consisted of a straight piece of elk or deer horn, about 7 inches long, pointed, and mounted on the end of a long willow pole. A small piece of bone was then fashioned into a very sharp point with either one or two barbs. This small point was hollowed and fitted snugly over the long piece of horn fitted to the pole. A cord was then made fast to the small point and secured firmly to the pole about 2 or 3 feet back from the head. Enough slack was left in the cord so that the small point could be removed without difficulty. When ready for use, the small point was mounted on the longer piece of horn. When a salmon was struck the small point was usually forced completely through the fish. The point would then become dislodged from the rest of the spear and turn sideways with the result that it could not be pulled out through the wound. Since the point was attached to the wooden shaft of the spear by a cord, the salmon could then be played and landed with the short line and stiff pole. Such an implement has a considerable advantage over a spear with the head attached immovably to the shaft, since a large fish<sup>21</sup> is apt to either tear away from the spear or break the shaft when one of that type is used. (Craig and Hacker 1940:144)

After contact with Europeans and Euroamericans, iron was substituted for the bone materials used to make the spear's head. While it seems unlikely that a seal or sea lion could be "played and landed with the short line and stiff pole" (Craig and Hacker 1940:144) from a spear, it is likely that the wound caused by the head would eventually kill the animal which could then be pulled out of the river and harvested.

In his work on the Chinook, Ray (1938:113–114) relies on Swan's (1857:83–84) description, during his three years at Shoalwater Bay, in Chinook territory, of hunting hair seals (*Phoca richardii*

<sup>20</sup> Cous, the editor of this work, comments that "This is an exceptionally important passage. I hardly know where else to find positive indication of the former occurrence of Steller's sea lion on the Columbia" (1857:857). The chestnut color identifies the sea lions as Steller sea lions.

<sup>21</sup> McDonald (in Scholz et al. 1985:34) note that "Salmon as heavy as one hundred pounds have been caught in [Kettle Falls]."

*richardii*), which the Chinook also accomplished using spears. The upriver tribes likely observed seal hunting by the Chinook during trade. Not only did “Coastwise travel from both the north and the south” center in Chinook territory, but “traders from the interior” used the Columbia River to reach Chinook territory, “where the riches of the coast might be obtained” (Ray 1938:99). The Chinook eventually focused their culture on trade, and Chinook Jargon became the language of trade in the Northwest.

### *Use of Weirs to Take Salmon and Sea Lions*

Boxberger (2000:13) notes the presence of sea mammals in Lummi subsistence; while salmon “were by far the most important food source to the Lummi people,” sea mammals were also hunted. The Lummi employed both weir fishing and reef netting, and although “weir fishing was secondary to reef netting,” Lummi weirs “were very complex undertakings, stretching across an entire river and including walkways and several traps” (Boxberger 2000:14). As Moss and Losey (2011:186) suggest, sea mammals could easily have been hunted at such weirs.

Campbell and Butler (2010:7) comment that the efficiency of tribal weirs “is reflected by the fact that Euroamericans modeled much of their gear after aboriginal designs; indeed, some of the Euroamerican versions were so effective they were banned.” Craig and Hacker (1940:142) describe weirs as being “a singularly effective method for taking salmon and other fish in small tributary streams.” However, David Lavender notes the use of weirs at the confluence of the Snake and Columbia Rivers: hardly “small tributary streams”:

When the Corps of Discovery reached the confluence [of the Snake and Columbia Rivers], the last of that year's migration was ending. Though myriads of fish still undulated in transparent water fifteen to twenty feet below the boats, an even greater number lay dead in putrefying windrows along the banks or floated on the surface of the streams. The Indians, too, were leaving. Many of their settlements, frequently located where salmon congregated at the bottoms of the rapids, were empty. But, like the living salmon, many still remained, the men busy with spears, nets, and weirs, while the women dexterously slit in half and disemboweled, one by one, the fish brought to them and then laid the pieces on wooden scaffolds to dry. Amazed by the number of the structures, Clark tried to find out how far the people had rafted the timbers used in their building, but his gestured questions, turned into words by Twisted Hair, were not understood. (OpenJurist n.d.)

## Predator Suppression

Scholz et al. (1985:10) note that:

Historical and ethnographic sources indicate that salmon and steelhead were the principal means of subsistence for nearly all of the tribes in the Columbia River drainage, from The Dalles and Celilo Falls to Kettle Falls and even to the source of the Columbia at Columbia and Windermere Lakes in British Columbia.

Such an important resource would not have gone unprotected. Any influx of competing seals and/or sea lions would have been dealt with in order to secure the continuance of fish for the people.

It seems obvious that seals and sea lions enter the Columbia to prey on salmon and other fish. Lyman et al. (2002: 4) draw connections between the presence of seals in the Columbia and the presence of salmon and lamprey. Keefer et al. (2012:1240–1241) also note that sea lion arrival coincides with fish presence:

Seasonal timing differences among sea lion species coincided in part with availability of their primary prey species. . . . Peak pinniped abundance was in April or early May in all years, and typically preceded peak Chinook salmon passage at Bonneville Dam by several days.

Moss and Losey (2011:186) surmise that “Intensive human competition for prey surely affected pinniped behavior” since the animals most likely congregated during runs of chum salmon, other salmon species, herring, and smelt spawning. McMillan estimates “that seals and sea lions in mixed presence [gathered] at those points where salmon and steelhead were particularly concentrated.” that is, “between The Dalles and Celilo Falls, which of course, is where the fish were most concentrated.” While being “described in great numbers in October, November, February, March, April, July and September,” McMillan considers that seals and sea lions “were in the Columbia River virtually year around” and that until commercial fishing began being practiced on the Columbia in the 1860s, “the seals and sea lions were largely eradicated as competitors.”

During April of 2014, “A host of spawning spring Chinook salmon arriving at the lower Columbia River’s Bonneville Dam . . . coincided with a rush of sea lions eager for a feast.” Numbers of Chinook salmon increased to 79,874, while steelhead increased to 3,867, “about average for the past 10 years.” The single-day high was on 30 April when 17,972 salmonids passed through: “the third highest one-day total seen since 2002.” This included 17,409 adult Chinook salmon, 519 chinook jacks, and 43 steelhead. Not surprisingly, seal and sea lion predation “really increased” over those two weeks as well. “Things really picked up the past couple of weeks” as the spring chinook run increased. “About 60 California sea lions (*Zalophus californianus*—CSL) have been seen at Bonneville so far this year, and 24 of those are returning individuals.” Steller sea lion numbers also increased over the two-week period but averaged fewer than in 2010–2013. The maximum number seen in a day was 41, although some 50 different SSLs had been documented visiting the dam to that date. Thirty-three were returning individuals (CBWFWB 2014a).

Such congregations would traditionally have created competition between the tribes and the mammals; hunting the seals and sea lions in the Columbia may have been both a means to gain another subsistence resource and a way to lessen said competition. “Since pinnipeds and sea otters feed on salmon, herring, hake, smelt, and other fish known to have been important to Native Americans, we suggest that they were vulnerable to hunting when these prey taxa aggregate” (Moss and Losey 2011:186). In the 1820s George Simpson noted that “when sea lions entered the Columbia, natives would kill them” (in Ruby and Brown 1976:14).

However, while Campbell and Butler (2010:10) note that “Native peoples in the Northwest preyed on carnivores known to pursue salmon, such as *phocid* and *otariid* seals,” they question that the tribes reduced seal populations to the point of actually improving salmon populations. Campbell and Butler examined the frequency of *Phocidae* and/or *Otariidae* remains in nine sites on the lower (300-km) section of the Columbia River below The Dalles. Only a small amount of seal bones was found; of some 18,000 mammal specimens, only about 100 bones and teeth from harbor seals and other species were present. Campbell and Butler concluded from these findings that seal hunting was more opportunistic than focused and did not affect the resilience of the salmon fisheries (Campbell and Butler 2010:11).



This is not to propose that the tribes hunted seals and/or sea lions solely to suppress their predation on salmon and other fish. As we have shown, the tribes had many uses for seals and sea lions, not the least of which would have been as another subsistence resource. Some scholars suggest that seals and sea lions were hunted opportunistically in concert with other activities. For example, Moss and Losey suggest that hunting of marine mammals was part of common travel through the estuaries “to fish, to gather clams, crabs, and fuel wood, to hunt waterfowl, and to meet and trade with neighboring groups” (Moss and Losey 2011:191); certainly Columbia River tribes would also have hunted sea mammals while fishing, gathering, and performing other labors. Moss and Losey propose that during runs and spawning times, American Indians traditionally pursued not only the fish, but the marine mammals that fed on the fish: “Pinnipeds and sea otters were probably also taken at places where fish were artificially concentrated, such as at the fish weirs and traps;” further, “Native Americans built these weirs not only to attract a variety of fish, but also to attract their mammalian . . . predators” (Moss and Losey 2011:186). While Moss and Losey focus on estuaries of northern Oregon and southern Washington, it is possible that tribal fisherpeople farther up the Columbia River and its tributaries also traditionally utilized weirs and traps not only to gather fish, but to capture and utilize marine mammals as well. For example, and as noted previously, Cressman considers the Fivemile Rapids site to mainly be a hunting site for mammals including seals and sea lions.

Some scholars believe that tribal hunting of sea mammals may have even resulted in the animals’ extirpation from certain areas. Lyman (2011:26–27) suggested that pre-contact hunters may have wiped out species of California sea lions on the coast between 800 and 200 years ago although, importantly, such losses may also be due to shifts in climate. Lyman (2011:26–27) also implied that this decimation of species was due to the tribes’ suppression of seals and sea lions specifically as predators. However, this is a reversal of his 1988 opinion in which he “believed that precontact marine mammal hunting had not adversely affected local pinnipeds” (Lyman 1988; Moss and Losey 2011:168). McMillan, however, disagrees with Lyman’s implication of tribal overhunting in his discussion of historic numbers of seals and sea lions, instead associating seal and sea lion numbers with salmon populations:

We could only wish there were still 20,000 seals and sea lions in the Columbia. It would tell us that we once again had historic run sizes of salmon and steelhead (likely between 35–50 million, not 11–15 million) that human procreation and agricultural/industrial civilization, not animal predation, will never allow us to recover.

Lyman hoped that “identifying a human cause of extinctions will not become evidence used for political purposes as it has for the overkill hypothesis regarding Pleistocene extinctions,” and certainly some archaeologists “argue that prehistoric hunters drove many populations toward extinction,” (Lyman 2011:26, 27), suggesting at least that the tribes traditionally hunted the mammals. “Available data suggest that central and southern California populations of fur seals and sea lions were extirpated 800 or more years ago whereas more northern populations of these taxa were extirpated only in the last 200 or so years” (Lyman 2011:26), although their losses may also be attributed to climate change. Other scholars, such as Whitaker and Hildebrandt (in Braje and Rick 2011:300) note that the tribes maintained a sustainable fur-seal harvesting practice for some 1,500 years before the arrival of Europeans. They argue “for a case of long-term continuity in marine mammal populations, despite human hunting and natural climatic oscillations.” Braje and Rick (2011:301) conclude that “the degree of human forcing on North Pacific marine mammal

populations has ranged from significant to superficial.” Campbell and Butler (2010:1, 2) even suggest that predator suppression was not a major factor in fishery resilience; in other words, the tribes did not kill enough seals and/or sea lions to affect the number of salmon. That number remained consistent more because of social institutions surrounding fishing.

## Conclusions

Pinniped predation on salmonids and other aquatic species on which the tribes depend has prompted this ethnographic research to document tribal hunting of pinnipeds along the Columbia River. Several published sources describe traditional tribal hunting of pinnipeds in the Columbia River, but more extensive ethnographic research with contemporary tribal members has provided a clearer, accurate, factual foundation for federal, state, and tribal management of the pinnipeds in the Columbia River. Our ethnographic and ethnohistoric research expands previous research findings concerning the pinniped predation in the Columbia River by addressing the tribal history of pinniped hunting, traditional uses of pinnipeds, and the contemporary impact they are having on tribal harvests.

Braje and Rick (2011:304–305) argue for establishing a “baseline for effective conservation management” of sea mammals based on traditional practices, although identifying this baseline is not without its difficulties as sea mammals have been influenced by humans since at least the Pleistocene. Certainly, “The most significant human impacts occurred with historic commercial overhunting beginning in the 17th century.” What Braje and Rick fail to mention is that the tribes also suffered significant impacts from these same Euroamericans who overhunted the marine mammals.

Tribal hunting of seals and sea lions also occurred independently of fishing activities, according to some tribal elders. Among the conclusions we have drawn from our research at this time are the following:

1. The four reservation tribal populations each possess words for sea lions and seals. They are recognized as part of their traditional culture.
2. Members of each of the four reservation tribal populations traditionally traveled to customary seal/sea lion locations in the Columbia basin where they took seals/sea lions in association with fishing activities.
3. Tribal harvesting of seals/sea lions coincided with fishing activities during fish runs. Tribal fishermen traveled to locations such as Cascade Locks and Celilo to fish, and seals/sea lions were harvested not only for their meat and hides but likely also because they interfered with tribal fishermen who sometimes disposed of them primarily because of their depredations on the fish runs on which the tribes depended, but also because the seals/sea lions congregate at these locations in order to intercept fish runs.
4. Establishment of reservations and restrictions on tribal off-reservation travel and hunting/fishing began in the mid-nineteenth century, as did heavy non-Indian predation on both fish and seals/sea lions in the Columbia Basin.
5. The impact of new fishing technologies, extensive and largely unregulated non-Indian fishing, and increased settlement of non-Indians in the middle Columbia served to quickly reduce both fish runs and sea mammal population.

6. Construction of dams on the Columbia River and its tributaries limited fish populations.
7. Tribal opportunity to hunt for seals/sea lions had also been reduced by construction of dams and restrictions by State-imposed fish and game laws limiting tribal access to these resources.
8. The possibility that there were permanent populations of seals and sea lions on the Columbia River has not been adequately investigated at this time such that the effect of the elimination of seal/sea lion habitat and rookeries by real estate and related development has not been determined. We are informed that sea lions were hunted on the land and, we presume, largely in rookeries during the nineteenth and early twentieth centuries.

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## ABOUT THE AUTHOR

Deward E. Walker, Jr., has authored more than 200 publications, technical reports, and reviews dealing with anthropology and tribal cultures of western North America. He specializes in various topics of direct interest and relevance to contemporary tribes for whom he frequently serves as an expert witness. As part of a larger commitment to anthropology he has served as editor of the Plateau volume of the *Handbook of North American Indians* and several academic journals. He is also vice-president of Walker Research Group, Ltd. and has held academic professorships at George Washington University, Washington State University, the University of Idaho, and the University of Colorado, Boulder.

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The 67<sup>th</sup> Annual Northwest Anthropological Conference  
**“Anthropologists Connecting”**  
March 26-29<sup>th</sup>, 2014  
Western Washington University  
Bellingham, WA



**Acknowledgements**

**Administration/Finance Assistance:** Viva Barnes

**Webmaster:** Gail Cowan

**A special thanks to volunteers who assisted with conference preparation:**

Chris Barrett, Erin Benson, Will Damitio, Jordan Dustin, Mary Hood, Luke Jones, Duane Kahler,  
Susan Larsen, Whitney Osiensky, Audrey Pefferman, Julia Rowland, Laura Syvertson and Laura Taylor

**A Special Thanks to our Sponsors**

Archaeological Investigations Northwest (AINW)  
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Lower Columbia Research and Archaeology  
SWCA Environmental Consultants  
Versar Inc.  
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Statistical Research, Inc. (SRI)

# THE 67TH ANNUAL NORTHWEST ANTHROPOLOGICAL CONFERENCE

26–29 March 2014

**Hosted by the Anthropology Department, Western Washington University  
Bellingham, Washington**

## *Anthropologists Connecting<sup>1</sup>*

### Organized Sessions/Panels

#### *Emerging Trends in Northwest Coast Wet-Site Archaeology*

Wet sites and waterlogged wood artifacts are showing up at an accelerating rate in the Pacific Northwest and challenging the prevailing assumption that they are rare. Archaeological fieldwork in a region where wet sites abound requires attention to the possibility of water-saturated deposits and readiness to recover, analyze, and curate waterlogged perishable materials. The papers in this symposium address practical aspects of wet-site archaeology and give examples of important research that can be accomplished with modest investigations. Recent everyday finds and small, unpublished or under-reported projects illustrate that wet sites are not only for specialists and not only about spectacular objects. They are what every CRM or Research archaeologist working in the region might encounter on their next field expedition. In addition to their legendary potential, wet sites are an integral component of Northwest Coast archaeology.

Organizer: Kathryn Bernick (Royal British Columbia Museum)

*Introduction: Pacific Northwest Wet-Site Archaeology in Global Perspective*, Kathryn Bernick (Royal British Columbia Museum)

*Perceptions of Wetland Ecology in Cowichan Traditional Territory, Vancouver Island, B.C.*, Genevieve Hill (Madrone Environmental Services Ltd. )

*What Are the Levees Hiding? The Story of the Fisher Slough Basketry, Skagit River Delta, Washington*, Kelly R. Bush (Equinox Research and Consulting International, Inc.)

*Blueberry Fields Forever (Not!) – The Carruthers Site, Lower Fraser Valley, B.C.*, Stan Copp (Langer College), Tanja Hoffmann (Simon Fraser University), Emily Wilkerson (Sunstone Archaeological Consulting)

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<sup>1</sup> Abstracts of individual papers can be found in “Bellingham 67” at <http://northwestanthropology.com/volumes.php>.

*A Late Holocene Cradle Basket from the Stave River Delta, Southwestern British Columbia*, Duncan McLaren (University of Victoria and Hakai Beach Institute), Kathryn Bernick (Royal British Columbia Museum), and Brendan Gray (Cordillera Archaeology)

*The Hopetown Archaeological Project – Wet Site Challenges and Outcomes*, Hartley Odwak (Sources Archaeological & Heritage Research, Inc.)

*Wet-Site Artifacts from Hopetown Village*, Aviva Finkelstein (Sources Archaeological & Heritage Research Inc. and Simon Fraser University), Morgan Bartlett (Sources Archaeological & Heritage Research Inc.), Kathryn Bernick (Royal British Columbia Museum)

*Paleoethnobotanical Investigations of Berry Seed Concentrations and Wooden Artifacts from the Kilgii Gwaay Wet Site*, Jenny Cohen (University of Victoria)

*Early and Mid-Holocene Waterlogged Materials from the Triquet Island Site on the Central Coast of B.C.*, Duncan McLaren (University of Victoria and Hakai Beach Institute) and Kathleen Hawes (Pacific Northwest Archaeological Services)

*Wet Sites: The Dummies Guide to Finding Them*, Morley Eldridge (Millenia Research Ltd.)

*Saratoga Beach Wooden Stake Fishing Structures: A Northwest Coast Example of Longshore Weirs*, Deidre Cullon (University of Victoria, Laich-Kwil-Tach Treaty Society), Heather Pratt (Golder Associates, Ltd.)

*Look Inland, Look Deeper: Insights from an Analysis of the Fish Weirs of Washington*, Tait J. Elder (ICF International), Daniel M Gilmour (Willamette Cultural Resources Associates Ltd.), Virginia L. Butler (Portland State University), Sarah K. Campbell (Western Washington University), Aubrey Steingraber (Western Washington University)

Discussant: Dale Croes (Pacific Northwest Archaeological Services, Washington State University)  
*Wet-Site Archaeology in the Pacific Northwest—40 Years Since We Formally Discussed “Why Dig ‘em?,” at the 28th Annual NWAC, Seattle*

### ***Disturbed is Not Destroyed: The Pit Road Recovery Project Oak Harbor, Washington***

In June of 2011 the City of Oak Harbor inadvertently disturbed an archaeological site during a road and utility upgrade project and the material from that archaeological site was redeposited with over 5000 yards of material from other concurrent road projects at multiple locations. This symposium gives the results of the 14 months of screening the material that may have been associated with the archaeological site 45IS45. Although the historic and pre-contact material from the road project was disturbed numerous times both during this project and in the past, there is still plenty of data to be gleaned from the assemblage and the construction reports. Some spatial relationships were rebuilt during the analysis to confirm that not all disturbance destroys the stories that can be told about past human lifeways here on the shorelines of the Pacific Northwest.

Organizer: Kelly Bush (Equinox Research and Consulting International Inc.)

Introduction and Site Background, Kelly Bush (Equinox Research and Consulting International, Inc)

*Have You Been Dumped? Using Artifact Analysis to Reconstruct Deposition in a Disturbed Context*, Michelle North (ERCI)

*What Information Can Fauna from a Re-deposited Site Tell Us? Analysis of the 45IS45/300 Faunal Assemblage*, Alyson Rollins (ERCI)

*Casings with Context: Bullet Casings, Shotgun Shells, and Military Memorabilia from Site 45IS45/300*, Ian R. Lewis (ERCI)

*What Can Lithic Artifacts from a Re-deposited Site Tell Us? Is a cursory Examination of the Lithic Assemblage from 45IS45/300, Whidbey Island, WA*, Tamela S. Smart (ERCI)

*Does Size Really Matter?*, Sara Johnson Humphries (ERCI)

*Clasped Tight: An Ethnohistoric Examination of Shell Buttons from Site 45IS45/300*, Ian R. Lewis (ERCI)

*No Context, No Problem: Connecting 45IS45/300 with Historic Pioneer Way*, Anna Robison-Mathes (ERCI)

### ***Connecting with the Past: Techniques to Assist in Site Identification and Evaluation***

Work in archaeology today continues to be dominated by CRM activities with a primary emphasis on identifying and evaluating archaeological sites that may be impacted by proposed projects. Such an emphasis highlights the importance of using every technique possible to identify the location of possible sites as well as placing them in a historic context of past land use. This symposium highlights several basic technologies that are gaining acceptance in CRM, useful in locating buried sites without relying solely on the excavation of subsurface probes. In addition, discussions on the importance of basic data collecting techniques are emphasized to assist efforts in site evaluation.

Organizers: Dennis Griffin and Matthew Diederich (Oregon State Historic Preservation Office)

*I'm Not Touching You! A Comparison of Three Remote Sensing Techniques*, Kendall McDonald (Applied Archaeological Research)

*Recording Submerged Sites: Conventional and Unconventional Technologies*, Jacqueline Marcotte (Environmental Science Associates)

*LiDAR Applications in Applied Archaeology*, Rory Becker (Eastern Oregon University)

*Archival Records and Research Design for Cultural Resource Surveys on National Forest System Lands in the Pacific Northwest*, Rick McClure (U.S. Forest Service, Gifford Pinchot National Forest)

*Ask and You Shall Find: The Importance of Incorporating Oral History in Archaeological Site Identification and Evaluation*, Dennis Griffin (Oregon State Historic Preservation Office)

*Bridges of Time: The Use of Photography in Archaeology*, Thomas E. Churchill (Archaeological Frontiers)

*Is the Map Wrong, or Were the Mappers Wrong?*, Ann Bennett Rogers (USDA Natural Resources Conservation Service)

Discussant: Thomas Connolly (University of Oregon Museum of Natural & Cultural History)

***Historic Roads, Waterfronts, and Communities: The Year in Transportation CRM***

As a result of the extensive construction and infrastructure work conducted by both state Departments of Transportation in Oregon and Washington, both agencies maintain large cultural resources programs. ODOT and WSDOT archaeologists and consultants present some of the highlights of the past year's cultural resources management activities undertaken by the two agencies.

Organizers: Carolyn Holthoff (Washington State Department of Transportation) and Scott S. Williams (Oregon State Department of Transportation)

*The Year in Perspective: Highlights of ODOT and WSDOT CRM in 2013*, Carolyn Holthoff (Oregon Department of Transportation) Scott S. Williams (Washington States Department of Transportation)

*Underwater Archaeology, Methods and Use of Contexts*, Mitch Marken (Environmental Science Associates)

*Going Public: Public Archaeology and Heritage Tourism at the Jacksonville Chinese Quarter Site in Southern Oregon*, Chelsea Rose (Southern Oregon University)

*Archaeology and the 2013 Fish Passage Barrier Federal Court Injunction*, Roger Kiers (Washington State Department of Transportation) and Erin Littauer (WSDOT)

*Sites under Roads: Three Examples of Intact Archaeological Deposits, King County WA*, Tom Minichillo (King County Department of Transportation, Road Services Division)

*The Great Wall of Harrison Street: An Unanticipated Discovery at the North Portal Access of the SR99 Bored Tunnel Project*, Patrick Elliott (Environmental Science Associates) and Tyler Graham (Washington State Department of Transportation)

*Overland through the Columbia River Gorge: The Dalles-Sandy River Wagon Road*, Thomas J. Connolly (University of Oregon Museum of Natural & Cultural History), Julia A. Knowles (U of O MNCH), Christopher L. Ruiz (U of O MNCH)

*Identifying the Seattle to Walla Walla Wagon Road*, Fennelle Miller (FDMC) and Jennifer Hackett (Manastash Mapping)

*Washington State Roads: Integrity and Context GIS Analysis*, Michael Sullivan (Artifacts Consulting, Inc.)

*I Fought the Law and the Law Won: Making Road Gravel at Fidalgo Rock Quarry*, Charles T. Luttrell (Washington State Parks and Recreation Commission)

***Reconstructing Monte Cristo: Research in a Historic Mining District in Snohomish County, Washington***

Within the narrow confines of the mountain walls and the slimmest margin of time, Monte Cristo encapsulates our national struggle between the fierce drive toward industrialization and the equally passionate urge to conserve the natural wonders of the American West. Monte Cristo's 30-year lifespan as a boomtown was short lived, truncated by rising production costs, the collapse of the silver market, and an often catastrophic misunderstanding about the natural forces at play in the valley. The story of Monte Cristo is derived from myriad resources, ranging from oral history to formally recorded feature coordinates to surveys by environmental engineers, and represents the wildly disparate activities of people who converged on Monte Cristo from places as far flung as Japan and Cornwall. These diverse approaches to evaluating the landscape have resulted in multilayered histories of the town, often contradictory and endlessly fascinating.

Organizers: Jen Hushour and Katherine M. Kelly (Tierra Right of Way)

*Introduction*, Jen Hushour (Tierra Right of Way), Jan Hollenbeck (USFS, Mount Baker/Snoqualmie National Forest)

*GIS and Mapping Solutions in Rugged Terrain*, Jonathan Haller (Tierra Right of Way)

*The Meta of Mining - The Search for Data and Meaning on a Shifting Landscape*, Katherine M. Kelly (Tierra Right of Way)

*My Friends, Edith and Jean*, Astrida R. Blukis Onat (BOAS, Inc.)

***Take a Tip from Us in Seven Minutes or Less***

Many of us have tricks of the trade, things we have figured out over the years through experience, the quirks of a project, or because we are big nerds. This fast-paced, informal series of presentations will cover our top tips, reminders, and lessons-learned-the-hard-way on a variety of topics. None of these should take more than 7 minutes to present and audience questions are encouraged.

- Tips on taking meaningful monitoring notes (Jenny Dellert, HRA)
- Tips for repurposing typical hardware store purchases into field curation supplies (Paula Johnson, ESA)
- Tips on photographing/capturing video using a micro drone (Jason Cooper, AMEC)
- Tips for developing and implementing an effective monitoring and discovery plan (Mike Shong, SWCA)
- Tips on drawing profiles (Chris Lockwood, ESA and Brandy Rinck, SWCA)
- Tips on identifying freshwater mussel shell (Alex Stevenson, HRA)
- Tips on distinguishing human and non-human bone (Alyson Rollins, ERCI)
- Tips on using illustration vs photography for artifact figures (Melanie Diedrich, AMI)
- Tips on using online mapping resources (Chris Lockwood, ESA)

Organizer: Paula Johnson (Environmental Science Associates)

***Archaeology and Environmental Restoration (wicked problems, unintended consequences, and righteous solutions)***

Wicked problems, such as those commonly encountered by biologists, engineers, agencies, archaeologists, and resource managers working on environmental restoration projects, are rarely “textbook,” instead they are large, messy, complex, and systemic. Wicked problems, even the small ones, seem overwhelming; each part of the problem seems to require an uneven mix of contradictory solutions and untenable choices. The most successful strategies developed to untangle wicked problems tend to rely on inclusive, collaborative, and innovative strategic approaches. As practiced as archaeologists are at crossing interwoven social, ecological, and economic systems, we occupy unique positions on restoration management teams, and are often presented with opportunities to step out of our traditional roles.

Organizer: Kelly, Katherine M. (Tierra Right of Way)

*Wicked Problems –Framing the Discussion*, Katherine M. Kelly (Tierra Right of Way)

*Saving Fish, Losing History (or, Not Just another Ratty Ass Barn)*, Lauren McCroskey (USACE Technical Center of Expertise for the Preservation of Historic Structures and Buildings)

*Finding Balance between Environmental Restoration and Protecting Historic Properties*, Michael Shong (SWCA Environmental Consultants, Inc.)

*The Unrealized Potential for Archaeology and Anthropology in Environmental Restoration*, Maurice L. Major (Washington State Department of Natural Resources)

*The Interplay of Biology and Archeology in Environmental Restoration*, Andrea K. Cummins (Cummins Botanical Consultants)

*Preserving Mining Landscapes: What to Do When Your Archaeological Site is a Big Hole in the Ground?*, Danielle Storey (U.S. Army Corps of Engineers)

*Relationship Between Culture, Geology and Transportation Viewed Through Roadcut Hazards*, Shari Maria Silverman (Apres Rain Arroyo)

***Exploring Collective Approaches: Co-constructing and Applying Anthropological Research in Migrant Communities***

This symposium explores the process, experience, and applied dimensions of research involving migrant communities, with particular emphasis on practical steps for design and initiation of research, building partnerships, and fostering dissemination and positive impact beyond the research endeavor itself. The value of the anthropological perspective is evident in the way it inhabits and promotes the intersection of local, global and academic interests. How research can speak to the perceived needs of communities with whom we are co-constructing knowledge is essential for an ethical and applied anthropological endeavor. Participants span various stages of the graduate research process from preliminary framing to establishing relationships and methodology, synthesis and writing, and finally, to post-degree applications. Contributors will address commonalities across their particular research directions, as these relate to issues of resiliency, inclusion and long-term prospects for members of groups who are frequently marginalized by legal, cultural, and economic borders.



Organizers: Mariel Kniseley and Duane Kahler (Western Washington University)

*Nurturing Children Left-Behind: Technology-Mediated Parenting in Migrant Communities*, Katie Goger (Brigid Collins Family Support Center)

*A Nation Away: Coping with Parental Migration in Mexican Public Schools*, Tiffini Ayala (Western Washington University)

*Connecting Communities of Care*, Marinel Kniseley (Western Washington University)

*Scene Divided or Scene United: Inter/Intra/Cross-cultural Connections through Punk in Los Angeles*, Duane Kahler (Western Washington University)

***Perspectives on Federal and State Laws and Regulations: A Panel Discussion Hosted by the Association for Washington Archaeology***

Cultural resource management professionals in the private sector work with an array of federal, state, county, and local agencies as well as Indian Tribes. This panel discussion hosted by the Association for Washington Archaeology will include agency and Tribal representatives who will summarize their perspectives on federal and state laws and regulations, explain how they interpret and apply the regulations, and outline their expectations when dealing with private contractors. The session will provide an opportunity for a dialog among agency, Tribal, and consulting archaeologists.

Organizer: Dennis E. Lewarch (Suquamish Tribe, Association for Washington Archaeology)

**Mission Possible: Salvage at the Mission Spit Site, Olympia, Washington**

What happens when an archaeologist feels like a site is significant, but the proponent and the regulatory agencies decide it is not, and damage to that site benefits natural resources including salmon? This session explores what happened when the Mission Spit site (45-TN-450), bisected by channel excavation done to restore an estuary in Olympia, Washington, became the focus of a salvage project run by volunteers from universities, contract archaeology firms, agencies, and the local community. We will report on the process of obtaining and screening a large sample of the site, as well as the results. Ongoing analysis shows that while the site may not be the best we could hope for, it does reflect a Contact era site associated with the first Catholic Mission on Puget Sound, with ample evidence of Native American occupation and a few surprises.

Organizer: Maurice L. Major (Washington State Department of Natural Resources)

*Within Spitting Distance: An Introduction to the Mission Spit Salvage Project*, Maurice Major (Cultural Landscapes)

*Extending our (Out)reach--Promoting Stewardship, Public Awareness, and Education*, Katherine M. Kelly (Tierra Right of Way) and Melanie Diedrich (Archaeological Macroflora Identification)

*The Lithic Technology of the Mission Creek Site*, Scott S. Williams (Washington State Department of Transportation)

*Historic Hot Rocks? Fire Modified Rock Characteristics at Mission Spit*, Kate Shantry (SWCA Environmental Consultants)

*Seven Saturdays, Were They Worth It?*, Maurice Major (Cultural Landscapes)

### ***Maritime Heritage – Preserving, Conserving, and Sharing***

In keeping with year's conference theme, the maritime symposium focuses on connecting with the public and sharing our research with the community, and with each other. Presentations highlight volunteer maritime heritage oriented projects in the Pacific Northwest, their methods, and the strides these organizations are currently making towards documenting and preserving the coastal, submerged, and extant maritime history of the region. This symposium also shares a range of current research regarding pre-contact and historic cultural resources found in coastal and submerged settings throughout the Pacific Northwest. In the course of the presentations we will explore: conservation of previously submerged carronades (wood and metal), shoreline geomorphology; the archaeology of submerged cultural resources, new methods for recording historic vessels, as well as nautical archaeology and the restoration of historic vessels.

Organizer: Jacqueline Marcotte (Environmental Science Associates)

*Exploring the Beeswax Wreck*, Alison Neterer (Beeswax Wreck Crew)

*Cooperative Connections: Professional Archaeologists Team-Up with Volunteer Divers*, Chris Dewey (Beeswax Wreck Maritime Archaeologist)

*Lake Union: the Inside Story, the Lake Union Underwater Archaeology Project*, Dick Wagner (The Center for Wooden Boats)

*Piotr Bojakowski (Ashford U; A WMARI) The Many Lives of the Equator*, Katie Bojakowski (Ashford University, Atlantic World Marine Archaeology),

*Underwater Archaeology in Idaho: The Lake Pend 'Oreille Dugout Canoe*, Mary Anne Davis (Idaho State Historical Society), Ann Ferguson (ISHS), Matthew Russell (Environmental Science Associates)

*Archaeology and History beneath the Lake: Lake Coeur d'Alene Maritime Heritage*, Michelle M. Hannum (Plateau Archaeological Investigations)

*Gunning for the Shark: The Conservation of the Arch Cape Carronades*, Brennan Bajdek (Archaeological Investigations Northwest, Inc., Texas A&M University)

*Digital Photogrammetry and Nautical Archaeology – Measuring and Monitoring Change Over Time*, Kyle Hunter (The Center for Wooden Boats), Nathaniel Howe (Northwest Seaport)

*Heritage at Risk: An Assessment of Environmental Factors and Archaeological Site Damage in the Pacific Northwest*, Jeanette Hayman (Maritime Archaeology Contractor)

*Navigating the Temple of Doom: Shipboard Hazards for Archaeologists*, Nathaniel Howe (Nautical Archaeologist and Vessel Manager, Northwest Seaport)

### ***Anthropology of the Skagit Valley***

Recent research in the Skagit Valley combines methods archaeological, ethnographic, ethnohistorical, and oral historical, to create new interpretations of the Indigenous peoples and a move away from ahistorical representations. In this session, papers are concerned with the issues of community cohesion in light of historical forces of colonialism, at different time scales and with varying theoretical orientations. A community leader/intellectual (Schuyler) focuses on the critical role of anthropology in preserving tribal culture today, an ethnohistorical paper (Miller) concerns legal and political issues, an archaeological paper (Angelbeck) addresses settlement patterns, another (Mierendorf) uses distinctive toolstones to define geographic patterns in its circulation across watersheds and an ethnographic paper (Malone) advances a waterscape notion of orientation.

Organizer: Bruce G. Miller (University of British Columbia)

*Toolstone Geography in the Upper Skagit River Valley and Adjacent Areas*, Robert R. Mierendorf (TA. QT Studies) and Kevin E. Baldwin (TA. QT Studies)

*Ethnohistory of the Upper Skagiti*, Bruce G. Miller (University of British Columbia)

*Oral History and the Skagit Waterscape*, Molly Sue Malone (University of British Columbia)

*Expressions of Power on the Landscape: Examining the Dispersed Settlements of Upper Skagit Peoples*, Bill Angelbeck (Douglas College)

### ***Connections in Context: A Panel in Honor of the Work of Daniel Boxberger***

This year, as Dr. Daniel Boxberger steps down as chair of the Department of Anthropology at Western Washington University, we hold this symposium in honor of an important elder. In his three decades of service, Dr. Boxberger has contributed immensely to the field of anthropology in the Northwest, both as a professor and applied anthropologist, and as an advocate for indigenous rights. Dan's emphasis on the importance of understanding the contexts of data for analysis, and connections between the past and the present continues to influence many students and colleagues. This symposium's topic reflects his attention to "connections in context". Paper presentations will be followed by some time to speak directly about Dan and his work. If you, or your practice, have been influenced by the work of Dr. Boxberger, please consider joining us for this symposium.

Organizer: Nora K. Pederson (University of Alberta)

*Wapato Harvests on the Lower Columbia: Incipient Agriculture? Industrial Agriculture?*, Nora Pederson (University of Alberta)

*Locating Blended Communities in Early 19th Century Hawaii*, Lisa Philips (University of Alberta)

*Connections in Context: Property in Early Oregon*, Allan K. McDougall (University of Western Ontario)

*Fish Wars in Whatcom County 1912 and 1916*, Kathleen Žuanić Young (Western Washington University)

***Applying the National Register Criteria: Assessing Eligibility of Pre-contact Archaeological Sites under Criteria A, B and C***

As a holistic discipline, archaeology has the ability to serve both the academic community and the living communities that have ancestral connections to the places archaeologists explore. In fact, under the National Register of Historic Places (NRHP), pre-contact archaeological sites can be viewed as significant for more than or aside from the ability to answer academic research questions. While pre-contact archaeological sites are less often determined or recommended eligible under Criteria A, B or C than under Criterion D, evaluations should still assess eligibility under all four. Understanding all characteristics of a historic property that qualify it for the NRHP assist with assessing adverse effects and how they may be mitigated. It is therefore additionally important for the archaeologist to incorporate different cultural views relating to the importance of a place when assessing eligibility. This forum will discuss applying Criteria A, B, and C to pre-contact archaeological sites with examples.

Organizer: John Pouley (Oregon State Historic Preservation Office)

Participants: Catherine Dickson (Confederated Tribes of the Umatilla Indian Reservation), Dave Ellis (Willamette Cultural Resources Associates, Ltd.) and Rick McClure (U.S. Forest Service, Gifford Pinchot National Forest)

***CRM and the State Environmental Policy Act (SEPA): What's the Connection, What's New in 2014, and Why It Matters***

In 2012, the State Legislature passed Senate Bill 6406 directing the Department of Ecology to modernize the rules guiding state/local agency SEPA reviews; the purpose of the modernization is to bring SEPA in line with current land-use planning and development regulations, including the Growth Management Act and the Shoreline Management Act. As required by the bill, Ecology convened an Advisory Committee of various interest groups to provide input on two rounds of rule updates and to serve as informal liaisons to others with an interest in SEPA. The first round of updates became effective January 28, 2013. A second and more comprehensive update will be adopted in early March 2014. Join panelists from Ecology's Advisory Committee, DAHP, and the Yakama Nation for a discussion about the SEPA rule updates and how they will affect CRM in Washington State. Learn how to use SEPA policies to enhance your CRM work.

Organizer: Mary Rossi (Eppard Vision-APT Program)

Participants: Gretchen Kaehler (Department of Archaeology and Historic Preservation), and David Powell (Yakama Nation)

***The Future of Ethnographic Research in the Pacific Northwest; Compliance and Academic Models***

This session will highlight the importance of ethnographic research with Tribes in the Pacific Northwest, and to show how the Federal compliance process can generate ethnographic work. Panelists will represent Federal Agencies who fund ethnographic research, academicians who work with regional Tribes, staff from Tribal cultural resource programs, and private sector cultural resource consultants. We will discuss some of the differences between academically driven ethnography and compliance ethnography, both through consultants and research done by

Tribes. Compliance ethnographic work highlights the living culture of Tribes in the Pacific Northwest, exemplified by issues such as: cultural adaptation to a new riverine ecology; restricted use of traditional homelands to hunt and gather culturally significant plants; the complex dynamics of access to salmon and salmon fishing; and many more. The importance of ethnographic research, specifically related to Traditional Cultural Properties, is increasingly acknowledged in management documents generated by land-managing agencies.

Organizer: Shannon, Donald (Willamette Cultural Resources Associates)

Participants: Daniel Boxberger (Western Washington University), Ted Fortier (Seattle University), Rodney Frey (University of Idaho), Dennis Griffin (Oregon State Historic Preservation Office), David Harrelson (Confederated Tribes of the Grand Ronde Community of Oregon), Warren Hurley (Bureau of Reclamation), Kristen Martine (Bonneville Power Administration), Jon Meyer (Colville Confederated Tribes), Lawr Salo (Army Corps of Engineers, Seattle), Donald Shannon (Willamette Cultural Resources Associates), and Shawn Steinmetz (Confederated Tribes of the Umatilla Indian Reservation)

### ***Columbia Plateau Homelands, Households and Habitats***

Archaeological investigations of households continue to develop at several levels: regional synthesis; feature analysis and activity patterns; collections inventory and analysis; site mapping, scanning, and sensing; and analyses of soils, residues and microstratigraphy. Demographic models are undergoing refinement, and greater variation in settlement patterns is now recognized within and between regions. Fuller inventory, mapping, and protection of house features and sites are in progress. Minimally destructive approaches for studying sites and house features are becoming practical and affordable. (Poster Symposium)

Organizers: Sarah Steinkraus (Central Washington University), Steven Hackenberger (Central Washington University), and Robert Sappington (University of Idaho)

Baumgart, Erin (Central Washington University), Tiffany Cummings (CWU) *Geoarchaeology of House Features, Redbird Beach, Hells Canyon, Idaho*

Brown, James (Central Washington University), Steven Hackenberger (CWU) and Patrick McCutcheon (CWU) *Resources Intensification, Sedentism, Storage, and Ranking: A Visual Synopsis of Pacific Northwest History and Theory*

Fulkerson, Tiffany J. (Washington State University), Elizabeth Truman (WSU), John Dorwin (Eastern Washington University), Kevin Lyons (Kalispel Tribe of Indians), Richard Conrey (Hooper Geoanalytical Laboratory, School of the Environment), and Melissa Goodman (WSU) *Geoarchaeological Investigations of a Late Holocene Site (45PO426) on the Kalispel Reservation, Pend Oreille County, WA*

Hendrix, Jillian (Central Washington University), Sarah Steinkraus (CWU), and Steven Hackenberger (CWU) *Revitalizing Collections for Environmental Archaeology: The 1962/63 House Features (45KT12 and 45KT13) Excavated by Robert Kidd*

Ramey, James (Willamette Cultural Resources Associates, Ltd.) *Mammalian Butchery at the Briar Site (35CO35)*

Reid, Kenneth C. (Idaho State Historical Society) *Thermal Aquifers and Winter Villages in Idaho*

Risdon, Edrie (Grant County Public Utility District), Sarah Steinkraus (GC PUD) and Steven Hackenberger (Central Washington University) *Middle and Upper Columbia House Settlements: Population Dynamics, Collector Strategies, and Sampling Bias*

Sappington, Robert Lee (University of Idaho) *An Overview of Prehistoric House Structures in the Clearwater River Region, North Central Idaho*

Shellenberger, Jon (Yakama Nation), Shane Scott (Yakama Nation), and Steven Hackenberger (Central Washington University) *Documenting and Protecting House Settlement within the Yakama Nation Lands*

Truman, Elizabeth (Washington State University), Dr. John Dorwin (Kalispel Tribe of Indians) Stan Gough (Eastern Washington University Archaeological and Historical Service) and Dr. Melissa Goodman-Elgar (WSU) *Delineating Space Using Geoarchaeological Methods for Occupation Sites in the Pacific Northwest*

Williams, Alexandra (Archaeological Investigations Northwest, Inc.) and Molly Eimers (University of Montana) *Trade and Traditional Prey Use: Examining Housepit 54's Faunal Strategies during the Fur Trade Era*

### ***Collaboration and Competition: Working Together to Address Challenges and Further our Shared Goals***

As archaeologists, historians, and ethnographers, we strive to make meaningful contributions to our chosen fields of study. Regional meetings and professional associations provide opportunities for us to share ideas, discuss challenges, and explore topics that interest us in business and in our technical fields. When the conferences and meetings are over, it is rare that this collaboration carries over into our technical work, especially in a competitive marketplace. However we believe that this insular orientation is detrimental to the field and to our clients' interests. It is our goal in this session to identify and discuss real world factors that drive our collaboration, or lack of it, and discuss approaches that will aid us all in realizing our professional and personal goals without undermining the financial success of our companies. It is our intent to create discussion not only among our panel members but ideally among session attendees.

Organizers: Alexander Stevenson (Historical Research Associates, Inc.) and J. Tait Elder (ICF International)

Participants: Kelly Bush (Equinox Research and Consulting International Inc.), Brent Hicks (Historical Research Associates, Inc.), Paula Johnson (Environmental Science Associates), Robert Kopperl (SWCA Environmental Consultants), Paul Solimano (Willamette Cultural Resources Associates, Ltd.)

### ***Making Public Connections: Public Archaeology in Practice***

Over the last several decades, the meaning of "public archaeology" has evolved. Ethics of stewardship and public interest demand archaeologists continue to approach archaeology and cultural resource management with communities in mind. Now also referred to as "community

archaeology,” this domain is approached through a variety of contexts, including mitigation, community empowerment, museums, research, digital media, and collaboration between educators and archaeologists. Archaeologists must also take into consideration such issues as protecting site locations and data. In this symposium, we will examine some recent archaeology projects practicing community-based engagement and education throughout the Pacific Northwest.

Organizers: Molly E. Swords (SWCA Environmental Consultants) and Mary Petrich-Guy (University of Idaho)

*Documenting Chinese Railroad Laborer Camps in Northern Idaho: A Professional/Amateur Collaboration*, Rachel Stokeld (University of Idaho) and Mary Petrich-Guy (University of Idaho)

*Defining a Unique Model of Public Engagement at the Fort Vancouver Public Archaeology Field School*, Jeffrey Marks (University College of London)

*Creating a Comprehensive Research Tool: The Wah Lee Letters*, Bailey Cavender (University of Idaho), Oliver, Kali D. V. (University of Idaho)

*Connecting with Communities: Putting Community Archaeology into Practice in Skagit County, Washington*, Julia Rowland (Western Washington University)

*Applied Archaeology in the Silver Valley of North Idaho*, Theodore Charles (University of Idaho)

*Digital Museums Used to Create Accessibility and Educational Outreach*, Kyle Parker-McGlynn (University of Idaho)

*Bringing it Home: Archaeology, History and Mitigation Alternatives in North Idaho*, Sherry Boswell (SWCA Environmental Consultants)

### ***Applying Anthropology to Teaching Anthropology***

How are we currently applying the methods of anthropology to improve our classroom outcomes? How are we using participant-observation, excavation methodologies, or biological studies to improve our classroom environments and measuring the outcomes? This symposium will present a few methods used by instructors and students in their own programs. It will end with an open discussion and sharing of ideas and approaches between panel members and audience.

Organizers: Alex A. G. Taub (Wenatchee Valley College) and Julia Smith (Eastern Washington University)

*Undergraduate Research in Anthropology: A Recipe for Student Success*, Julia Smith (Eastern Washington University)

*I Can Dig This: Applying Archaeology Field Research Methods to Teaching Introductory Classes*, Alex A. G. Taub (Wenatchee Valley College)

*From Bartender to Research Afficionado*, Amara Fiegel (Eastern Washington University)

*Anthropological Inspiration: Applying Anthropological Foundations Across the Curriculum*, Brandy Bippes (Eastern Washington University)

*A Time for Sharing Classroom Techniques and Methods*, Alex A.G. Taub (Wenatchee Valley College)

### ***Why Heritage Matters***

As defined by Gregory Ashworth, heritage can be viewed as a process, whereby objects, events, sites, performances, and personalities derived from the past are transformed into experiences in and for the present. The way heritage is manifested is telling of the culture it represents. These papers explore heritage and tourism: what it is, whom it is for, and who benefits (or who is hindered) by its presence. Highlighted in this discussion are issues of authenticity, place identity, and multi-vocality in walking tours of Whatcom County, Washington, tourism and activism in the Occupy Movement, and speculation, promotion, displacement, and documentation of petroglyphs in Roosevelt, Washington.

Organizer: Laura Taylor (Western Washington University)

*The Sound, Ships, and Salmon: An Investigation of Walking Tours in Whatcom County, Washington*, Laura Taylor (Western Washington University)

*Glyphland: The Story of the Century-Long Speculation, Promotion, and Unlikely Journey of the Roosevelt, Washington, Petroglyphs*, Douglas Beauchamp (Independent Arts Consultant)

*The Occupy Movement, Materialism, and Tourism*, Jodie Ficca (University of Idaho)

### **Contributed Papers**

#### **New Work, New Analysis, and New Directions in Plateau Archaeology**

*Lithic Reduction at Bernard Creek Rockshelter, Idaho*, Shaun Dinubilo (University of Idaho)

*Medium and Small-Sized Mammals from the Sanders Site, Yakima County, WA as Paleoenvironmental Indicators*, Neal Endacott (Central Washington University)

*Species Identification through aDNA Barcode Analysis of Salmon Bones of Central Washington Archaeological Sites*, Victoria Frederickson (Central Washington University), Joseph G. Lorenz (CWU)

*The Kelly Forks Work Center Site: A 12,000-Year Record of Human Occupation at the Interface Between the Columbia Plateau and the Northwestern Plains*, Robert Lee Sappington (University of Idaho) and Laura Longstaff (Uof I)

*Excavation at 45-KT-248, The McDonald Springs Site*, Sarah M. H. Steinkraus (Central Washington University)

*Exploring the Future of Archaeology on the Plateau: The 2014 Washington State University Museum of Anthropology Plateau Conference*, Shannon Tushingham (Washington State University) and Mary Collins (WSU)



## **Connecting with Words: Anthropologists Look at Communication**

*How to Communicate Your Research in 2014: Adapting Advertising and Marketing Techniques for Anthropological Communication*, Lawrence M. Shaw (University of Idaho)

*Stories Affecting Stories: The Convergence of Native American Folklore and Nonfiction Literature*, Megan Epperson (Central Washington University)

*The Chicana/o Struggle*, Taylor Phillips (Eastern Washington University)

*Those Who Speak Tl'ingán Hol (Klingon)*, Adam Kessler (University of Idaho)

*Perceptions of Stuttering*, Tiffani Kittilstved (Eastern Washington University)

*"tlhIngá maH!": Fan Adaption of Invented Languages*, Janie Knutson (Eastern Washington University)

## **Upping Our Game: Reflecting on Practices in CRM**

*Columbia Plateau Cultural Affiliation: Connecting the Data*, Lourdes Henebry-DeLeon (Central Washington University)

*Behind the Bulkhead: Lessons Learned*, Gretchen Kaehler (Department of Archaeology and Historic Preservation)

*More Than Just-'It's the Law'*, Kelly R. Bush (Equinox Research and Consulting International, Inc.)

*Archaeological Sensitivity Model for Filucy Bay, Key Peninsula, Washington*, Sarah Van Galder (Statistical Research, Inc.) and Edgar K. Huber (Statistical Research, Inc.)

*Cultural Resource Management in Hong Kong*, Yu Ling Cheung (Hong Kong Archaeology Consultants)

## **Survival, Identity, and Subcultures**

*Risky Business: The Anthropology of Sex as Work*, Emily Williams (Western Michigan University)

*Kalotaszentkirály Revisited*, Wayne B. Kraft (Eastern Washington University)

*Conflict Versus Drama: The Role of 'Misplaced Fierceness' in the Struggle for the Future of Women's Flat Track Roller Derby*, Matt Newsom (Washington State University)

*The Nuclear-Shaped Family: New Trends in American Kinship Ideologies*, Judith R. Card (Washington State University)

*Shared Territory: Coast Salish Understandings of the Land Surrender and Land Use Provisions in the Douglas Treaties (1850-54) and the Stevens Treaties (1854-55).*, Neil Vallance (University of Victoria)

*Looking from the Inside Out: Connecting Prisoner Treatment to Rates of Violence in the Community at Large*, Natasha Utter (Western Washington University)

*Where Should Baby Sleep? An Examination of Discourse Regarding Bedsharing in the United States*, Kari M. Mentzer (Eastern Washington University)

*Enchantment and Seduction: Outrigger Canoe Voyaging and Gender Ideology on the North Coast of Papua New Guinea*, Kathleen Barlow (Central Washington University)

### **Innovative Archaeological Methods**

*A Debitage Analysis Sampling Protocol*, Bradley S. Bowden (Historical Research Associates, Inc.) Thomas E. Becker (Applied Archaeological Research, Inc.) Lindsay Ponte (HRA), Michael D. Falkner (HRA)

*Form vs Function: A Classification System for Rock Features*, Stephen Todd Jankowski (USDA Forest Service, Malheur National Forest)

*Use of Tablet Computers in Excavation of the Fort Vancouver Village*, Doug Wilson (Portland State University, National Park Service)

*Electrical Resistance Tomography as a Way to Map Sediment Depth in Limestone Caves in Croatia*, William J. Riley (Eastern Oregon University)

*Soil-fused Stones, Wood-ash Stones, and Clinkers: Pyrometamorphosed Rocks Found at Archaeological Sites*, Karla L. Hambelton (Archaeological Investigations Northwest, Inc.), Jo Reese (AINW.)

*Photogrammetric Recordation of a Stacked Rock Feature: A Test Case from Southern Oregon*, Bradley S. Bowden (Historical Research Associates, Inc.), Natalie K. Perrin (HRA), Nicole L. Vernon (Pacific Consulting Services, Inc.)

*The Old Shell Game: Late Holocene Variations in the Marine Reservoir Effect in the Northeast Pacific*, Ian Hutchinson (Simon Fraser University)

*Rethinking Archaeological Survey and Testing Designs, VSP and the Archaeologist*, James Knobbs (Northwest Anthropology, LLC), Ashley Morton (Fort Walla Walla Museum), and Darby C. Stapp (Northwest Anthropology)

### **The Multiple Faces of Medical Anthropology**

*Outsourcing America's Pregnancy: An Epigenetic and Sociocultural Evaluation of Commercial Surrogacy in India*, Sarah E. Mann (Western Washington University)

*Diagnostic Trajectories to Celiac Disease and Gluten Sensitivity, Symptom Levels and the Gluten Free Diet: Persisting Challenges*, Christopher Barrett (Western Washington University), Joan Stevenson (WWU)

*Cilantro, Anise, Cumin: Yum or Yuk?*, Sarah Keller (Eastern Washington University)

*The Effects of Intentional Cranial Deformation on Fontanelles*, Nambi Gamet (Eastern Washington University)

*Infant Microbial Diversity and Immune System Development*, Kyle Hall (Western Washington University)

*Efficacy of Marine Protein in the Self Management of Joint Disorders*, Casey Polmueller (Eastern Washington University)

*Social Control in US Biomedicine: Theory and Examples from Primary and Urgent Care*, Robert K. Packwood (University of Montana)

*National Narratives and Cultural Identity: 'Trianon Trauma' and Hungarian Depression*, Katarina Gombocz (Western Washington University)

*The Skeleton in the Closet: An Historic Forensic Case from Scio, Oregon*, Dawn Marie Alapisco (Oregon State University)

### **From Lithics to Landuse**

*Using Ethnographic Context and Spatial Distribution Analysis to Understand the Significance of Ambiguous Stacked-Rock Features: A Case Study from Northeast California*, Celia Moret-Ferguson (Cardno Entrix)

*Late Prehistoric Bison Hunters in Southeastern, Oregon*, Scott Thomas (Bureau of Land Management, Burns, Oregon)

*Results From the Continued Lithic Analysis of the Sunrise Ridge Borrow Pit Site (45PI408)*, Patrick C. Lewis (Central Washington University), David R. Davis (CWU), Patrick T. McCutcheon (CWU)

*Using XRF to Assess Variance in Obsidian Source Distribution in Southern Idaho*, Marielle Black (Boise State University)

*A Diachronic and Synchronic Comparison of Sites 45PI429, 45PI438, 45PI406, and 45PI408, at Mount Rainier, WA*, Joy D. Ferry (Central Washington University) and Dr. Patrick McCutcheon (CWU)

*Precontact Land-use in the John Day Reservoir*, Paul S. Solimano (Willamette Cultural Resources Associates, Ltd.) and Daniel M. Gilmour (WCRA)

*Critically Evaluating the Applicability of Dart-Arrow Indices in the Salish Sea*, Adam N. Rorabaugh (Washington State University)

*Medicine Wheels in Oregon? Archaeological Evaluation and Inquiry Into Two Large Stone Circles and Related Features in the Northern Great Basin of Southeastern Oregon.*, Patrick O'Grady (University of Oregon Museum of Natural and Cultural History) and Scott P. Thomas (Bureau of Land Management, Burns District, Oregon)

*The Exception Proves the Rule: A Case Study of Collapse and Resilience from Champotón, Campeche, Mexico*, Jerald Ek (State University of New York at Albany)

### **Material Perspectives on Past 'Realities'**

*Where the Railways Ran: Transportation, Commerce and Sandpoint, Idaho, 1880-1935*, Bailey Cavender (University of Idaho)

*'Studying Up' at Fort Yamhill: The Historical Archaeology of Officer's Row*, Justin E. Eichelberger (Oregon State University)

*The Impact of Catholicism: Exploring St. Joseph's College, the First Catholic Boarding School for Boys within the Oregon Territory*, Cayla L. Hill (Oregon State University)

*The Cyrus Jacobs-Uberuaga House: Reflections of Gender and Class in Early Boise*, Jessica Goodwin (University of Idaho)

*From Wide-Open Town to Chinatown: Investigations at Site 35WS453 in The Dalles, Oregon (Part I)*, Ron Adams (Archaeological Investigations Northwest, Inc.) and Nicholas Smits (AINW)

*From Wide-Open Town to Chinatown: Investigations at Site 35WS453 in The Dalles, Oregon (Part II)*, Nicholas Smits (Archaeological Investigations Northwest, Inc.) and Ron Adams (AINW)

*On the Home Front: Exploring the Domestic Life of Women and Children in Early Oregon*, Mollie Manion (Oregon State University)

*Florence, Idaho: Fabulous but Soon Forgotten*, Leah Evans-Janke (U of I), Ariana Burns (U of I), Dakota Wallen (U of I)

*A Brief History of Hillside Farm: Multnomah County's First Poor Farm*, Cam Walker (Archaeological Investigations Northwest, Inc.)

*Maima: A Taino-Spanish Contact Settlement on the North Coast of Jamaica*, Shea Henry (Simon Fraser University)

*The First Abbey in the New World: An Expression of Power and Ideology*, Robin Woodward (Simon Fraser University)

*Chinese Benevolent Societies in the Old West: "Joss Houses," the Tongs, and their Effect on Chinese Immigrants 1860-1920*, James MacNaughton (University of Idaho)

*After They Drove Old Dixie Down: Identity and Isolation in a Southwestern Oregon Mountain Refuge*, Chelsea Rose (Southern Oregon University) and Mark Tveskov (SOU)

*The Materiality of Family Identity: Archaeological Investigations of 19th Century Jewish Merchant Households in Aurora, Nevada*, Katee R. Withee (University of Nevada, Reno)

## **Tools for Historic Archaeology and Washington State DAHP Reports**

*A Baseline Context for the Interpretation and Evaluation of Historic Mining Properties Using the 1872 Mining Law*, Christopher D. Noll (Versar, Inc.)

*Understanding Washington's Railroad History: A Context Statement Arriving Soon*, Russell Holter (Washington Department of Archaeology and Historic Preservation)

*Toward An Archaeological Guide to Coffin Plates and Their Use in the United States and Canada (ca. 1800 to 1930)*, Guy L. Tasa (Washington Department of Archaeology and Historic Preservation) and Liam Q. Tasa (South Puget Sound Community College)

*The Dalles Chinatown Site, a Laboratory Marathon*, Jamie French (Oregon State University)

*Hershey's, Big Hunk, and Jujubes: An Analysis of Candy Wrappers from the Historic Rivoli Theater*, Courtney Millsap (Eastern Oregon University) and Mary Kolb (EOU)

*Chemical Analysis of Historic Artifacts Recovered from the Site of a 19th Century San Jose Chinatown*, Ray von Wandruszka (University of Idaho) and Tara Summer (U of I)

*Mid-20th Century Pan-Abode Log Cabins*, Ann Sharley (SWCA Environmental Consultants)

*Old Records and New Tools: Using Historic Land Records to Structure Archaeological Survey and Historic Site Management on the Siuslaw National Forest*, Lindsey Stallard (Oregon State University) and Kevin Bruce (Siuslaw National Forest)

*2013 Biennial Report to the Legislature Concerning Activities Performed Under Washington's Non-Forensic Human Skeletal Remains Legislation*, Guy L. Tasa (Washington Department of Archaeology and Historic Preservation)

*Permitting Update from DAHP: Current Permit Compliance and External Audit Results*, Stephanie Kramer (Department of Archaeology and Historic Preservation)

## **Food Matters**

*More Dog Anyone? Dogs as Food among the Fur Traders of the Lower Columbia*, Cheryl A. Mack (Olallie Research)

*Cetacean Hunting at the Par-Tee Site (35-CLT-20): Ethnographic, Artifact, and Blood Residue Analysis Investigation*, Gabriel M. Sanchez (University of Oregon), Dr. Jon Erlandson (U of O), Eirik Thorsgard (The Confederated Tribes of Grand Ronde)

*Faunal Analysis from Labouchere Bay Rockshelter Middens*, Mark R. Williams (University of New Mexico) and Dale Croes (Pacific Northwest Archaeological Services)

*Long Term Shellfish Harvest and Resource Stability in the San Juan Islands of Washington State*, Phoebe Daniels (University of Washington)

*Leukoma Seasonality and Maturity at 45-WH-55*, Todd Koetje (Western Washington University)

*Introduction to Sablefish Life History: Preliminary Results from Tse-whit-zen Village Site Faunal Analysis*, Reno Nims (Portland State University)

*A Study of Social Rank and Resource Control Using Ichthyofaunal Remains from the Cathlapotle Plankhouse Village Site*, J. Shoshana Rosenberg (Portland State University) and Virginia L. Butler (PSU)

*Fish and Complexity: Faunal Analysis at the Shell Midden Component of Site DgRv-006, Galiano Island, B.C.*, Justin Hopt (Washington State University)

*Plants and Potlatching: A Paleobotanical Analysis of a Feasting Feature from Galiano Island, Southwestern B.C.*, Juliet McGraw (Washington State University), Colin Grier (WSU), and Jade D'Alpoim Guedes

*Dry Bone Complex: A Preliminary Study of Hunting Behavior in Southeast Harney County, Oregon*, Carolyn Temple (Bureau of Land Management, Burns)

### **Connecting Different Forms of Knowledge to Respect/Protect Cultural and Natural Resources**

*The Clam Garden Network: Documenting Traditional Mariculture Practices on the Northwest Coast*, Dana Lepofsky (Simon Fraser University), Skye Augustine (Northwest Indian College), Nathan Cardinal (Parks Canada), Amy Groesbeck (Simon Fraser University), Marco Hatch (NWIC), Julia Jackley (SFU), Eric Mclay (University of Victoria), Misha Puckett (SFU), Kristen Rowell (University of Washington), Anne Salomon (SFU), Nicole Smith (Independent), Elroy White (Central Coast Archaeology)

*Written in the Stars and on Stone: Drawing On Native American Oral Tradition to Answer Archaeological Questions*, Marna A. Carroll (Central Washington University)

*Archaeology in Laxyuup Gitxaala: Connecting with Community through Teaching*, Charles T. Menzies (Gitxaala Environmental Monitoring, University of British Columbia)

*From Cultural Keystone Species to Threatened Species: The Place of Pacific Herring in Northern Coast Salish Social-Ecological Systems*, Alisha Gauvreau (Simon Fraser University), Dana Lepofsky (SFU), Michelle Washington (Tla'amin First Nation)

*Connecting Zooarchaeology to Community Interests: The Archaeology of Pacific Herring in Alaska*, Madonna L. Moss (University of Oregon), Camilla F. Speller (University of York), Antonia Rodrigues (Simon Fraser University), Dongya Yang (SFU)

*Recording Traditional Cultural Properties: Wallowa Case Study*, Arrow Coyote (Confederated Tribes of the Colville Reservation)

### **Segmented Yet Connected: Archaeology of Social Organization**

*The Social Lives of Projectile Points: Inter- and Intra-household Variation In Projectile Point Forms in Lower Columbia River Plankhouses*, Kenneth M. Ames (Portland State University)

*Late Holocene Trade and Exchange in the Willapa River Valley: Archaeology and “Just-so Stories” of Enclaves, Wealth, and Dance on the Southern Washington Coast*, Lyle Nakonechny (Washington State University)

*The Search for Women in Archaeological Site Records*, Kristina M. Hill (Eastern Washington University)

*Italian Piazzas as Models for Sustainable Public Outdoor Space*, Mark R. Pederson (Western Washington University)

### **Primatology and Bioanthropology**

*Vocalizations of Tibetan Macaques (*Macaca thibetana*) at Mt. Huangshan, China*, Erika J. Price (Central Washington University)

*Gesture Sequence in Captive Orangutans (*Pongo pygmaeus*)*, Amanda L. Carner (Central Washington University), Mary Lee Jensvold (CWU)

*Spirited Away: Coevolution of Hepatitis B and C with East Asian Alcohol Phenotype*, Rebecca Ortega (Western Washington University)

*Inflammation, Poverty and Type II Diabetes*, Alissa Bronwyn Daschbach (Western Washington University)

### **Expanding the Late Pleistocene/Early Holocene Archaeological Record**

*A Recent Pleistocene Megafauna Discovery in the Willamette Valley*, Kristen A. Fuld (Archaeological Investigations Northwest, Inc.), Terry L. Ozbun, (AINW), Sarah L. Jenkins (AINW)

*Update on the Wenas Creek Mammoth Site: Age and Cultural Affiliation*, Patrick M. Lubinski (Central Washington University), James Feathers (University of Washington), Karisa Terry (CWU), Patrick T. McCutcheon (CWU)

*Pre-Missoula Flood Site Suitability Model*, Kyle Parker-McGlynn (University of Idaho)

*Evidence for Late-Pleistocene to Early-Holocene Cricket Consumption at the Paisley Caves Site, Lake County, Oregon*, Martin E. Adams (Paleoinsect Research)

*Recent Archaeological Investigations at an Early Holocene Site on the Lucy Islands, Near Prince Rupert, British Columbia*, David J. W. Archer (Northwest Community College), Christine S. G. Mueller (Northwest Community College)

*Sea Levels, Oral Traditions, and Settlement Pattern Dynamics in Prince Rupert Harbor: A Report on Recent Research*, Kenneth M. Ames (Portland State University), Andrew Martindale (University of British Columbia), Bryn Letham (UBC), Kevan Edinborough (University College London), Kisha Supernant (University of Alberta), Susan Marsden (Museum of Northern British Columbia), Thomas J. Brown (Portland State University), Aubrey Cannon (McMaster University)

*The Dietz Site: Revisiting the Geochemical Sourcing and Hydration Measurement Properties for Fluted and Stemmed Artifacts from 35LK1529, Lake County, Oregon*, Patrick O'Grady (University of Oregon Museum of Natural and Cultural History) and Scott P. Thomas (Bureau of Land Management, Burns District, Oregon)

## Posters

Adler, Amanda D. (University of Idaho) *The Effects of Homelessness on the Mother-Child Relationship*

Ancheta, Melonie *Pigments and Paint Technology of NW Coast Peoples*

Andrews, Shannon (Western Washington University) *Building Local History: Involving Community in the Inventory Process for a Living History Museum*

Armstrong, Chelsey Geralda D. (Simon Fraser University) *Hazelnut (Corylus cornuta) on the Northwest Coast: An Ethnobiological Profile*

Barrick, Wilbur C. (Warm Springs Geo Visions Cultural Resources Department) *A Systematic Approach to Historic Railroad Documentation and National Register Recommendation, Jefferson Co., Oregon*

Baumgart, Erin (Central Washington University), Tiffany Cummings (CWU) *Geoarchaeology of House Features, Redbird Beach, Hells Canyon, Idaho*

Bennett, Elizabeth (University of Nevada, Reno) *Anthropology Museums in a Postmodern World: Future Directions and Challenges*

Brown, James (Central Washington University), Steven Hackenberger (CWU) and Patrick McCutcheon (CWU) *Resources Intensification, Sedentism, Storage, and Ranking: A Visual Synopsis of Pacific Northwest History and Theory*

Campbell, Renae (Willamette Cultural Resources Associates, Ltd.), Kanani Paraso (Willamette CRA), and Michael Daniels (Willamette CRA) *Ceramic Vessel Quantification: An Experimental Analysis of Methodologies*

Campbell, Sarah K. (Western Washington University), Will Damitio, (WWU), and Katie Wiggins *Western Washington University's Clovis Point?*

Carner, Amanda (Central Washington University), Ricardo A. Fernandes, (CWU), Savannah Schulze (CWU), Mary Lee Jensvold (CWU), and Joseph G. Lorenz (CWU) *Characterization of the Mitochondrial Ancestry in 20 Captive Chimpanzees (Pan troglodytes)*

Chalmer, Nyra (Simon Fraser University) and Chris Picard (Gitga'at First Nation) *Gitga'at-Simon Fraser University (SFU) Archaeology and Heritage Pilot Project: Connecting to the Past to Protect the Future*



Chenvert, ErinMarie (Central Washington University) and Dr. Patrick McCutcheon (CWU) *Paradigmatic Lithic Analysis of an Upper Kittitas County Spring Site, Washington*

Cheung, Yu Ling (Hong Kong Archaeology Consultant Ltd.) *Ancient Chinese Jade Sawing Techniques*

Dampf, Steve (Historical Research Associates, Inc.) and Gabe Frazier (HRA) *A Systematic Approach to a Tablet-based Data Form Management Process for Archaeological Site Updates, Testing and Monitoring*

Davis, David R. (Central Washington University) *Evidence for the Presence of an Archaic Ritual Mortuary Complex in Vermillion County Indiana*

Day, Lianne A. (Central Washington University) and Patrick M. Lubinski (CWU) *A Faunal Sample from Pre-Mazama Levels of the Bernard Creek Rockshelter, Hells Canyon, Idaho*

Fitz-Gerald, Kyla (University of Idaho) *'Goo and Gunk' Cosmetics and Masculinity*

Fulkerson, Tiffany J. (Washington State University), Elizabeth Truman (WSU), John Dorwin (Eastern Washington University), Kevin Lyons (Kalispel Tribe of Indians), Richard Conrey (Hooper Geoanalytical Laboratory, School of the Environment), and Melissa Goodman (WSU) *Geoarchaeological Investigations of a Late Holocene Site (45PO426) on the Kalispel Reservation, Pend Oreille County, WA*

Gamble, Erin (Edmonds Community College) *Tree People: A Survey of Culturally Modified Trees on Hope Island*

Gilmour, Daniel M. (Willamette Cultural Resources Associates) and Martin E. Adams (Paleoinsect Research) *Proxies of Younger Dryas Climate Change in Western Oregon*

Goodwin, Matt (Willamette Cultural Resources Associates, Ltd.), Michael A. Daniels (Willamette CRA), and Josh Moss (Willamette CRA) *The Spread of Invasive Plant Species and Their Effect on Cultural Resources along the Middle Columbia River*

Hammond, Joyce (Western Washington University), Heather Christensen (WWU), Ashley Duncan (WWU) Naomi Karasawa (WWU) Cecilia Martin (WWU) Meredith McKay (WWU) Destiny Petroske (WWU) and Kristopher Rolstad (WWU) *Connecting Through Participatory Action Research*

Hanson, Sydney (Central Washington University), Eric Wakeland (CWU), Thomas Hale (CWU) and Patrick Lubinski (CWU) *Investigating the Anatomy of the Hyoid Bone of Hoofed Mammals for Archaeological Interpretation*

Harris, Kiah (Central Washington University) *Analysis of Slang Translation*

Hendrix, Jillian (Central Washington University), Sarah Steinkraus (CWU), and Steven Hackenberger (CWU) *Revitalizing Collections for Environmental Archaeology: The 1962/63 House Features (45KT12 and 45KT13) Excavated by Robert Kidd*

Jackley, Julia (Simon Fraser University), Dana Lepofsky (SFU), Jennifer Carpenter (Heiltsuk Integrated Resource Management Department), Nancy Turner (UVic) *Mountain Top to Ocean Floor: The Eco-cultural History of Haüyat*

Jansson, Anna (Burns Paiute Tribe) *Making Connections with Isolates; Historic Isolated Finds from the Jonesboro Plowing Project in Malheur County, Oregon*

Johnson, Jeffrey (Eastern Washington University) and Adam Calkins (EWU) *Paleo-Indian Thermal Feature Identification*

Johnson, Katie (Southern Oregon University Laboratory of Anthropology) *Profiles of the Past: A Glimpse of a Chinese Home in Jacksonville, Oregon*

Johnson, Sarah (Equinox Research and Consulting International Inc.) *Bone and Antler Tool Assemblage from the Recovery of the 45IS45/300 Site in Oak Harbor, WA*

Kannegaard, Rachael N. (Western Washington University) *What is that Spot?: Residue Analysis of Quartz Crystal Microblades*

Kassa, Sonja (Central Washington University) *The Archaeology of Obsidian Occurrence in Stone Tool Manufacture and Use along the Mid-Columbia River, Washington*

Kennedy, Dustin (The Confederated Tribes of Grand Ronde) *Impacts of Projected Sea Level Rise on the Northern Oregon Coast and Columbia River.*

Kolb, Mary (Eastern Oregon University) and Tiffany Wiley (EOU) *The Rivoli Theater Past, Present and Future*

Kopperl, Robert (SWCA Environmental Consultants), Christian Miss (SWCA), Kenneth M. Ames (Portland State University), Charles Hodges (Pacific Geoarchaeological Services) and Amanda Taylor (Pacific Lutheran University) *Preliminary Findings from Data Recovery Excavation at the Bear Creek Site (45KI839), a Paleoindian Occupation in the Puget Sound Lowlands*

Larsen, Susan (Western Washington University) and Erin Benson (WWU) *Conditions of Recrystallization of Biogenic Aragonite by Experimental Heat Treatment of Clinocardium Shells*

LeTourneau, Philippe D. (Burke Museum and King County Historic Preservation Program) *Recent Paleoindian Point Finds in Western Washington*

Lewis, Ian (Equinox Research and Consulting International Inc.) *Casings with Context: Bullet Casings, Shotgun Shells, and Military Memorabilia from Site 45IS45/300*

Litzkow, Jamie M. (Bureau of Land Management) *Taking it Down to Build it Up: Resolving Adverse Effects to Historic Barns through Reclamation*

Maddoux, Maryanne (Oregon State University) and Emily Modelski (OSU) *“Coast to Coast”: A Chronology of Towle’s Log Cabin Syrup*

Major, Maurice (Washington State Department of Natural Resources) *DNR Office Hours*

McWilliams, Tyler (AMEC) *Weighted Artifact Density: Mapping the Hot Spots of an Archaeological Site*

Morton, Ashley M. (Fort Walla Walla Museum) *Towards a Historical Archaeology of Health and Illness*

Murphy, Andrew (Grant County PUD) and Brett Lenz (Columbia Geotechnical Associates) *Geoarchaeology for a Crescent Find on the Babcock Bench, Grant County, Washington*

O'Grady, Patrick (University of Oregon Museum of Natural and Cultural History) and Scott P. Thomas (Bureau of Land Management, Burns District, Oregon) *Medicine Wheels in Oregon? Archaeological Evaluation and Inquiry Into Two Large Stone Circles and Related Features in the Northern Great Basin of Southeastern Oregon; The Dietz Site: Revisiting the Geochemical Sourcing and Hydration Measurement Properties for Fluted and Stemmed Artifacts from 35LK1529, Lake County, Oregon.*

Oosahwee-Voss, Eric (Confederated Tribes of the Colville Reservation) *Sinixt Traditional Cultural Properties and Practices*

Osiensky, Whitney S. (Western Washington University) *Daciteopia?: What We Can Learn From a Holistic Approach to Sourcing Fine-Grained Volcanic Artifacts (FGVs)*

Parfitt, Anne B. (Central Washington University) and Dr. Patrick T. McCutcheon (CWU) *Chemical Sourcing of Obsidian Lithic Fragments from the Grissom Site (45KT301) to Study Intra-site and Inter-site Source Variability*

Pefferman, Audrey (Western Washington University), Luke Jones (WWU), and Julia Rowland (WWU) *Odorono Days and Mentholatum Memories*

Phaneuf, Christen (Eastern Washington University) *Comparative Analysis of Paleo-Indian Osseous Rods*

Ramey, James (Willamette Cultural Resources Associates, Ltd.) *Mammalian Butchery at the Briar Site (35CO35)*

Reid, Kenneth C. (Idaho State Historical Society) *Thermal Aquifers and Winter Villages in Idaho*

Risdon, Edrie (Grant County Public Utility District), Sarah Steinkraus (GC PUD) and Steven Hackenberger (Central Washington University) *Middle and Upper Columbia House Settlements: Population Dynamics, Collector Strategies, and Sampling Bias*

Rodrigues, Antonia (Ancient DNA Laboratory, Department of Archaeology, Simon Fraser University), Iain McKechnie (University of Oregon, Hakai Network for Coastal People, Ecosystems and Management, SFU), Kasia Zimmerman (Ancient DNA Laboratory, SFU), and Dongya Yang (Ancient DNA Laboratory, SFU) *Species Identification of Archaeological Rockfish (*Sebastes* spp.) in the NE Pacific: New Insights from Ancient DNA*

Rorabaugh, Adam N. (Washington State University) *Re-examining 45WH1 Cherry Point and 45WH17 Semiahmoo Spit*

Ross, Laurie (Edmonds Community College) and Lia Andrews (ECC) *Wildlife monitoring at Two Sisters Return: animal survival in a semi-rural environment*

Rowland, Julia (Western Washington University) *Community Matters: An Archaeological Investigation of the 1897 to 1907 Equality Colony, Skagit County, Washington*

Saban, Chantel V. (Oregon State Anthropology), Martin E. Adams (Paleoinsect Research), and Katelyn N. McDonough (University of Oregon Anthropology, University of Oregon Museum of Cultural & Natural History) *Paleoecological Research from Paisley Cave 2 (35LK3400)*

Sappington, Robert Lee (University of Idaho) *An Overview of Prehistoric House Structures in the Clearwater River Region, North Central Idaho*

Schulze, Savannah M. (Central Washington University) *The Introduction of Artificial Habitat Structures in Two Troops of Lemur Species (Eulemur sanfordi) in Semi-Free Ranging Enclosures*

Sechrist, Laura (University of Nevada, Reno) *Land Use at a 19th Century Stagecoach Station*

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