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JOURNAL OF NORTHWEST ANTHROPOLOGY

FORMERLY NORTHWEST ANTHROPOLOGICAL RESEARCH NOTES

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A HISTORY OF UNDERWATER ARCHAEOLOGICAL RESEARCH IN OREGON

Dennis Griffin

ABSTRACT

Archaeological resources, both prehistoric and historic, are known to exist off Oregon's coastline and within its primary rivers and lakes, but for a variety of reasons, to date they have attracted little attention. Recent interest in offshore modeling to identify prehistoric landforms likely to contain buried cultural deposits, efforts to locate historic shipwrecks and submerged Native American canoes, and the periodic appearances of historic townsites that now lie buried in reservoirs have all increased awareness of this long ignored resource base. The history of underwater archaeology in Oregon and the protection allotted such resources under current state laws are summarized. Given increased interest in offshore energy development (both wind and wave) in the United States, recommendations are made to assist in the future identification and preservation of such resources.

Introduction

The Oregon State Historic Preservation Office (SHPO) is responsible for the coordination of archaeological investigations throughout the state including those affecting any sites that lie underwater. Submerged cultural resources include a wide range of sites, structures and objects that are at least 50 years of age with historical, cultural, or archaeological significance (i.e., Oregon state laws recognize the significance of sites that are 75 years of age while federal laws maintain a 50-year recognition). Examples of such sites include shipwrecks and submerged aircraft located along the state's coast, rivers and interior lakes, which would encompass remnants of the vessel's structure as well as cargo and personal belongings of the crew and passengers. Additional submerged site types include terrestrially-based sites that have been subsequently inundated through natural subsidence events (e.g., earthquakes, rise in sea level) or prehistoric and historic settlements inundated by reservoir/dam construction.

Oregon SHPO's archaeological database contains location information for over 31,000 historic and prehistoric terrestrial sites; a number of which are now inundated by one of the four Columbia River dams in Oregon. Recorded shipwreck locales within this database number just

over 300. With over 3,000 reported shipwrecks off the Oregon coast alone, the huge disparity between this number and that earmarked in the state's records highlights the need for improvement in both recording location information for shipwreck sites and more professional investigation of the significance of submerged resources in general. This article outlines current state laws protecting underwater resources in Oregon, a historical perspective on the interest in submerged resources, a brief history of underwater research that has been conducted to date, and new fields of research that hold promise for the future identification and understanding of these poorly recorded and researched resources in light of a growing interest in future energy development of Oregon waters.

Background

The state of Oregon is bordered by 581 km (363 mi.) of coastline with management responsibility extending 4.8 km (3 mi.) from the shore and includes those sections of the intertidal zone below mean high tide and the channels of navigable streams. The primary historic commercial waterway on Oregon's rivers focused on 611 km (380 mi.) of major navigable waterway along the Columbia and Willamette Rivers. The historic commercial waterway on the Willamette River extended as far south as the town of Springfield while current commercial access stops at Willamette Falls, totaling only 492 km (306 mi.). The numbers of both identified and potential submerged shipwrecks within these waters are numerous.

In addition to submerged marine vessels, Oregon's waters contain several historic aircraft, a few of which were associated with World War II military activities. The location of most shipwrecks and military aircraft has not been physically verified through field investigation or remote sensing. Instead, mapped positions are often based on the last reported coordinates or the relationship to visible landmarks at the time of disappearance. Of those wrecks whose exact locations are known, cultural resource professionals have subjected few to field examinations. Even fewer have been assessed for eligibility to the National Register of Historic Places. Aside from submerged vessels, there are innumerable prehistoric coastal and riverine sites, in addition to a number of historic communities that are now wholly or partially inundated due to erosion, past tectonic events, fluctuation in sea level, and the purposeful flooding of areas through the construction of dams and reservoirs. While many of these resources may be of considerable significance, baseline information on their current condition is virtually nonexistent.

Recreational diving along Oregon's coastline has been limited due to colder water temperatures, poor visibility, and dangerous currents. While the colder water temperatures along Oregon's coastline may enhance the preservation of submerged resources, the preservation of such objects, in contrast to the combination of temperature, visibility and currents, has not resulted in an increase in diving of wreck sites. Diving in the state's rivers and interior lakes appears to have also been limited, or at a minimum, poorly reported. However, in recent years, new and inexpensive remote sensing devices (e.g., side-scan sonar, sub-bottom profiler) have removed many obstacles that had previously prevented site discovery and exploration. A review of recent newspaper and magazine articles discussing the reappearance of Oregon shipwrecks along our coastline highlights a continuing, if not growing, strong public interest in such sites.

A complex mixture of temperature, turbidity, benthic variety and biomass, sedimentation, and other variables largely affects preservation of artifacts retrieved from a saltwater environment. Iron objects quickly attract surrounding minerals and particles, creating a concretion around the object that may result in long-term preservation but expensive management conditions.

Conservation issues of such resources remain a challenge. With growing interest in offshore energy development, both in wind and wave energy, it is important that we begin to focus our attention on identifying and evaluating such resources before they are inadvertently destroyed. The 2008 discovery of two nineteenth century carronades near Arch Cape, believed to be from the *USS Shark*, a U.S. naval vessel sunk near the mouth of the Columbia River in 1846, highlights the potential significance of such submerged resources (Griffin 2013). Carronades are a small form of cannon which were designed as a short-range naval weapon with low muzzle velocity. They are the most likely weapon lost by many of the weapon-bearing shipwrecks off Oregon's coastline and Columbia River.

Historic Preservation and the Law of the Sea: Legal Foundation

The public remains very confused about the ownership of discovered resources relating to shipwrecks and lost objects in the state of Oregon. Maritime law in the United States traditionally consists of the "law of salvage" and the "law of finds." The law of salvage is grounded in ancient Roman law, which allows for the recovery of property in peril at sea and its return to its owner for a reward. David Howe, an admiralty attorney, summed up this law: "In a nutshell, 'salvage' means that if I save your property from peril at sea and return it to you, you owe me a reward for saving it. . . . Salvage law promotes the unscientific destruction of historic wrecks and the permanent loss of the archaeological evidence they contain by rewarding the economically efficient recovery of commercially valuable objects" (Howe 2000:1).

In older maritime cases, salvors successfully argued in court that shipwrecks as old as 400 years were "in peril" for purposes of obtaining salvage awards. In a few more recent cases this argument has been rejected by the courts (McMahan 2007:57). Recent cases have also set precedents for the inclusion of archaeological documentation in conjunction with salvage operations; however, such efforts have not been held to the same standards required of terrestrially-based scientific archaeology. Under salvage, a property owner, which might include an insurance company, can limit, prohibit, and control recovery efforts. The property owner can also relinquish ownership and abandon the wreck, which may be desirable to avoid liability in some cases, particularly if the vessel contains hazardous materials.

The law of finds applies only to property voluntarily abandoned by its owner. Whoever finds sunken property and takes control over it can become its new owner. This concept has led to a common misconception among the public that the schoolyard rule of "finders-keepers" automatically applies to any sunken property under federal admiralty law. Over the past several decades, a number of federal and state laws were enacted to protect historic values of submerged cultural resources. Laws of particular interest include Oregon's Archaeological Objects and Sites (ORS 358.905-962) and Archaeological Sites and Historical Materials (ORS 390.235) permit statutes, with federal laws including the Abandoned Shipwreck Act (ASA) and the Archaeological Resources Protection Act.

Since 1993, the definition of an archaeological site in Oregon's Archaeological Objects and Sites statute (ORS 358.905(c)) specifically includes "submerged and submersible lands, and the bed of the sea within the state's jurisdiction, that contains archaeological objects and the contextual associations of the archaeological objects" with examples of such sites specifically including shipwrecks. This statute provides protection to terrestrially-based sites, which are now submerged due to natural or man-made events in addition to shipwrecks. It addresses the protection and management of cultural resources on all nonfederal public and private lands,

including submerged lands and tidelands in the state. The state's legal basis for claiming title to submerged resources is partially founded in the federal ASA (43 U.S.C. Part 39, 1988) and its implementing guidelines (54FR 13642, 1989). Under the ASA, the federal government asserted title to three categories of abandoned shipwrecks, and then transferred the titles of most wrecks to individual states. These three categories include: 1) abandoned shipwrecks in a state's submerged lands (i.e., out to 4.8 km); 2) abandoned shipwrecks embedded in coralline formations protected by a state on its submerged lands; and 3) abandoned shipwrecks located on a state's submerged lands and included in or determined eligible for inclusion in the National Register of Historic Places.

The ASA provides that the laws of salvage do not apply to shipwrecks protected under the act. However, problems have arisen from the fact that the ASA does not adequately define "abandonment," a term that has been subject to varying interpretations by the courts. Following the passage of the ASA and the development of its guidelines, many states developed active programs for managing historic shipwrecks and other submerged cultural resources. Some of these state programs included a staff position for a state underwater archaeologist. Early focus on submerged cultural resources in Oregon preceded the passage of ASA and centered on the discovery of historic shipwreck sites by non-archaeologists. This movement spawned the passage of a Treasure Trove Act (ORS 273.718-742), which conflicted with other state statutes protecting archaeological sites. Subsequent Oregon legislation resulted in the repeal of the state's Treasure Trove Act (after being in place for 32 years) and the specific inclusion of shipwrecks within state cultural resource protection laws.

Submerged military craft (including ships and airplanes) of all nations are managed under a separate set of laws, guidelines and legal precedents. International law, as practiced by the majority of the world's leading maritime countries, recognizes the special status of sovereign vessels. This status includes the sovereign nature of sunken vessels and the perpetual ownership of all such vessels by their flag country. Precedents under international law state that ownership of a military or state vessel can only be transferred by one of three ways: 1) if the vessel is captured or surrendered in battle before sinking; 2) by an international agreement; or 3) by an express act of abandonment, gift or sale under international law and the law of the flag state governing the abandonment of government property (Pixa 2009:5). Another nation does not acquire title to enemy vessels through the act of sinking them or through the passage of time. In the same manner, a coastal state does not acquire ownership of a sunken state vessel by reason of it being located on, or embedded in, land or the seabed over which it has jurisdiction (Pixa 2009:6). For example, Spain has never abandoned or relinquished title to ships sailing under the flag of the Kingdom of Spain during colonial times. According to Spanish law, interests in ships and their contents can only be extinguished through "specific actions pertaining to particular vessels or property taken by Royal Decree or Act of Parliament" (Pixa 2009:4). During the 1990s Spain began successfully meeting legal challenges by salvors attempting to gain rights to historic Spanish vessels in U.S. waters. In 2002, the Embassy of Spain provided notice to the U.S. that salvage or other disturbance of Spanish sunken vessels or their contents may not be conducted without express consent by an authorized representative of the Kingdom of Spain. The recent U.S. court supported return of a treasure trove recovered from the nineteenth century Spanish frigate *Nuestra Senora de las Mercedes* by the American Odyssey Marine Exploration company reinforces the U.S. government's recognition of Spanish sovereignty to such sites (Minder 2012). This position will be an important consideration if current efforts to locate the wreck site of a believed seventeenth century Spanish galleon near Neahkahnie, Oregon, prove successful.

In October 2004, Title XIV of the FY2005 National Defense Authorization Act (Public Law 108-375) codified the protected sovereign status of sunken U.S. military craft and their

permanent U.S. ownership, regardless of location or the passage of time. This law, known as the Sunken Military Craft Act, provides a mechanism for permitting and civil enforcement to prevent unauthorized disturbance of federal vessels. The February 2008 recovery of two submerged carronades near Arch Cape, Oregon, raised the possibility of these artifacts belonging to the wreck of the *USS Shark*, a U.S. naval vessel sunk near the mouth of the Columbia River in 1846. Recent analyses of these carronades strongly reinforce their link to the U.S. Navy and the ownership of the carronades will likely remain the property of the federal government (Griffin 2013). A discussion of the Sunken Military Craft Act can be found on the Naval Historical Center, Underwater Archaeology Branch website (Naval Historical Center 2004).

Interest in Shipwrecks and Treasure Trove

Legal issues aside, interest in underwater archaeological sites in Oregon have long centered on the search by the public for reported Spanish shipwrecks and any associated treasure that may have gone down with such wrecks or been buried by survivors on the adjacent mainland. At the time of first settlement in the Oregon Territory, stories of shipwrecks and stranded seamen were reported along the coast with Oregon's most widely circulated treasure story describing an early Spanish wreck on the Nehalem spit at the base of Neahkahnie Mountain (Lyman 1903). This legend has since been linked to the fabled landing of the Sir Francis Drake expedition of 1579 (Bergeson 1984:6) or the wreck of a Spanish galleon in the 1500–1600s, with reports of a treasure chest being buried that contains everything from the treasure of King Solomon and the Queen of Sheba (*The Oregonian* 1983) to gold from Cortez's exploits and the Holy Grail. Evidence supporting early contact along Oregon's coast includes an account by Lewis and Clark in 1805 where mention was made of a red haired, freckled man amongst a party of Clatsop natives (about 25 years of age) that may have been a product of exchange from passing sailors (Coues 1965:750–751; Cook 1973), reports of Japanese junks washing up along the Northwest coast and the infusion of Japanese words among Oregon tribes (Webber 1984), and great quantities of beeswax said to have been dug from the sand in northwest Oregon (Anonymous 1929b; Lyman 1903:167–169) with an estimated 12 tons recovered by 1898 (Cook 1973). Radiocarbon dates from the reported beeswax and two wooden ship's pulleys found washed up on Oregon's beaches include five dates with an average equaling 310 ± 10 B.P. with calibrated ages of AD 1520 to 1635 (Erlandson, Losey, and Peterson 2001:47). An abundance of Chinese porcelain shards have also been recovered from the beaches near Manzanita and Netarts (some within an archaeological context) with age date ranges of manufacture interpreted between AD 1573–1722 (127 shards by Beals and Steele 1981) and AD 1650–1700 (>1100 shards by Lally 2008). Woodward has interpreted the large quantities of Chinese porcelains to have derived from a Portuguese East India trading vessel wrecked off the Oregon coast between AD 1630 and 1638 (Woodward 1986:253). Others claim such ceramics derive from the wreck of a Chinese junk (Menziess 2002:201) or a Spanish galleon (Beals and Steele 1981; Beals 1983; Lally 2008; Williams 2008) that may date closer to AD 1700 (Williams 2009). Given the dates of the artifacts and the quantity of beeswax that has been recovered (12-plus tons); there appears to be substantial evidence of at least one Spanish shipwreck along Oregon's northern coast that occurred within the late sixteenth or seventeenth century. Popular legends of shipwrecks and the lure of treasure have long interested the public to seek their location and many early accounts of treasure hunting activities in this area abound; all with no success (Anonymous 1929a; Gibbs 1971:113; Gilson 2002; Griffin 2009). In spite of all the years people have searched for the remains of early shipwrecks or associated treasure, neither

have yet been found in Oregon. This leads us to the 1960s, a period when the Oregon legislature took an active role in attempting to facilitate the recovery of shipwrecks.

The Treasure Trove Act

Public interest in searching for treasure in Oregon came to a head in 1967 with the passage of the Treasure Trove Act—a bill designed to allow the public to seek treasure hidden in such places as shipwrecks. The initial interest in the passage of such a bill was spurred by a Salem housepainter (Ed Fire, a.k.a. Tony Moreno) who wanted to search for the fabled “Neahkahnie treasure” in northwest Oregon. In 1966, being unable to acquire an archaeological permit from the University of Oregon, Ed Fire contacted his state House Representative, and HB 1321 was introduced, approved and signed into law establishing the first treasure trove permit process in the state. When asked about his intention with this legislation, Fire stated: “It is my every intention to execute my rights as an individual to do what I feel is right and my feeling is that what I am doing on the beach is beneficial to the state in my findings to this point. I hope the future will bring to light just what did take place on the beach at Manaznita [sic] 340 years ago” (Mareno 1968).

The passage of the Treasure Trove Act required that a treasure permit be obtained to explore for and recover goods, money or treasure trove on state-owned lands, and defined treasure trove as “money, coin, gold, silver, precious jewels, plate and bullion found hidden in the earth or other private place where the true owner thereof is unknown” (Oregon Revised Statute 273.718). At this time shipwrecks were not considered archaeological sites and therefore an archaeological permit was not needed to search for treasure. During the 22 years (1967–1989) that treasure Trove permits were issued, 37 applications were received and 16 were issued (43%). While the majority of Treasure Trove permits searched for treasure on land, permit applications for excavations in Oregon’s beaches, offshore coastal lands and along a few coastal streams were also submitted.

An important change incorporated in a 1973 law revision acknowledged the potential historical value of a find. If a discovery was deemed to have sufficient historical value, it was to be placed in a museum and the finder awarded money rather than the recovered property. The finder’s fee would be paid from moneys within the Distributable Income Account in the state’s Common School Fund. After the 1987 passage of the federal Abandoned Shipwreck Act (ASA), title to shipwrecks in state waters was transferred to the states in whose waters they lie, thus removing them from the jurisdiction of the Federal Admiralty courts. State of Oregon legislators began to take notice of the value of shipwrecks as archaeological sites and a review of the state’s cultural resource laws with regards to shipwreck sites began. At the same time, the shipwreck *Isabella*, a Hudson Bay trading vessel sunk near the mouth of the Columbia River in 1830, was added to the National Register of Historic Places becoming the first shipwreck in Oregon to be placed on the National Register. It is interesting to note that recent investigations at this wreck site now suggest that the wreck is not associated with the *Isabella*, but is that of the *Great Republic*, a side-wheel steamer wrecked in 1879 (Delgado and Ostermiller n.d.; Bennett 2004; Roberts 2008).

In 1989, shipwrecks known to have contact with Native peoples were allotted protection under state archaeology laws since such sites had the archaeological potential to reveal information on early Native-Euro-American interaction. Non-native-related shipwrecks were not protected. This discrepancy was largely due to the competing forces in addressing the passage of the federal ASA and continued interest by the public to apply for Treasure Trove permits and seek their fortune in get-rich-quick schemes to find buried treasure. This change in legislation led to a review of the Treasure Trove permitting process, the subsequent repeal of the inherited Highway Division rules, and authorized the Division of State Lands (DSL) to initiate new rulemaking. This review highlighted the direct conflict between the Treasure Trove statutes and the state’s

archaeological laws, and the need for a changed policy direction toward the proper treatment of historical materials. An additional problem that surfaced during the law review is that the reported value of some shipwrecks currently being salvaged in the U.S. (e.g., Florida's *Atocha*) was so high, and the knowledge that if such a wreck was ever found in Oregon the recovered artifacts would undoubtedly be of historic value. Any attempts by the state to pay the resultant finder's fee could potentially bankrupt the state's Common School Fund. It was these fears that largely led to a moratorium on the issuance or renewal of Treasure Trove permits in October 1989 (Gilsen 2007). Attempts to modify the bill in 1991 failed and the Treasure Trove Act was subsequently repealed in 1999. Before the act's repeal, citizens from throughout Oregon, in addition to Washington, California, Texas, Wisconsin, and Kansas had submitted over 50 Treasure Trove permit applications.

Following the repeal of the Treasure Trove Act in 1999, all explorations for sunken shipwrecks or abandoned treasure needed to be conducted under a state archaeological permit. The need for a state permit, however, did not result in a drop in interest in discovering evidence of abandoned shipwrecks or related treasure. There is hardly a month that goes by that the Oregon SHPO is not contacted by at least one individual who believes they know the whereabouts of Drake's buried treasure, a sixteenth century Spanish galleon, a WWII submarine, or a lost Chinese fleet of junks. The SHPO continues to strongly encourage these individuals to work with professional archaeologists to confirm the location of such finds, but with the lack of financial incentive to the discoverer or the state agreeing to cover the cost of proposed excavation, nothing yet has come of any of these requests. Starting in 2007, a group out of Hawaii, assisted by Scott Williams, an archaeologist from Washington State, has conducted ground penetrating radar surveys near Nehalem State Park (vicinity of Neahkahnie Mountain) and the surrounding ocean shore (Williams and Rogers 2007; Williams 2008, 2009; Peterson et al. 2011). This is the most recent effort to locate the remains of the reported Spanish galleon and the most serious, to date, in that they are involving specialists from a variety of disciplines (e.g., geology, archaeology, marine studies, and ceramic analysis) with investigations continuing.

Current level of interest

Public interest in shipwrecks is not restricted to those few individuals who applied for Treasure Trove Permits. Rather, the majority of interest in shipwrecks is by the public at large who continue to be fascinated by accounts in the newspapers of shipwrecks appearing along the Oregon coast. Who can blame them for their interest when within one month in 2008, beachcombers discovered two nineteenth century carronades off the north coast and the wreck sites of the *George L. Olson*, a 223' schooner wrecked in 1944 near Coos Bay; the *Bella*, a 121' 3-masted schooner sunk in 1905 near Florence; an unnamed Umpqua River wreck; the 1924 wreck site of the 124' schooner *Acme* near Bandon; and the 1908 wreck of the *Emily Reed* near Rockaway (Griffin 2008:6). The months that followed these discoveries resulted in sightings of the 1929 wreck of the steamer *Sujameco*, north of Coos Bay; the 1954 wrecked U.S. Navy subchaser *Helen E.*, north of Coos Bay; and an unnamed wreck near Gardner.

As a general rule, non-historic civilian shipwrecks (in Oregon < 75 years of age) are not protected by state laws and remain available for salvage; military wrecks, however, remain under the jurisdiction of the government that lost the ship. Many of the shipwrecks that have been appearing recently along the Oregon coast would fall into the non-historic category (e.g., *Helen E.*). The protection of the *George L. Olson*, being partially buried on federal land, remains due to recognition under federal law with a 50-year historic age criteria. However, protection under state and federal law in no way insures a site's protection. As with other types of archaeological sites,

many people remain unaware of the significance of shipwrecks, the knowledge of laws protecting such sites, and the harm that could result from their inquisitiveness. In 2009, several youths attempted to expose portions of the wrecked freighter *Emily Reed* (Figs. 1 and 2). Iron and wood that has long been inundated in salt water, and once is exposed to the air and freshwater, suffers rapid oxidation and deterioration. The desire of many to haul a piece of shipwreck home to one's front yard (Fig. 3) not only results in separating these fragments from the larger wreck site, but soon these pieces begin to fall apart and become unrecognizable. Their value whether historically or as objects de art quickly disappears. It is for these reasons that people are asked to not remove any artifacts from wreck sites. It is best to let them be reclaimed by the sea and sand from future storms. Such wreck sites are usually better preserved buried off shore or beneath our beaches than being exposed to the elements (Figs. 4 and 5).

Summary on Shipwrecks

Given that many wrecks have been salvaged and later purposively destroyed, one might ask are such shipwrecks really "significant" and why or should they merit future protection? The discovery and on-going analysis of an eighteenth century shipwreck found during the 2010 excavations beneath the World Trade Center in New York provides an example of the important data available from a purposively placed wreck as fill (i.e., a circa 1773 single-masted sloop, built from Philadelphia oak trees, used during the Revolutionary War, found to contain a British regiment button, and whose history included trading along the Hudson River in addition to the Caribbean [Reed 2011]). There are over 3,000 ships known to have wrecked along the Oregon coast. The exact locations of the vast majority of these remain unknown. Given the continued erosion of our coastline and the severity of winter storms, it is likely that we will soon be seeing evidence of many more wrecks. While archaeological research on shipwreck sites should be strongly encouraged, it is likely that the majority of new wreck sites will result in little fanfare. Recent shipwreck investigations include an investigation of the *Emily Reed* by students from Washington State University (Ahrens, Byers and Jones 2008) and the north coast beeswax ship investigations by Williams (2008, 2009). Hopefully enough information can be garnered from future shipwreck investigations to be able to identify, at a minimum, the ship's identity, add them to the state's shipwreck database, and continue to educate the public on the value of shipwreck sites to our state's history.

Underwater Archaeological Investigations in Oregon

Few professional underwater archaeological investigations have yet to be conducted in Oregon. An initial effort to introduce underwater archaeology in Oregon occurred during the late 1980s and early 1990s but these efforts were largely spearheaded by one firm (Institute for Archaeological Studies), were tied to small efforts in Oregon state parks along the north coast (Stegner 1988, 1992), and to U.S. Forest Service *Passport In Time* (PIT) projects (Stegner 1993, 1995) in interior lakes. All efforts were largely staffed by paraprofessional members of the Oregon Archaeological Society with little involvement with the professional archaeological community, aside from United States Forest Service (USFS) oversight of the PIT projects. Reports of the investigations include little details on methodology and do not meet professional reporting standards. Sites located during these surveys were never formally recorded. Since the 1990s, a few



Fig. 1. Youth exposing portions of the *Emily Reed* in 2008 (photograph courtesy of Tony Stein 2009).



Fig 2. Oxidation of the *Emily Reed* resulting in heavy rust of exposed metal (photograph courtesy of Tony Stein 2009).



Fig. 3. Portion of shipwreck collected by beachcomber (photograph courtesy of Calum Stevenson 2009).



Fig. 4. Exposed 1944 shipwreck *George L. Olson*, February 2008 (photograph courtesy of Calum Stevenson 2008).



Fig. 5. Sand covered remains of 1944 shipwreck *George L. Olson*, November 2009 (photograph courtesy of Dennis Griffin, 2009).

small underwater surveys within the Columbia River have been conducted with negative results on the Oregon shoreline due to poor visibility (Ellis and Baker 2008), and more positive results in Washington (Marcotte and Wilson 2010).

In contrast, excavations in the state's tidal wetlands have attracted a lot of attention among the professional archaeology community with many investigations focusing on fish weirs (Tveskov 1995; Byram 1998; Byram and Witter 2000;), terrestrial sites that have been submerged through coastal subsidence events (Woodward, White and Cummings 1990; Newman 1991; Minor and Grant 1996; Croes, Fagan, and Zehendner 2009), the remains of historic fishwheels (Reese et al. 1990), and an analysis of artifacts recovered from channel-dredging activities (Minor and Nelson 2002). It is not known if the avoidance of a diving component in Oregon coastal site investigations is due to a shortage of archaeologists that feel adept at underwater investigations or if area conditions (poor visibility, cold water temperature) have deterred such investigations. It is evident in reviewing websites of various dive shops in the state that area divers do not suffer from such an aversion and topics at local dive meetings often focus on collecting activities and the display of artifacts that members recover.

A review of a 1979 diving book entitled *Diving for Northwest Relics* (White 1979), finds a discussion of the search and recovery of historic artifacts at many sites within Oregon (within five rivers, five bays, and adjacent to 13 communities) (Fig. 6). To believe that such activities have diminished since the publication of this book would probably not be realistic. That we are not hearing more about the looting of such sites is only because we are largely unaware of where such

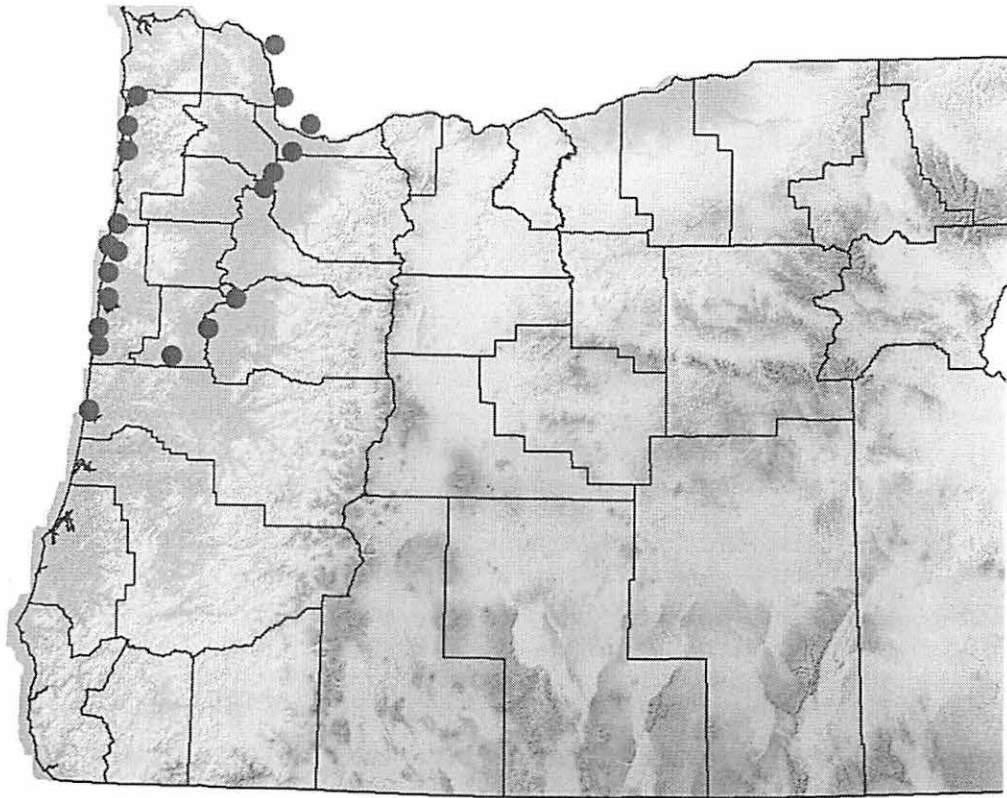


Fig. 6. Locations where artifacts were recovered by local diver/author James White (White 1979).

sites exist; the public, including local police, are not aware that there are state laws protecting such sites; and we fail to educate the public on the importance of such sites once they are found and the need to leave such sites as undisturbed as possible.

Offshore Exploration for Buried Archaeological Sites

Looking beyond the role of shipwrecks, the geology of Oregon's coast reveals evidence of a history of catastrophic earthquakes that recurred, on average, every 500–600 years (Kelsey et al. 2002; Witter, Kelsey, and Hemphill-Haley 2003). Over the past 15,500 years, Oregon's coastal native peoples could have experienced 26 or more such severe earthquakes (Davis et al. 2009). The effects of such quakes, given Oregon's position within the larger Cascadia Subduction Zone (a 600-mile-long offshore fault that runs from northern California to southern British Columbia), was the differential deformation of the coastline with landscapes often dropping a meter or more into the intertidal zone. Archaeological exploration along Oregon's coast reveals maritime adapted sites extending back only through the past 5,000 years. Earlier period sites along the coast are generally found on coastal headlands and reflect human use of inland terrestrial and aquatic environments (Punke and Davis 2006), not littoral or estuarine ecosystems (Davis et al. 2009:327). Earlier marine-based sites are likely to be located along Oregon's coastal plain, which now lies submerged.

Efforts to reconstruct the paleogeography of Oregon's central coast between 15,500 and 3000 cal. years B.P. have drawn attention to Oregon's submerged coastal landscapes and the archaeology they may contain (Davis 2009; Jenevein 2010). A study of Oregon's central coastline (from the Siletz to Siuslaw Rivers) has revealed a now submerged, large, low-gradient plain that would have produced a landscape larger than Rhode Island (Davis et al. 2009:325). Assuming that later marine transgressions did not completely erode terrestrial coastal deposits and the sites they may contain, Dr. Loren Davis and his colleagues (Davis et al. 2009:332) believe that Oregon's offshore region offers an important area for archaeological exploration (possible early evidence of humans occupying lands along North America's west coast and human maritime resource exploitation). Based out of Oregon State University, Dr. Davis's efforts are currently focusing on creating a GIS model of Oregon's submerged coastal plain through the use of plotting bathymetric data (side-scan sonar, sub-bottom profiler) and mapping ancient river valleys and embayments (Fig. 7). Once such a model has been created for the entire coast, the selection of an investigative technique that will prove effective, while not cost prohibitive, will be needed. Much of Oregon's submerged coastal plain is too deep for the use of more conventional investigative techniques such as scuba diving and the use of close-circuit rebreathers. Possible techniques to consider will include the use of coring (gravity-based, vibracore, hydraulic multicorer or box core), suction or bucket dredges, submersibles, or remotely operated vehicles (Davis et al. 2009). A primary factor in using such techniques, at present, is their relative high cost.

Despite the knowledge of thousands of submerged cultural resources in Oregon, the state does not currently have a program specific to the investigation and management of these resources or for maritime heritage education. While Oregon has two recognized maritime museums (Columbia River Maritime Museum in Astoria; Coos Bay History and Maritime Museum) and houses the regional office for the National Oceanic and Atmospheric Administration (NOAA), investigations of Oregon's submerged resources have not been a primary focus of any state or federal institution. However, over the past several years NOAA has been contracting with David Evans and Associates to conduct a hydrographic survey of the Columbia River from its mouth to the mouth of the Willamette River (David Evans and Associates 2009). The purpose of this effort was to locate any possible obstructions within the river's main transportation channel as well as identify areas that have been affected by natural shoaling. All shipwrecks identified during this process are added to a central information system, called the Automated Wreck and Obstruction Information System, that is used to update local hydrographic charts and confirm the location of shipping obstructions. Figure 8 offers an example of the identification of a well preserved shipwreck. With the use of multibeam bathymetry and multibeam side scan sonar data, information on the location of such sites may prove useful for future research opportunities as well as an invitation to recreational divers and professional looters. Treasure hunters now have access to search tools that are cheaper and more powerful than ever. Use of magnetometer and side scan sonar enable ships to map over 100 sq. mi. of ocean a day sensing objects as small as an oil drum 3 mi. below the surface (Koerner 1999). The equipment feeds data into shipboard computers that correlate GPS locations for finds. On one weekend in February 2012, two articles were highlighted by the Associated Press discussing shipwreck salvagers and the international appeal of treasure that can be recovered from shipwreck sites (Ballou 2012; Gera 2012). As mentioned earlier, in Oregon we have yet to appeal to the larger, more professional and well-equipped salvage operators but this absence does not mean that looting of submerged sites has yet to take hold in our state.

Central Oregon Coast Paleolandscape Reconstruction

15.5 ka cal BP (-114 m) to modern sea level (0 m)

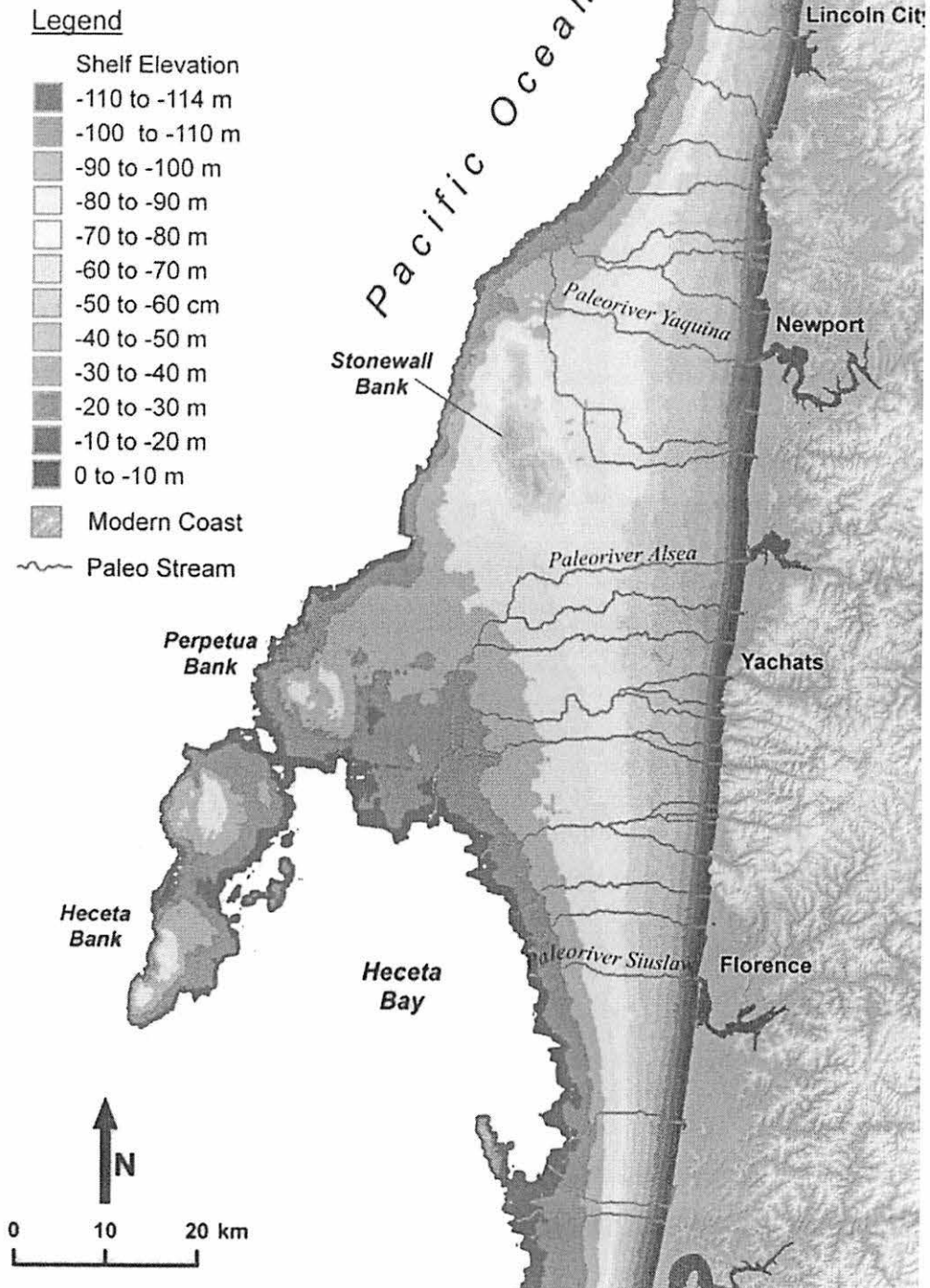


Fig. 7. Central Oregon coast paleolandscape reconstruction (from Jenevein 2010).
Management Challenges

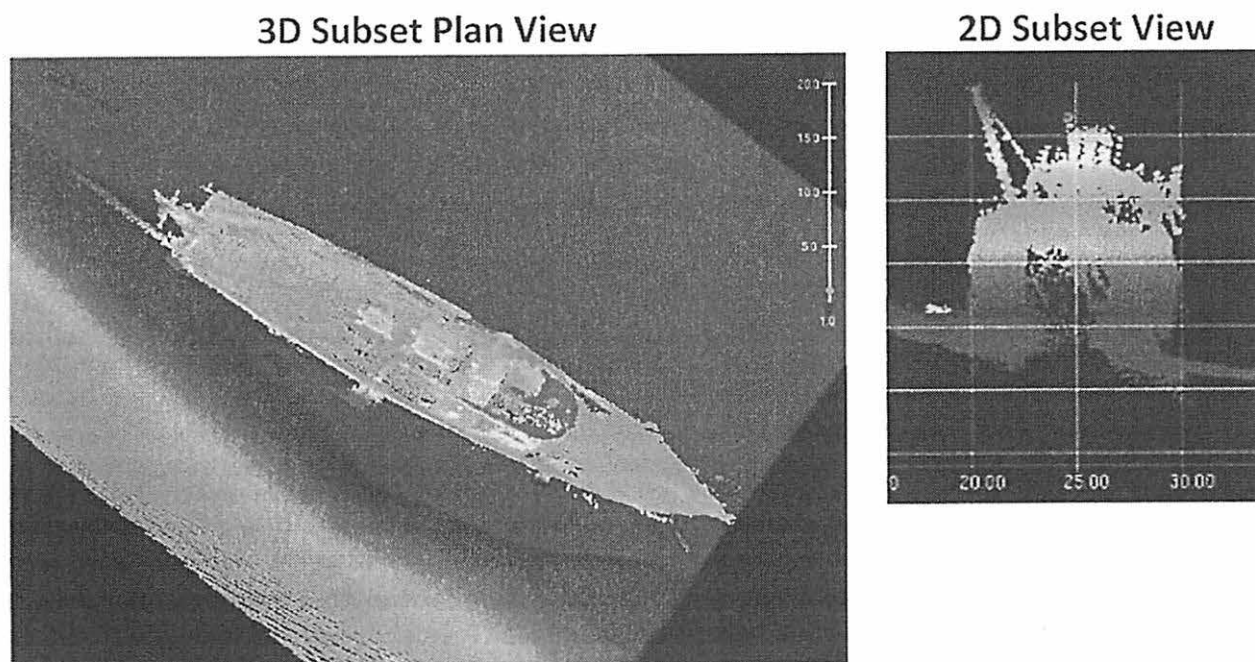


Fig. 8. Hydrographic survey results from the Columbia River, Oregon (from David Evans and Associates 2009).

How many such submerged sites are known to exist in Oregon? As noted above, efforts to locate submerged prehistoric sites off Oregon's coast is a long-term project that cannot be adequately ground-truthed until substantial funding can be assured. This is not expected in the immediate future; however, GIS modeling of the most likely areas to contain intact sediments is ongoing. Attempts to verify the condition of prehistoric sites inundated by the Columbia River are nonexistent but need to be addressed. Known submerged historic sites include many shipwreck sites along the coast and within the Columbia and Willamette Rivers; at least eight historic communities flooded when the Corps of Engineers constructed dams and reservoirs throughout the state; submerged Native American dugout canoes in at least two lakes and two rivers; both private and naval aircraft in interior lakes, numerous inter-tidal fishweirs (Tveskov 1995; Byram 1998), the remains of a minimum of 76 fishwheels in the Columbia River (Donaldson and Cramer 1971; Reese et al. 1990), and refuse scatters remaining from a minimum of 40 pre-1883 fish canneries on the Columbia that relied heavily on Chinese labor (Smith 1979).

Oregon has just entered a period when the next major earthquake and subsidence event could occur any time within the next 100 years. Such an event would likely result in destruction and flooding in many coastal communities and a relative raise in sea level (possibly as high as one meter) creating many new underwater archaeological sites. It is important that an assessment of current archaeological sites within this zone of influence be recorded before such a loss occurs.

There are currently two wave energy test facilities that have been approved off Oregon's coast. In addition, at least two major cultural resource-consulting firms are currently researching the state of known cultural resources off our coastline for firms interested in determining the viability of harnessing wind power from offshore turbines. It appears that the Coos Bay area will be the focus of the initial offshore wind power development area (Higgins 2012). Given the publicity, delays and bad relations that developed between energy engineers and tribal groups

resulting from the Nantucket Sound Cape Wind project, it will be important that consultation with coastal tribes begins early rather than late in the planning process. Tribes will need to become proactive if there are particular areas of the coast that are most sensitive to their people that might be adversely affected by future turbine placement. One good side that might come from the increased attention to the state's offshore waters is the availability of funding to assist in the mapping of the state's offshore coastal plain. Such data will not only assist in the routing of future project impacts away from areas likely to contain intact submerged coastal deposits, but in addition, help to highlight those areas most likely to yield significant information on early human coastal adaptation.

Summary

Recognition of the presence and importance of underwater archaeological sites in Oregon is of growing concern among regional archaeologists. However, knowledge of state laws protecting shipwreck sites remains largely unknown to the public. While a symposium at the 2012 Northwest Anthropological Conference attempted to reach the professional archaeological community regarding the need to consider underwater archaeological resources when conducting cultural resource management surveys and assessments, more public outreach is needed in order to gain widespread support. Recent articles in local papers (e.g., Tobias 2012; Wells 2012) highlight continued public interest in shipwrecks and local history. Such interest is bound to be renewed with the return of the *USS Shark* carronades to Oregon in the summer of 2013. It is important that the archaeological community strengthen efforts to educate and involve the public in underwater archaeological research. Williams's work in attempting to locate the "Spanish" Beeswax ship off Oregon's north coast provides a good example of continued public outreach and participation. With the continued effects of climate change likely to result in the uncovering of long buried shipwrecks along Oregon's coast, it is only a matter of time before a shipwreck is found that will again focus state and nationwide attention on our coastline. Public education and stewardship will prove essential if we hope to protect such discoveries from looting. Public talks, cooperative ventures and airing of underwater investigation videos (e.g., *The Archaeology Channel*) are a few of the ways that archaeologists can begin to build an interest within coastal communities to record and understand why such sites are in need of protection.

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GREAT BASIN OBSIDIAN AT THE DALLES: IMPLICATIONS FOR THE EMERGENCE OF ELITES IN THE SOUTHWESTERN PLATEAU

Rick Minor

ABSTRACT

The Dalles of the Columbia River was one of the two primary centers in the late prehistoric Plateau Interaction Sphere in which elites controlled the distribution of prestige items in the Plateau culture area in northwestern North America. Among the materials used in the manufacture of prestige items was obsidian from sources in the northwestern Great Basin. It has been suggested that a system for distributing Great Basin obsidian through The Dalles and northward into the Plateau was in existence by ca. 9,000 B.P. A review of the evidence indicates, however, that obsidian is scarce in early components at The Dalles. Prestige items made of exotic materials, including obsidian, do not appear at The Dalles until ca. 3,500 B.P. and substantial obsidian use at The Dalles dates to after that time. Current evidence indicates that the distribution of obsidian from the northwestern Great Basin expanded significantly with the establishment of the Plateau Interaction Sphere and the emergence of The Dalles as a primary center for interregional exchange after ca. 2,500 B.P.

The Dalles of the Columbia River at the southwestern edge of the Plateau culture area has long been recognized as one of the major centers for interregional exchange in western North America. This activity occurred in Native American settlements concentrated along the river banks at Fivemile Rapids, which, together with Celilo Falls some 16 km (9 mi) upstream, constituted the single most productive area for fishing in the entire Plateau, and possibly in all of North America (Hewes 1947:102). Although much of this activity involved “mutual cross-utilization of economic resources” among groups within the Plateau (Walker 1967), items and products from the adjacent Northwest Coast, Plains, and Great Basin also found their way into the exchange system centered at The Dalles (Anastasio 1972; Wood 1972; Walker 1997; Stern 1998).

Archaeological evidence, as well as ethnographic and ethnohistoric accounts, indicate that The Dalles was the most culturally complex area in the Plateau, and in fact was atypical of the Plateau culture area as a whole. The characteristics that distinguished the native population at The Dalles from the rest of the Plateau—ranked societies, practice of slavery, interment in burial houses—are often attributed to the presence of the Wishram and Wasco peoples, related linguistically to Chinookan-speaking peoples downstream on the Columbia River who are placed within the Northwest Coast culture area (e.g., Spier and Sapir 1930; Strong et al. 1930; Ray 1939). However, both linguistic and archaeological evidence suggest that the Wishram and Wasco moved upriver in late prehistoric or protohistoric times (Rigsby 1965; Minor and Walker 1993). The

cultural complexity represented in the archaeological record in The Dalles area was an autochthonous development that grew out of a basal cultural stratum that was fundamentally Plateau in nature (Minor 1988, 1997).

Building on previous studies of interaction spheres, Hayden and Schulting theorized that exchanges between communities in the Plateau would have been primarily managed by high-ranking individuals or elites, and that interactions between elites should be reflected more in prestige items than common utilitarian items (Hayden and Schulting 1997). Reviewing the archaeological literature, Hayden and Schulting mapped the distribution of prestige items as a means of defining the late prehistoric "Plateau Interaction Sphere" (Hayden and Schulting 1997). The Dalles area was identified as one of the two localities in the Plateau with the greatest concentration of prestige goods, the other being the Lillooet-Lytton area at the confluence of the Thompson River with the Fraser River in British Columbia.

Hayden and Schulting's concept of a late prehistoric "Plateau Interaction Sphere" has not seen universal acceptance (e.g., Quinn 2006). Objections to this concept by some Plateau archaeologists may stem in part from the fact that the interaction sphere was centered in exchange between the Lillooet-Lytton area and The Dalles. Although "secondary centers" existed, archaeological evidence of the interaction sphere may be scarce in some areas of the Plateau. As well, the concept of an interaction sphere controlled by elites challenges the ethnographic portrayal of exchange among Plateau peoples as involving mutually beneficial activity among culturally similar groups (e.g., Walker 1967; Anastasio 1972). As noted above, ethnographers have long recognized that the native groups at The Dalles were more culturally complex than peoples elsewhere in the Plateau. The task for archaeologists, then, is to trace the origins of this cultural complexity in the archaeological record at The Dalles.

Among the materials used in the manufacture of prestige items was obsidian, generally considered an exotic material obtained from outside the region due to lack of high-quality sources of obsidian in the Plateau (Galm 1994:280). Hayden and Schulting (1997:58) noted that "[o]bsidian was available from a number of sources (the best in central Oregon), was widely traded (Nelson, D'Auria, and Bennett 1975; Carlson 1994), and also may have been a material with considerable prestige attached to it, at least in some parts of the Plateau." The recovery of obsidian artifacts in the assemblage from the earliest prehistoric component at The Dalles dating to ca. 10,000 B.P. (Cressman et al. 1960), and the presence of obsidian specimens traced to Oregon sources in early contexts at sites to the north in British Columbia, has led to the assumption that the distribution of obsidian from sources in the northwestern Great Basin northward through an interregional exchange network at The Dalles began by 9,000 B.P. (Carlson 1994:318; cf. Quinn 2006:212; Sobel 2006:165).

The time depth for the manufacture and distribution of prestige items, and the materials from which they were made, in the Plateau is in need of better documentation (Hayden and Schulting 1997:79; Quinn 2006:212). Toward that end, this study examines the occurrence of obsidian at prehistoric sites at The Dalles. Included are the results of x-ray fluorescence (XRF) analysis of 60 obsidian specimens from three late prehistoric settlements on the Oregon shore in the vicinity of Fivemile Rapids. Although only one of the many raw materials used in the manufacture of prestige items, obsidian is the material most widely preserved and available for recovery in the archaeological record. In reviewing the evidence for obsidian at The Dalles, this study contributes to an understanding of the timing of the appearance of elites at The Dalles and the emergence of The Dalles as the premiere center for interregional exchange in the southern portion of the prehistoric Plateau.

The “Great Emporium” at The Dalles

The name “The Dalles of the Columbia” refers to the former great rapids a short distance upstream from the present city of The Dalles in Wasco County, Oregon. At The Dalles, the Columbia River begins cutting through the mountains of the Cascade Range, and its narrow channel becomes so constricted that rough rapids occur along the river for many kilometers. The term “The Dalles” refers collectively to several sets of rapids that, based on their distance upstream from the landing at the city, were called “Three Mile Rapids” (present location of The Dalles Dam), “Five Mile Rapids” (The Long Narrows), and “Ten Mile Rapids” (The Short Narrows). Historically, most attention was on the 4.8-km-long Fivemile Rapids, also known as The Dalles or The Great Dalles, immediately upstream from Big Eddy (McArthur 1982:725). Some 16 km upstream on the Columbia was Celilo Falls, identified on maps prepared by Lewis and Clark as “the Great Falls of the Columbia” (Moulton 1988:322, 324). In writing about trade among Native Americans on the Columbia River, Lewis and Clark in 1806 identified “the falls,” meaning The Dalles–Celilo section of the Columbia, as “the Great Mart of all this Country” (Moulton 1991:129). In his 1893 edition of the Lewis and Clark journals, historian Elliot Coues used the more colorful phrase “the great emporium . . . where all the neighboring nations assemble” to refer to The Dalles–Celilo section of the river (Coues 1893[2]:786).

The narrowing of the river channel along The Dalles–Celilo section of the Columbia River created “a first class natural dip-net and grab-hook fishery,” with stations along this section of the river collectively known as “The Dalles fisheries” (Gordon 1889:80–87). The Columbia was formerly one of the world’s most productive environments for salmon, and four of the five species common along the North Pacific Coast ascended upstream past The Dalles. The Columbia was also the principal center of abundance for steelhead trout on the Pacific coast, another anadromous species that migrates upstream past The Dalles. Aside from the concentration of fish in a narrow gorge where they could be caught in large numbers, another aspect of the environment at The Dalles was the warm dry winds, enabling rapidly dehydrated fish to be stored in huge amounts for consumption at other times of the year. Salmon and steelhead were most plentiful in The Dalles area during the summer (May through October) (Spier and Sapir 1930:174), and trading occurred, with dried fish as a primary commodity, from late spring into fall (Wood 1972:158; Stern 1998:641).

Wishram Ethnography, the primary description of ethnographic lifeways among the Chinookan groups at The Dalles, was based on linguistic fieldwork in 1905 by Edward Sapir and on ethnographic fieldwork in 1924 and 1925 by Leslie Spier (Spier and Sapir 1930). The section in the ethnography that describes trade at The Dalles contains little information obtained from informants, and instead draws heavily on historical accounts written by Lewis and Clark in 1805–1806 and by Alexander Henry in 1811. The Wishram occupied the north (Washington) shore at Fivemile Rapids, and the Wasco occupied the south (Oregon) shore. Spier and Sapir added that the Wishram “commonly render the name of their principal settlement, *Nixlu’idix* (now Spedis, Washington), as “trading place” (Spier and Sapir 1930:224). Although most accounts of trading activity at The Dalles have focused on the Chinookan-speaking Wishram and Wasco around Fivemile Rapids, native peoples upstream at Celilo Falls who spoke Sahaptin languages “shared in it equally” (Spier and Sapir 1930:224).

The role of the Wishram and Wasco in trading activity was entirely as middlemen (Spier and Sapir 1930:224). They served as hosts for trade fairs attended by people from native groups throughout the Plateau (Spier and Sapir 1930:228). Individuals sometimes had “special friends” or trading partners in other groups (Spier and Sapir 1930:225). A thoughtful consideration based

on ethnohistoric sources of the mechanisms by which goods were exchanged between native groups at The Dalles identified bartering, gambling, gifting among affinal kin (in-laws), and to initiate or confirm friendly relations, which might take on the appearance of tribute (Boyd 1996:64–66).

A number of writers have commented on the fact that environmental diversity within the Plateau contributed to the great variety of items brought for trade to The Dalles, with people from different areas tending to specialize in obtaining or producing different kinds of goods (Walker 1967:16; Anastasio 1972:120; Wood 1972:158; Stern 1998:642–642). Most of the exchanged items were of a perishable nature, such as skins, fur, fish, oil, roots, pemmican, feathers, robes, clothing, shells, slaves, and horses (Teit 1928:121–122; Spier and Sapir 1930:224–226). The perishable nature of most of the items known from ethnohistorical sources to have been traded contrasts with the materials represented in the archaeological record, which are overwhelmingly of stone and bone (as discussed further below). Significantly, references to obsidian as a commodity of exchange at The Dalles are conspicuously absent in the ethnographic and historical literature. The lack of references to the exchange of obsidian at The Dalles suggests that this was an aspect of traditional native lifeways that may have been discontinued early in the historic period. The study of obsidian from archaeological contexts thus has the potential to provide a temporal dimension that may illuminate aspects of interregional exchange at The Dalles not apparent in the ethnographic and ethnohistorical literature.

Previous Information about Obsidian at The Dalles

As elsewhere in the Plateau, lithic assemblages at prehistoric sites in The Dalles area are mostly composed of locally available raw materials. Chert was the preferred material for the manufacture of flaked stone tools, while basalt and quartzite were favored for the manufacture of heavy stone tools. All of these lithic materials are available in stream gravels, and often in outcrops as well, along the Columbia River. Probably in part because lithic assemblages are dominated by local materials, early reports on archaeological investigations in The Dalles area generally did not include data on the various types of lithic materials represented. Consequently, there is remarkably little site-specific information available about the occurrence of obsidian at prehistoric sites in The Dalles area.

Specific reference by Hayden and Schulting to information about obsidian use in The Dalles area was limited to a single citation, referring to excavations in the 1920s at a number of sites by Strong, Schenck, and Steward from the University of California (Strong et al. 1930:84). In their study, Hayden and Schulting listed obsidian as accounting for “~ 5% of lithics” from sites in The Dalles area (Hayden and Schulting 1997:56). Although only the use of obsidian in making projectile points (and not other artifact types) was discussed, the actual data from six site collections provided by the University of California archaeologists indicate that the proportion of obsidian points ranged from 2% to 15%, or an average of 8%. This figure was rounded up in the statement that obsidian “constituted approximately 10% of the points (Strong et al. 1930:84). Based on the occurrence of obsidian at sites of different ages, it was concluded that “obsidian was obtained and worked in our region *from the earliest times of which we have knowledge* [emphasis added]” (Strong et al. 1930:84). The investigations by the University of California archaeologists were conducted long before the invention of radiocarbon dating, but typological cross-dating of the projectile points found suggests that the sites excavated were occupied within the last 2,500 years before historic contact.

Some of the data regarding obsidian use summarized by the University of California archaeologists was derived from excavations at Wakemap Mound, the premiere late prehistoric site in The Dalles area, located at the upstream end of Fivemile Rapids. Additional information about obsidian use at Wakemap Mound can be gleaned from investigations in 1953 and 1954 by Caldwell (Caldwell 1956). Approximately 3% of the 623 “points and blades” recovered were made of obsidian. This category consists mostly of projectile points, but also appears to include items that would now be recognized as bifaces, knives, and preforms. Among the 2,500 “scrapers” found, only two, both in the subcategory “blades with parallel sides” ($n = 215$), were made of obsidian. The only other items in the flaked stone assemblage made of obsidian were one “elongate drill” and one “polyhedral core.”

The most influential publication on the prehistory of The Dalles area, by Luther S. Cressman and his students, presented the results of excavations from 1953 to 1956 at the Roadcut Site (35-WS-4) on the Oregon shore at the head of Fivemile Rapids, where evidence of occupation was found extending back 10,000 years. Cressman noted that “[t]he river gravels provided a great wealth of material for stone tools and many varieties of rock were used” (Cressman et al. 1960:68). Unfortunately, specific data on the frequency with which various lithic materials were represented among the artifacts recovered at the Roadcut Site were not provided.

The only reference to obsidian in Cressman’s publication on the Roadcut Site occurs in the description of Feature 29, a “continuous living area” with which a cache of artifacts including “five flake scrapers of obsidian,” was associated. Feature 29 was found in Level 31, near the top of Stratum 1. A composite sample of charcoal collected from throughout Stratum 1 yielded a radiocarbon date of $9,785 \pm 220$ RCYBP (Cressman et al. 1960:66). Stratum 2, which began in Level 30 (immediately above Feature 29) and extended upward to Level 25, produced a radiocarbon date of $7,675 \pm 100$ RCYBP (Cressman et al. 1960:66). According to Cressman:

The obsidian flakes in this cache are of particular significance for the nearest obsidian is probably to be found in the Bend area some 150 miles to the south. *Obsidian does not occur otherwise in the site until quite late and then only as the material for a few arrow points* [emphasis added]. Quite often the obsidian used then is the clear variety as though the effort was made to get a material that at least looked like the chalcedonies and other cryptocrystalline rocks which had provided the raw material for points for many centuries. (Cressman et al. 1960:63)

The Roadcut Site was revisited in 1993 when excavations under the direction of Virginia L. Butler were made “through about 3.5 vertical meters of primary sediment that includes the lower half of the 7.8 m thick deposit” previously investigated by Cressman and his students (V.L. Butler 1998:9; also see V.L. Butler and O’Connor 2004). Over 160 stone artifacts and “thousands of pieces of manufacturing debris” were recovered from cultural deposits from which radiocarbon dates with calibrated ages “ranging from about 9000 to 4900 yr B.P.” were obtained (V. L. Butler 1998:9–10). It was reported that “[o]bsidian was extremely scarce; only eight small flakes were recovered” [emphasis added]. Six of these were large enough for XRF analysis (carried out by Richard Hughes) which shows they came from three locations: Obsidian Cliffs, Inman Creek, and Dooley Mt (in the Blue Mountains)” (V.L. Butler 1998:10). These are the only XRF results previously reported from a prehistoric site at The Dalles.

On the Washington shore of the Columbia River at The Dalles is a series of sites from which B.R. Butler constructed an occupation sequence comparable to that at the Roadcut Site (B.R. Butler 1959). The assemblage from the early component at Indian Well (45-KL-42) includes leaf-shaped projectile points, large oval knives, end and side scrapers, graters, peripherally flaked

cobbles, cobble choppers, and hammerstones (B.R. Butler 1959:13). The Indian Well I component was associated with Stratum 4, the lowest artifact-bearing stratum at the site. A brief comment on the lithic materials represented among the stone tools noted that “*only one small flake of obsidian has been recovered from Stratum 4* [emphasis added],” as “most of the artifacts are made of cryptocrystalines” (B.R. Butler 1959:13). Although no radiocarbon dates were obtained, Indian Well I was viewed as most similar to and contemporaneous with the early component across the river at the Roadcut Site. These two components were in turn grouped by B.R. Butler into the Early Period in The Dalles area, estimated to date between 10,000 and 7,500 B.P. (B.R. Butler 1959:20–21).

Prestige goods, including some made of obsidian, first appear much later in the archaeological record at The Dalles. Most of what is known about prestige goods is from efforts by B.R. Butler to document evidence of prehistoric occupation along the Washington shore of Fivemile Rapids in the face of widespread and massively destructive looting by relic collectors, an activity that peaked in the years immediately prior to inundation of the prehistoric settlements along Fivemile Rapids by Lake Celilo behind The Dalles Dam in 1957 (B.R. Butler 1959, 1960, 1962, 1963, 1965). Most of the prestige goods at The Dalles apparently were recovered from mortuary contexts, and the information available from The Dalles was incorporated into a comprehensive study of mortuary variability and status differences in the Plateau by Schulting (Schulting 1995).

The earliest occurrence of prestige goods is represented at the multi-component Congdon Site (45-KL-41) located on the Washington shore along the lower center of Fivemile Rapids (B.R. Butler 1959:9–10; 1963; Schulting 1995:82–84). Overlying an older village site (Congdon I) were two major burial components. Congdon II was “a large cremation pit, noted as being especially rich in stone beads, carved stone amulets, steatite rings, and atlatl weights” (Schulting 1995:82). Congdon III was “a series of multiple mass burials which appeared to have been intrusive into one end of the Congdon II cap. . . .” (B.R. Butler 1963:16). The artifacts from Congdon II and Congdon III, which were “not distinguishable” (B.R. Butler 1959:10), were characterized as follows:

Sociotechnic artifacts include *Dentalium* and shell disc beads, a variety of stone beads, fragments of bone carvings, large zoomorphic stone carvings, red and white pigments, and so called “paint pots” (small, often decorated, mortars). A stone celt and a carved maul may also have functioned as prestige objects. Stone beads, made of steatite and sandstone or siltstone, were found up to 6.5 cm in length. *A number of the stone knives and points are made of exotic materials such as obsidian* [emphasis added] and are exceptional in their length and manufacture—these might have functioned at least partly as prestige objects as well (Schulting 1995:83).

On the basis of artifact cross-dating and without the benefit of radiocarbon dates, “*a beginning date* [emphasis added] of 1000–1500 B.C.” was suggested for the burial components at the Congdon site (B.R. Butler 1959:18). In a later discussion, B.R. Butler referred to these components as “tentatively dated at 1500–1000 B.C.,” which could be interpreted to imply that he thought their deposition spanned a 500-year-period between 1,500 and 1,000 BC (B.R. Butler 1963:16). An examination of photographs of projectile points from the Congdon burial components indicated the presence of broad-necked side- and corner-notched specimens, all of which according to Schulting “could be accommodated within the range of approximately 3500 to 3000 B.P.” (Schulting 1995:83).

Mortuary practices and associated prestige goods similar to those at the Congdon Site were reportedly present at other sites in The Dalles area (e.g., the Big Leap and Maybe sites), but most

of these localities were destroyed by relic collectors before they could be documented in more than a cursory way (see B.R. Butler 1959; Schulting 1995). Among these mortuary sites was the later component at Indian Well (45-KL-42), which apparently included some evidence of cremation as well as talus burials. Butler (1959:14) provided a long list of associated prestige goods:

The artifact inventory includes: innumerable tiny disk-shaped beads of felsite; larger, less numerous, bead[s] of serpentine, steatite and jet; large steatite rings, two of which have small animal heads projecting from the outer rim; small steatite animal pendants with incised ribs and dorsal-ventral perforations 1–3 in number; elliptical, two-hole stone gorgets; about 500 phyllite sticks, of varying sizes, which resemble crude tongue blades; small nephrite celts; wide-flanged mauls with incurvate grips and dome tops; large sandstone and vesicular lava pipes; thin-walled elbow pipes, of soft stone, with a narrow, flaring fin extending from the base of the bowl; various objects of vesicular lava; a single type of stone atlatl weight; a slab of basalt with a series of chevrons incised across one face; thin-walled stone vessels with elaborate geometric incisions on the exterior wall; stone sculptures, both anthropomorphic and zoomorphic, executed in Late Lower Columbia Valley styles; a stone “club” with a carefully pecked grip, rectanguloid in cross-section, with two small tit-like projections from the narrow side of the head end (its form is that of an incipient “slave killer” type of stone club); several well made blades with excurvate edges, a wide tang tapering to a straight or rounded base, and which measure up to nearly 6.5 in. in length—these are the largest tanged blades that I have seen in The Dalles Region; chipped stone points, graters and scrapers which appear to grade into the types found at Wakemap Mound—however, the diagnostic Plateau Pentagon point found at Wakemap is not present.

Although not specifically mentioned in the account by B.R. Butler quoted above, obsidian is known to have been used in the manufacture of some of the flaked stone items that represent prestige items (Schulting 1995:45–46). Most of these kinds of items are rarely found during controlled excavations by archaeologists and are mainly known from publications by relic collectors (Strong 1959; Seaman 1967). Flaked stone items that likely served as crafted prestige items include exceptionally finely made knives (Strong 1959:Figures 61 and 64) and projectile points (e.g., Strong 1959:Figure 47); chipped stone eccentrics occurring in both zoomorphic and abstract forms (Strong 1959:Figure 62); and chipped stone crescents that may have served as “nose pieces” (Strong 1959:Figure 63). A date range from 1900 to 1400 B.P. was estimated for the Indian Well component (B.R. Butler 1959:15). However, a similar complex of artifacts at Wakemap Mound, known from radiocarbon dating to have been occupied for the most part within the last 2,000 years, suggests that the mortuary practices in evidence at Indian Well II were broadly representative of the late prehistoric period in The Dalles area.

Aside from prestige goods in mortuary contexts, evidence of elites also is represented in the distinctive Lower Columbia River art style in which, among the more common motifs, anthropomorphic figures wearing an elaborate hat or headdress indicative of special status are depicted (Strong 1945:250–251). Most known examples were looted from sites by relic collectors rather than recovered during controlled excavations by archaeologists, but a number have made their way into museums, where these figures are portrayed in a variety of materials, including stone, bone, wood and ceramics (Mercer 2005:25–37).

In summary, the limited information available indicates that obsidian at The Dalles occurs in both mortuary and midden contexts. In contrast to the situation farther downstream on the Columbia River where obsidian has been characterized as a “non-wealth good,” at The Dalles obsidian was used in the manufacture of both utilitarian and crafted prestige items (Sobel 2012:18). Unfortunately, because most of the field investigations in The Dalles area were conducted more than a half-century ago, data from carefully controlled excavations are limited. At the present time, information about obsidian use at The Dalles is mainly available from two localities occupied during the late prehistoric period.

Obsidian at the Lone Pine Site

The Lone Pine Site (35-WS-247) is located on the south shore of the Columbia River about 1 km downstream from the lower end of Fivemile Rapids. This site falls within the ethnographic territory of the Chinookan Wasco, which extended along the Oregon shore of the Columbia River from Crates Point upstream to Fivemile Rapids, and corresponds to the Wasco settlement of *wotsaqs* meaning “lone pine” (Spier and Sapir 1930:168; Boyd 1996:46).

Archaeological testing was carried out in 1995 in advance of proposed improvements to the Lone Pine Treaty Fishing Access Site (Minor 1997). Treaty Fishing Access Sites (TFAS), also known as “in lieu sites,” are replacements for the usual and accustomed fishing sites formerly used by the Treaty Tribes that were inundated as a result of dam construction on the Columbia River. Small-scale testing involving the excavation and screening (through 1/8-in. mesh) of approximately 10.5 m³ of the cultural deposits resulted in the recovery of 287 flaked stone tools, 27 heavy stone tools (made on rounded river cobbles or large basalt flakes), and 25,076 pieces of flaked stone debitage. Charcoal recovered from 138 to 153 cm below surface in one test pit produced a radiocarbon date of 1,320 ± 50 RCYBP. While the lithic assemblage was mostly composed of locally available materials (chert, basalt, quartzite, petrified wood), obsidian was used in the manufacture of 11.5% of the flaked stone tools and made up 12.5% of the total debitage recovered from the Lone Pine Site.

Thirty-three obsidian specimens recovered during the 1995 investigations at the Lone Pine Site subjected to XRF sourcing analysis yielded reliable quantifiable data (Hughes 1996). Ten different obsidian sources are represented (Table 1). The most commonly represented source was Obsidian Cliffs (n = 10), followed by the Whitewater Ridge area (n = 4), Newberry Volcano (n = 3), and Cougar Mountain (n = 2). Single samples were attributed to the Inman Creek gravels, Juniper Spring area, Dog Hill, Quartz Mountain, Dooley Mountain, and Little Bear Creek obsidian. The remaining eight samples have trace element profiles unlike any of the standards currently in the regional database maintained by the Geochemical Research Laboratory. With the exception of the Inman Creek gravels in the Willamette Valley, all of the other obsidian sources represented are situated in eastern Oregon or, in the case of Obsidian Cliffs, immediately to the west in the Cascade Range.

Obsidian at Crates Point

Crates Point is a promontory on the Oregon shore of the Columbia River approximately 8 km downstream from the Lone Pine Site. Although Crates Point has been identified as the downstream boundary of Chinookan Wasco territory (Boyd 1996:46), ethnographic sources do not identify any settlements by the Wasco (or any other native group) there (Spier and Sapir 1930:160).

TABLE 1. XRF ANALYSIS RESULTS FROM THE LONE PINE AND CRATES POINT SITES

Site/Artifact No.	Provenience	Artifact Class	Obsidian Source
Lone Pine (35WS247)			
TPA-2/1-6	Test Pit A, L2, S1	Projectile point tip fragment	Obsidian Cliffs
TPA-3/1-7	Test Pit A, L3, S1	Used flake	Obsidian Cliffs
TPA-3/1-8	Test Pit A, L3, S1a	Used flake	Unknown A
TPB-12/1-3	Test Pit B, L12, S1	Biface edge fragment	Newberry Volcano
TPB-12/1-4	Test Pit B, L12, S1a	Uniface	Newberry Volcano
no number	Test Pit B, L13, S1	Debitage	Quartz Mountain
TPB-13/1-9	Test Pit B, L13, S1a	Biface midsection fragment	Obsidian Cliffs
TPB-13/1-10	Test Pit B, L13, S1b	Biface midsection fragment	Whitewater Ridge
no number	Test Pit B, L14, S1	Debitage	Unknown
TPB-15/1-12	Test Pit B, L15 S1	Used flake	Unknown B
TPB-16/1-7	Test Pit B, L16, S1	Biface midsection fragment	Cougar Mountain
TPC-7/1+2-2	Test Pit C, L7, S1+2	Used flake	Inman Creek
TPC-9/2-2	Test Pit C, L9, S1	Biface tip fragment	Cougar Mountain
TPD-7/2-6	Test Pit D, L7, S2	Biface edge fragment	Dog Hill
TPE-14/3-2	Test Pit E, L14, S3	Projectile point barb fragment	Obsidian Cliffs
TPE-17/3-1	Test Pit E, L17, S3	Biface midsection fragment	Obsidian Cliffs
TPF-6/1-6	Test Pit F, L6, S1	Biface midsection fragment	Juniper Spring area
TPF-9/1+2-4	Test Pit F, L9, S1+2	Projectile point base fragment	Little Bear Creek?
TPF-10/2-1	Test Pit F, L10, S2	Biface tip fragment	Obsidian Cliffs
TPF-10/2-2	Test Pit F, L10, S2a	Biface tip fragment	Dooley Mountain
PR5-4/1-1	Probe 5, L4, S1	Biface tip fragment	Unknown A
PR6-3/1-3	Probe 6, L3, S1	Projectile point base fragment	Obsidian Cliffs
PR8-4/2-2	Probe 8, L4, S2	Used flake	Unknown
PR9-3/1-1	Probe 9, L3, S1	Biface edge fragment	Obsidian Cliffs
PR17-2/1-5	Probe 17, L2, S1	Biface edge fragment	Whitewater Ridge
PR20-2/1-1	Probe 20, L2-3, S1	Projectile point	Unknown
PR25-4/2-1	Probe 25, L4, S2	Biface midsection fragment	Obsidian Cliffs
PR26-5/2-3	Probe 26, L5, S2	Biface midsection fragment	Unknown
PR30-7/2-2	Probe 30, L7, S2	Biface tip fragment	Unknown B
PR30-8/2-1	Probe 30, L8, S2	Used flake	Newberry Volcano
PR23-7/1-2	Probe 23, L7, S1	Biface edge fragment	Obsidian Cliffs
AH7-13/2-1	AH7, L13, S2	Projectile point base fragment	Whitewater Ridge
AH7-14/2-1	AH7, L14, S2	Biface edge fragment	Whitewater Ridge
Crates Point (35WS221, 1991)			
S-30 #1	S-30, 50-60 cm	Debitage	Obsidian Cliffs
S-40 #1	S-40, 10-20 cm	Debitage	Newberry Volcano
S-60 #1	S-60, 50-60 cm	Debitage	Obsidian Cliffs
S-70 #1	S-70, 30-40 cm	Debitage	Unknown
S-70 #2	S-70, 40-50 cm	Debitage	Obsidian Cliffs
S-70 #3	S-70, 60-70 cm	Debitage	Obsidian Cliffs

Site/Artifact No.	Provenience	Artifact Class	Obsidian Source
S-80 #1	S-80, 60–70 cm	Debitage	Unknown
S-110 #1	S-110, 50–60 cm	Debitage	Obsidian Cliffs
S-110 #2	S-110, 60–70 cm	Debitage	Unknown
S-110 #3	S-110, 120–130 cm	Debitage	Obsidian Cliffs
Crates Point (35WS221, 2003)			
Landfill Con-1	Disturbed Sediments	Projectile Point	Obsidian Cliffs
Landfill 5/14/03	Disturbed Sediments	Knife Fragment	Wise Flat
B-2	Disturbed Sediments	Projectile Point	Obsidian Cliffs
Pile B	Disturbed Sediments	Debitage	Quartz Mountain
Hole B #1	Disturbed Sediments	Debitage	Obsidian Cliffs
Hole B #2	Disturbed Sediments	Debitage	Obsidian Cliffs
4/30/03	Surface	Debitage	Newberry Volcano
TP1 #1	TP1, 90–100 cm	Debitage	Obsidian Cliffs
TP1 #2	TP1, 100–110 cm	Debitage	Newberry Volcano
TP2 #1	TP2, 10–20 cm	Debitage	Obsidian Cliffs
TP3-6/1-1	TP3, 50–60 cm	Used Flake	Newberry Volcano
35WS242 (2003)			
TPA #1	TPA, 20–30 cm	Debitage	Obsidian Cliffs
TPA #2	TPA, 30–40 cm	Debitage	Obsidian Cliffs
TPA #3	TPA, 40–50 cm	Debitage	Obsidian Cliffs
TPA #4	TPA, 50–60 cm	Debitage	Newberry Volcano
TPA #5	TPA, 60–70 cm	Debitage	Obsidian Cliffs
TPA #6	TPA, 110–120 cm	Debitage	Obsidian Cliffs

Furthermore, no evidence indicating use of the area by native peoples in the historic period has so far been found at sites on Crates Point. Archaeological investigations have been conducted at Crates Point on a number of occasions, resulting in the recording of two prehistoric sites (35-WS-221, 35-WS-242).

The Crates Point Site (35-WS-221) was initially recorded in 1989 after prehistoric artifacts and human skeletal remains were exposed on the ground surface on the east side of the Union Pacific railroad tracks as a result of illicit digging by relic collectors (Minor and Hemphill 1990). Subsequent investigations in 1990 (Minor and Beckham 1991), 1994 and 1995 (Tasa 1995a, 1995b), and 2003 (Minor 2003, 2004) established that evidence of prehistoric occupation also is present, although in lighter density, on the west side of the railroad tracks as well. The single radiocarbon date available, derived from charcoal collected from a layer of angular rocks overlying the burials in the cemetery area, produced a radiocarbon date of 560 ± 180 RCYBP (Minor and Hemphill 1989:68–69). Altogether, 85 heavy stone tools, 137 flaked stone tools, and 4,857 pieces ofdebitage have been recovered during the various investigations. While the lithic assemblage again was mostly composed of locally available raw materials, obsidian was used in the manufacture of 5.1% of the flaked stone tools and made up 1.4% of the totaldebitage recovered from the Crates Point Site.

Evidence of prehistoric occupation occurs in light density over much of the rest of Crates Point, but only one area contained cultural material in sufficient density to warrant formal recording as an archaeological site. Small-scale test excavations in 1990 and 2003 established the presence of a buried lithic scatter recorded as 35-WS-242 on the upper terrace at Crates Point (Minor and Beckham 1991; Minor 2004). Altogether, 2 heavy stone tools, 5 flaked stone tools, and 179 pieces of debitage have been recovered within the site boundaries. No flaked stone tools of obsidian have been found, but obsidian made up 37.4% of the total debitage recovered. The single temporally diagnostic artifact found was a fragmentary small arrow point indicative of occupation within the last 2,000 years. Elsewhere on the upper terrace at Crates Point, however, two large atlatl-size points of chert have been found, suggesting some activity on the upper terrace sometime before circa 2,000 years ago (Minor 2004:35).

In conjunction with the 1990 project at Crates Point, ten obsidian specimens from the Crates Point Site (35-WS-221) were submitted for XRF sourcing analysis (Hughes 1991). It should be noted that all of these specimens were from the area west of the Union Pacific Railroad tracks, and their relationship to the burials in the late prehistoric cemetery on the east side of the tracks thus remains unknown. From the 2003 investigations, 11 additional obsidian specimens from the west side of the railroad tracks at the Crates Point Site (35-WS-221), and 6 obsidian specimens from prehistoric site 35-WS-242, submitted for XRF sourcing analysis yielded quantifiable data (Hughes 2003). Altogether, then, 27 obsidian specimens from Crates Point have yielded reliable XRF results (Table 1). The obsidian specimens from Crates Point subjected to XRF analysis are from four sources in central Oregon (Fig. 1). Specifically, 17 specimens are from Obsidian Cliffs, 5 are from Newberry Volcano, 1 is from Wise Flat, and 1 is from Quartz Mountain. Three specimens are from unknown sources.

Patterns in Obsidian Use at The Dalles

In a review of prehistoric exchange in the Plateau, Galm observed that “in no site or time period is obsidian represented as more than an extreme minority raw material occurrence (Galm 1994:282). In most reported instances, obsidian debitage and formed implements/objects, if present at all, occur in frequencies representing less than 1% of total chipped stone assemblages.” The low frequency of obsidian recovered in the early cultural deposits at the Roadcut Site on the Oregon shore indicates that, as elsewhere in the Plateau, obsidian was not widely available to early prehistoric peoples at The Dalles. As noted above, Cressman reported finding only “five flake scrapers” in a feature near the top of Stratum 1, the early deposit whose age is based on a composite sample of charcoal collected from throughout the stratum that yielded a radiocarbon date of $9,785 \pm 220$ RCYBP (Cressman et al. 1960:66). In later excavations at the Roadcut Site, V.L. Butler reported finding only eight small obsidian flakes from cultural deposits with associated radiocarbon dates with calibrated ages “ranging from 9000 to 4000 B.P.” (V.L. Butler 1998:10). Likewise, B.R. Butler reported finding only one obsidian flake among the artifacts recovered from the Indian Well I component on the Washington shore (B.R. Butler 1959:13). Current evidence indicates, then, that obsidian is relatively rarely represented in early assemblages, which, using V.L. Butler’s age estimate, would include sites/components occupied before 4,000 B.P.



Fig. 1. Location of prehistoric areas/sites and obsidian sources referenced in text. Obsidian sources: 1, Obsidian Cliffs; 2, Three Sisters; 3, Newberry Volcano; 4, Glass Buttes; 5, Quartz Mountain; 6, Cougar Mountain; 7, Wise Flat; 8, Juniper Springs; 9, Dog Hill; 10, Whitewater Ridge; 11, Little Bear Creek; 12, Squaw Butte; 13, John Day; 14, Dooley Mountain; 15, Baker; 16, Inman Creek (stream gravels in Willamette River). Sources 1 through 4 above provide most of the obsidian represented in the Plateau; other sources are much more sparsely represented.

Current information seems to indicate that obsidian first occurs in significant frequency at the Congdon site, estimated to date from 3500 to 3000 B.P. (Schulting 1995:82–84). Obsidian occurs there in the form of, and/or in association with, prestige goods collected from mortuary contexts. Most of the prestige goods observed at the Congdon site, and in other mortuary contexts in The Dalles area, were looted by relic collectors and consequently have been scattered to the winds. None of the obsidian artifacts from mortuary contexts at The Dalles has been subject to sourcing analysis.

Currently, the best record of obsidian use at The Dalles comes from the Lone Pine and Crates Point sites, which date to the late prehistoric period (2,500 to 200 B.P.). Obsidian artifacts from these sites are from controlled small-scale excavations in non-mortuary contexts where rigorous recovery methods (1/8-in. mesh screens) were employed. The samples recovered thus provide a different perspective on obsidian use from that derived from earlier investigations in mortuary contexts at sites along Fivemile Rapids.

In comparison with the Plateau as a whole, data available from the Lone Pine and Crates Point sites indicate that obsidian is much more frequently represented among the flaked stone tools and debitage found in late prehistoric sites in The Dalles area. The highest proportions of obsidian, 11.5% of the flaked stone tools and 12.5% of the debitage, and the highest number of obsidian sources represented ($n = 10$), occur at the Lone Pine Site at the downstream end of Fivemile Rapids, the geographic focus of late prehistoric occupation in The Dalles area. The occurrence of obsidian appears to decline at the sites farther downstream from Fivemile Rapids, but obsidian still accounts for 5.1% of the flaked stone tools at the Crates Point Site (35-WS-221) and, somewhat surprisingly, for 37.4% of the debitage at 35-WS-242 on the upper terrace at Crates Point. Comparable data are available from only one other site in The Dalles area. At 35-WS-14, about 13 km downstream from Fivemile Rapids, 2.2% of the flaked stone tools and 1.1% of the debitage were of obsidian (Minor 1994).

Among the flaked stone tools recovered from the Lone Pine and Crates Point sites, obsidian most often occurs in the form of biface fragments, apparently broken while making projectile points, and secondarily as projectile points and used flakes, with one knife fragment also represented. Obsidian debitage uniformly occurs as small finishing/retouch flakes and shatter from the final stages of flaked stone tool manufacture (most of the debitage recovered is too small for XRF sourcing). Many of the obsidian items from these sites are small enough that they probably would not have been recovered during earlier investigations (i.e., during the 1950s, before 1/8-in. mesh screens were used).

Distance-to-source data indicate that most of the obsidian identified to source from the Lone Pine and Crates Point sites was obtained from the closest source, Obsidian Cliffs ($n = 27$; Table 2). This source lies approximately 166 km to the south of The Dalles in the mountains of the Cascade Range along the western edge of the northwestern Great Basin. Obsidian from the next closest source at Newberry Crater, approximately 209 km to the south, is a distant second in frequency ($n = 8$). Obsidian from nine other sources was identified, but these account for only a small number of the total sample ($n = 14$). Eleven specimens are from unknown sources. With the exception of Inman Creek in the Willamette Valley and Obsidian Cliffs in the Cascades, all of the other obsidian sources represented are situated east of the Cascade Range in central Oregon (Fig. 1).

The number of obsidian sources represented declines with distance downstream from Fivemile Rapids. In comparison with the ten different obsidian sources represented at the Lone Pine Site 1 km downstream from Fivemile Rapids, only four sources are represented at the Crates Point Site (35-WS-221), and only two sources are represented at 35-WS-242, both about 9 km downstream from Fivemile Rapids. A similar pattern is suggested by the results of XRF sourcing analysis on obsidian artifacts from the Celilo Treaty Fishing Access Site (35-WS-142), some 16

km upstream on the Columbia near Celilo Falls, where obsidian from eight sources (four of which are among the same sources identified at the Lone Pine and Crates Point sites) was identified (Skinner and Davis 1998).

The decline in the number of sources represented at sites upstream and downstream on the Columbia is consistent with the idea that the obsidian trade flowed primarily through the settlements along Fivemile Rapids, where the greatest number of obsidian sources would be expected to be represented. From the settlements along Fivemile Rapids, obsidian from sources in the northwestern Great Basin was distributed to prehistoric peoples living downstream at secondary exchange centers at the Cascades of the Columbia and Portland Basin (Sobel 2004, 2006, 2012).

The absence of references to obsidian in ethnographic and ethnohistorical accounts of the exchange center at The Dalles is curious, especially in view of the fact that obsidian from Great Basin sources continued to be distributed down the Columbia River to villages at the Cascades (Clahcclallah) and in the Portland Basin (the Meier site and Cathlapotle) in the post-contact period (Sobel 2012:14, Table 8). Perhaps the distribution of obsidian in its raw material form was a low-key activity embedded within the larger exchange network, which, judging from ethnohistorical accounts, largely involved perishable items. The eventual disappearance of the obsidian trade was almost certainly related to the decimation of the native population following the introduction of smallpox and other infectious diseases from indirect contact with Euroamericans (Boyd 1999:28–32). Abrupt decline in the native population at The Dalles is graphically illustrated in the construction and use of burial sheds or vaults containing the remains of hundreds of individuals (see Strong 1959:80–83; Seaman 1967:114–115). As the largest and densest native populations typically were most severely affected (Dobyns 1992), The Dalles area was almost certainly among the earliest in the Plateau to suffer catastrophic population decline early in the historic period.

TABLE 2. OBSIDIAN SOURCES REPRESENTED AT THE LONE PINE AND CRATES POINT SITES

Obsidian Source	Distance from The Dalles ^a	<u>Lone Pine</u> 35WS247		<u>Crates Point</u> 35WS221 35WS242			Totals
		Tools	Debitage	Tools	Debitage	Debitage	
Obsidian Cliffs	166 km	10	0	2	10	5	27
Newberry Volcano	209 km	3	0	1	3	1	8
Whitewater Ridge	258 km	4	0	0	0	0	4
Quartz Mountain	219 km	0	1	0	1	0	2
Cougar Mountain	244 km	2	0	0	0	0	2
Wise Flat	246 km	0	0	1	0	0	1
Juniper Spring Area	213 km	1	0	0	0	0	1
Little Bear Creek	260 km	1	0	0	0	0	1
Dog Hill	263 km	1	0	0	0	0	1
Dooley Mountain	270 km	1	0	0	0	0	1
Inman Creek	246 km	1	0	0	0	0	1
Unknown		7	1	0	3	0	11
Site Totals		31	2	4	17	6	60

^a Estimated straight-line distance; actual travel distance would obviously be greater.

Great Basin Obsidian in British Columbia

The first evidence suggesting that obsidian from Great Basin sources reached the prehistoric inhabitants of British Columbia at an early date was reported from the Milliken site (DjRi-3) in the Fraser River Canyon (Borden 1975:66–67). A single specimen of obsidian “dating to just over 8000 B.P.” was traced by XRF analysis to “the poorly known source at Little Bear Creek” in Oregon (Carlson 1994:315). This finding led to the statement that “[f]rom this perspective, obsidian trade started in all regions of the Northwest by 9,000 years ago” (Carlson 1994:318). In a subsequent reference to the sourced specimen from the Milliken site, Mitchell and Pokotylo (1996:70) noted that “X-ray fluorescence analysis indicates the item’s element composition is most similar to fingerprints for Oregon sources, but a new source in the Cascade Mountains in Washington is also a likely source (R. Carlson, personal communication 1987).”

A pioneering study using XRF analysis by Nelson, D’Auria, and Bennett traced 20 obsidian artifacts recovered from the Helen Point site (DfRu-8) on Mayne Island in the Gulf of Georgia to sources in Oregon identified as “Three Sisters Mountains; Glass Buttes #2, two unknown types” (Nelson, D’Auria, and Bennett 1975). In a subsequent compendium of XRF analysis results by Carlson, obsidian from sources in the northwestern Great Basin was identified at 18 sites in British Columbia, with 203 specimens from eight obsidian sources represented in all (Carlson 1994) (Table 3). Over half of the specimens (105, or 52%) from Great Basin sources identified in British Columbia were recovered from the Helen Point site.

Temporal information on the occurrence of obsidian at prehistoric sites in British Columbia presented by Carlson was limited to obsidian found at Namu (ElSx-1) and Helen Point (Carlson 1994). The earliest obsidian from Great Basin sources dates to 4,000–5,000 B.P., and includes a single specimen from Newberry Volcano found at Namu (the only obsidian from a Great Basin source found at the site), and five specimens from Newberry Volcano and nine specimens from Three Sisters found at Helen Point (Carlson 1994:322, Table 11). The number of obsidian specimens from Great Basin sources at Helen Point reached a high of 35 (16 from Three Sisters, 19 from Newberry Volcano) from 3,000 to 4,000 B.P. All other occurrences of obsidian from Great Basin sources at sites in British Columbia apparently postdate 3,000 B.P.

Significantly, all of the obsidian found at sites in British Columbia is from sources in the northwestern Great Basin. Obsidian sources in the Cascade Mountains and west of the Cascade Range in western Oregon that are strongly represented in the Portland Basin (e.g., at the Meier site and Cathlapotle) have not been identified at sites in British Columbia. This situation seems to indicate that the obsidian found at sites in British Columbia was distributed northward through the exchange center at The Dalles along interior routes as part of the Plateau Interaction Sphere, rather than from settlements downstream on the Columbia River involving distribution of obsidian along routes west of the Cascades and/or along the Pacific coast (*contra* Carlson 1994:318).

Conclusions

Interpretation of prehistoric obsidian use at The Dalles is complicated by the fact that the evidence occurs in the form of two contrasting data sets. The evidence of use of obsidian in the manufacture of prestige goods is derived from sites, often including burial contexts, along the river banks that were subject to large-scale excavations (often by self-styled “amateur archaeologists”) in the 1950s. These sites, occupied between ca. 3,500 B.P. and historic contact, are now inundated under reservoirs. The data reported here on obsidian sources represented at The

TABLE 3. NORTHWESTERN GREAT BASIN OBSIDIAN REPRESENTED AT PREHISTORIC SITES IN BRITISH COLUMBIA

Area / Site	Three Sisters	Newberry Volcano	Glass Buttes	John Day	Squaw Butte	Cougar Mtn.	Baker	Little Bear	Totals
Central Coast									
Grant Anchorage (FcTe-4)				1					1
Namu (EISx-1)		1							1
Queen Charlotte Strait									
Chatham Channel (EdSn-38)				1					1
North Georgia Strait									
Port Alberni (DhSe-7)		1	1						2
Gulf Islands									
Helen Point (DfRu-8)	45	37	13	7				3	105
Tolan's Beach (DfRu-24)	6	1	2		1	1		1	12
False Narrows (DgRw-4)	1	1	3						5
Pender Canal (DeRt-1)	1	1	4	3					9
Pender Canal (DeRt-2)		1							1
South Vancouver Island									
Willows Beach (DcRt-10)			18	1	2				21
Bowker Creek (DcRt-13)			1	3					4
Lower Fraser									
Marpole (DhRs-1)	3	3	6	1					13
Saint Mungo (DgRr-2)	1					1	1	1	4
Whalen (DfRs-3)	2	1							3
Milliken (DjRi-3)	1			1				3	5
Maurer (DhRk-8)		1		4				4	9
Crescent Beach (DgRr-1)		2	1	1					4
Southeast British Columbia									
McCall (DhQv48)		1					2		3
Totals (18 Sites)	60	51	49	23	3	2	3	12	203

Dalles, on the other hand, are from utilitarian tools and debitage recovered from non-burial contexts at sites subjected to small-scale test excavations in the last few decades. These sites, situated above the former river banks, were occupied within the last 1,000 years. The information contained in both data sets needs to be considered in arriving at a comprehensive understanding of obsidian use by prehistoric peoples at The Dalles.

Contrary to earlier suggestions that the obsidian trade has great antiquity in the Plateau (e.g., Carlson 1994:318; Quinn 2006:212; Sobel 2006:165), obsidian from sources to the south in the northwestern Great Basin is only sparsely represented in early prehistoric components at sites around The Dalles and farther north in the Plateau and adjacent Northwest Coast. Current evidence seems to indicate that movement of obsidian from northwestern Great Basin sources northward into the Plateau and beyond was light and sporadic before ca. 4,000 B.P.

Obsidian first appears prominently in the archaeological record at The Dalles in association with, and/or in the form of, prestige goods placed with burials excavated in the 1950s from the Congdon II and III components. Although an estimated date from 3,500 to 3,000 B.P. has become attached to these components (Schulting 1995:82–84), the projectile point types on which this

estimate is based have such broad time ranges that the burial components in the Congdon II and III components easily could date 1,000 years or more earlier, which would bring the chronology more closely into line with the appearance of obsidian from Great Basin sources in substantial frequencies at prehistoric sites in British Columbia. These estimated dates indicate that some kind of exchange system between native groups at The Dalles and peoples in British Columbia was in operation a thousand years or more prior to 2,400 B.P., the beginning date listed in the discussion of the Plateau Interaction Sphere (Hayden and Schulting 1997:52).

Aside from six sourced specimens from deposits at the Roadcut site dating to between about 9,000 and 4,900 B.P. recovered in 1993 (V.L. Butler 1998), XRF sourcing analysis has so far been conducted only on materials from sites at The Dalles occupied during the period from approximately 2,500 to 200 B.P., with ten sources identified at Lone Pine and four sources identified at the Crates Point sites. This is roughly the same time span when the late prehistoric Plateau Interaction Sphere is posited to have been in existence and when most obsidian from sources in the northwestern Great Basin found its way northward into British Columbia.

Hayden and Schulting's concept of a Plateau Interaction Sphere draws much needed attention to the existence of elites at The Dalles on the Columbia River. Because most of the archaeological investigations occurred more than a half-century ago, and the major sites along Fivemile Rapids were inundated beneath Lake Celilo in 1957, few archaeologists today are familiar with the evidence of substantial cultural complexity in the archaeological record at The Dalles. Considering the great number of obsidian sources known to exist in the northwestern Great Basin, the ten obsidian sources so far identified at sites in The Dalles area almost certainly under-represent the extent of interregional procurement and exchange of obsidian in the late prehistoric period. Further XRF sourcing studies of obsidian artifacts recovered during excavations at sites along Fivemile Rapids in the 1950s now in museum collections will no doubt identify additional sources from which obsidian was obtained for trade at The Dalles.

The Plateau Interaction Sphere concept invites comparisons between The Dalles and the Lillooet-Lytton area on the Fraser River in British Columbia, the second area in the Plateau where prestige goods were concentrated. However, the environmental and cultural setting at The Dalles was unique in the Pacific Northwest, and it may be necessary to look farther afield for models of comparable prehistoric cultural development (e.g., Poverty Point in the southeastern United States). The Plateau Interaction Sphere concept provides a starting point for a more in-depth study of elites at The Dalles, certainly one of the most poorly documented and least understood examples of culturally complex hunter-gatherers in North America.

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This article has been brewing since 1995, when I last directed archaeological investigations (at the Lone Pine Site) at The Dalles. In previous writings, I have tried to highlight aspects of the archaeological record that make The Dalles unique in the Pacific Northwest. I found one way to accomplish this was to further explore the role of The Dalles within the concept of the Plateau Interaction Sphere proposed by Brian Hayden and Rick Schulting. Final drafts of this paper were improved by comments from *JONA* editor Darby Stapp and two anonymous reviewers. Needless to say, I am solely responsible for any errors of fact or interpretation.

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TRADITIONAL ECOLOGICAL KNOWLEDGE: RECONSTRUCTING HISTORICAL RUN TIMING AND SPAWNING DISTRIBUTION OF EULACHON THROUGH TRIBAL ORAL HISTORY

Nathaniel D. Reynolds and Marc D. Romano

ABSTRACT

In response to a 2007 petition from the Cowlitz Indian Tribe, the National Oceanic and Atmospheric Administration (NOAA) listed the southern distinct population segment (DPS) of eulachon (*Thaleichthys pacificus*) as “threatened” under the Endangered Species Act of 1973 (ESA). NOAA’s Northwest Fishery Science Center’s summary report of eulachon noted: “. . . there is a largely untapped store of knowledge on eulachon residing in the culture and traditions of Native American Indian Tribes and First Nations in Canada. . . .” We interviewed Cowlitz Tribal elders and recorded oral histories of eulachon fishing along tributaries and the mainstem of the lower Columbia River. We also recorded oral histories of non-tribal elders who experienced community traditions of eulachon fishing in the same region. Traditional Ecological Knowledge (TEK) can augment strict biological data and create more holistic and better-integrated understanding of ecological relationships. In this inquiry, tribal oral histories identify timing and distribution of spawning eulachon runs. They do not identify habitat features associated with spawning areas but do reveal physical and behavioral characteristics of returning eulachon. This information may inform or generate new ideas for species- or habitat-related research. This information also supports NOAA and the Cowlitz Indian Tribe’s continuing efforts to identify and protect critical habitat, increase abundance of the species, and achieve species recovery.

Introduction

Eulachon are a small anadromous fish up to 10 in. in length, brown to blue on the dorsal surface, silver on the sides and white on their ventral surface (Fig. 1). They are finely and sparsely speckled on their backs. Mature eulachon return to freshwater to spawn after spending 2 to 5 years in the ocean, though there is regional variability (Gustafson et al. 2010). They are rich in fat: 6.3% in the Columbia River (Stansby 1976) and up to 19% in the Gulf of Alaska (Payne, Johnson, and Otto 1999; Iverson, Frost, and Lang 2002). They contain a high proportion of saturated fats, which allow eulachon oil to be a semi-solid at room temperature, a unique property among fish oils. The fish are commonly called Columbia River “smelt.” Another common name for the species is “candlefish,” named because dried smelt, when ignited, sustain a flame. The Latin binomial *Thaleichthys pacificus* translates as “rich fish of the Pacific.”

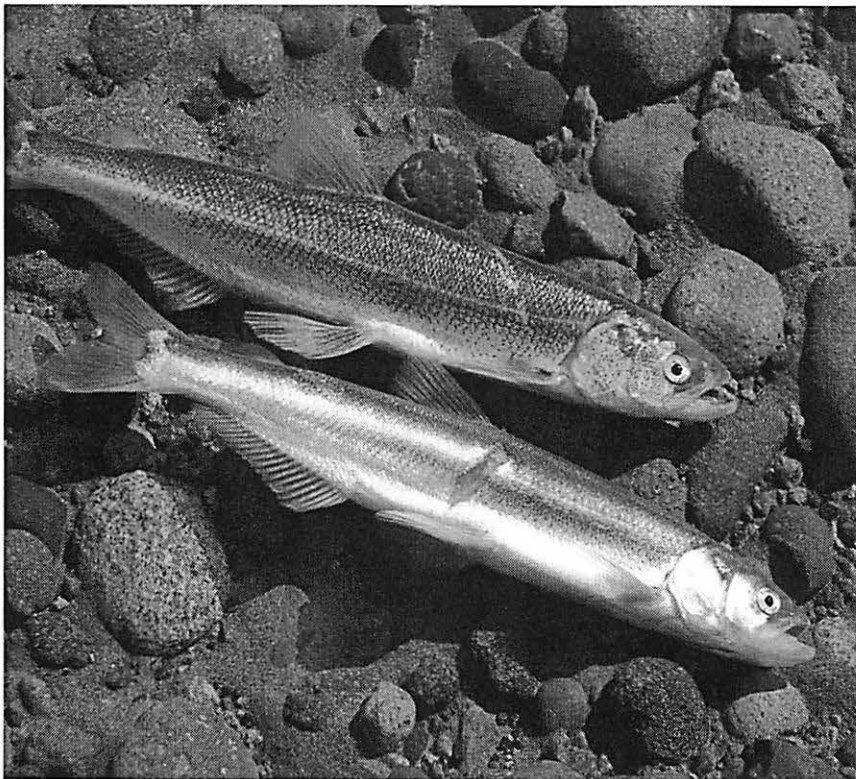


Fig. 1. Adult Eulachon, Cowlitz River 2011 (photograph by Nathan Reynolds).

The Cowlitz Indian Tribe has fished for eulachon in the tributaries and mainstem of the lower Columbia River for thousands of years. This river system supported the largest eulachon run in the world, and in the pre-contact era, the species was both a valuable economic commodity and an important cultural component for the Cowlitz people (Hay and McCarter 2000). Most coastal Indian Tribes and First Nations similarly fished for eulachon (Stewart 1977) and traded surpluses to groups that had no direct access to eulachon-bearing rivers (Harrington 1967; Byram and Lewis 2001). Many Tribes and First Nations have a strong cultural connection to eulachon and the species commonly appears in ancestral myths and oral traditions. In many areas, eulachon returned in the late winter and early spring when other fresh food resources were scarce. They were often known for this reason as the “savior-fish” or “salvation fish” (Miller 1997; Koppel 2007). The rest of the world was not introduced to the eulachon until February 1806, when Meriwether Lewis, over-wintering at Fort Clatsop, recorded this previously “unknown” fish as “superior to any fish I ever tasted, even more delicate and lussious than the white fish of the lakes which have heretofore formed my standard of excellence among the fishes [*sic*]” (Lewis 1806).

The traditional fishing technique for catching eulachon is to use a “dip net,” which consists of a long pole (varying from 5 to 20 ft.) with a hoop of approximately 2 ft. diameter on one end. A sock net 2 to 3 ft. long is attached to the hoop. The fisher stands on a riverbank, rock or platform, or wades into the river, or fishes from a canoe, sweeping the hoop downstream with the current, catching fish ascending upriver. After the onset of the colonial era, the technique did not change, though wooden poles and hoops were replaced by metal, nets of plant fiber were replaced with nylon twine, and boats of many shapes and sizes replaced cedar canoes. Dipnet fishers frequently gathered together to catch eulachon *en masse* (Fig. 2).



Fig. 2. Eulachon fishers with dipnets, Cowlitz River. Year, precise location and names unknown (Cowlitz County Historical Museum photo 1992.0019.0042, used with permission).

Early settlers and colonizers in the Columbia River Basin identified eulachon as an important natural resource and developed extensive commercial and recreational fisheries. At its height, the Columbia River Basin eulachon fishery consistently produced annual commercial harvests in excess of a million pounds, and in the peak year of 1945, produced greater than 5.5 million pounds (Gustafson et al. 2010). Recreational harvests were not systematically assessed, but limited creel census surveys revealed recreational catch may have equaled commercial catch in some years (JCRMS 2008). The combined economic and cultural aspects of these post-contact fisheries continued the tradition of the species as an important cultural figure; the city of Kelso,

Washington, located along the lower Cowlitz River, once billed itself as the “Smelt Capital of the World” (Hinrichsen 1998).

In the 1990s, the eulachon population experienced an abrupt and unexplained decline in abundance throughout a significant portion of its range (including the Columbia River Basin). In 2007, The Cowlitz Indian Tribe petitioned the National Marine Fisheries Service (NMFS) to list the fish under the Endangered Species Act (ESA). NMFS determined the petition presented sufficient scientific evidence to undertake a comprehensive inquiry into the status of the species, and conditions affecting population abundance. After completing review (Biological Review Team 2008; Gustafson et al. 2010), NMFS listed all eulachon stocks south of the U.S.-Canada border as “Threatened” under the ESA on May 17, 2010 (NMFS 2010).

Despite the recent comprehensive summary of eulachon knowledge assembled by Gustafson et al. and the important economic, cultural, and ecological history of the Columbia River eulachon run, many factors of life history and reproductive strategies of the species are poorly known (Gustafson et al. 2010). Even basic information regarding timing and distribution of the adult return in the lower Columbia River and associated tributary rivers (Fig. 3) remains sparse. In their review, Gustafson et al. observed: “. . . there is a largely untapped store of knowledge on eulachon residing in the culture and traditions of Native American Indian Tribes and First Nations in Canada. . . .” (Gustafson et al. 2010).

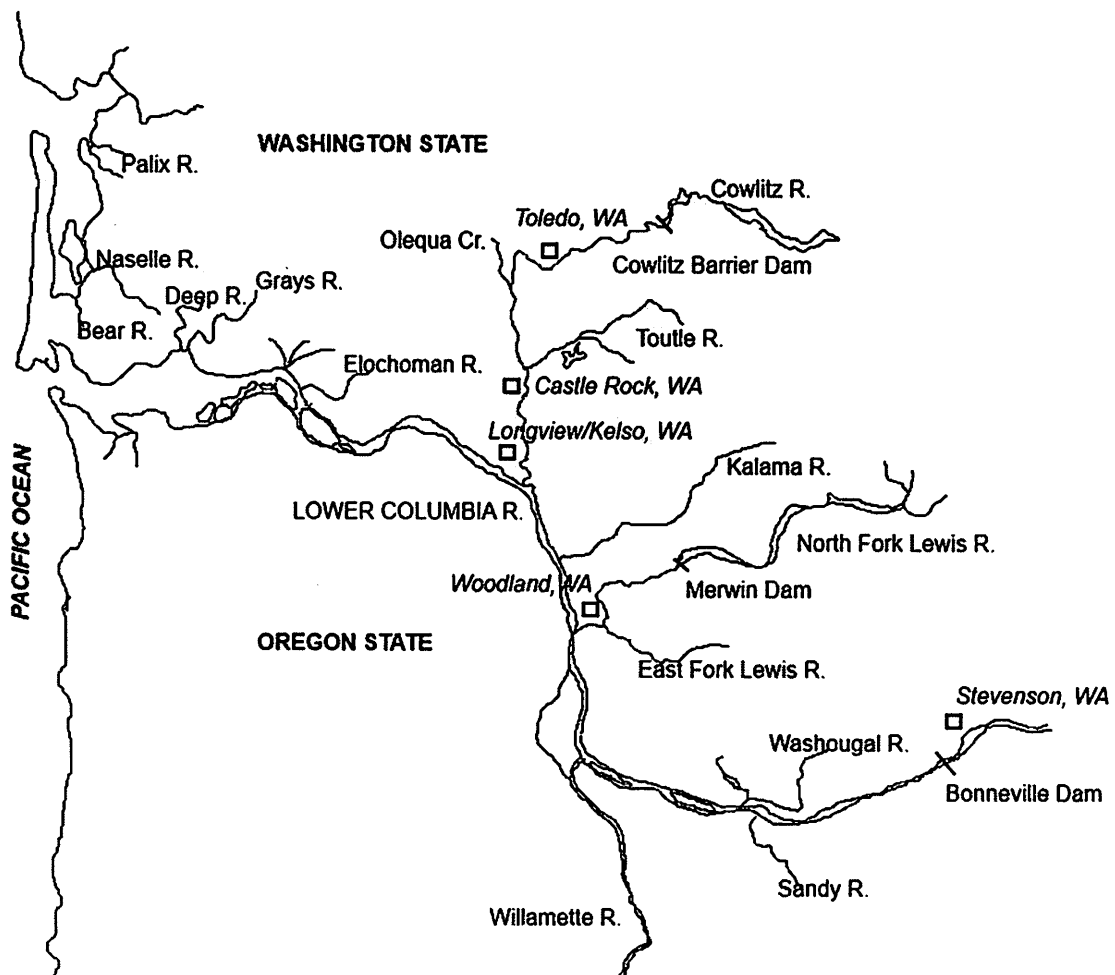


Fig. 3. Map of the Lower Columbia River region, showing locations discussed in the text.

The goal of this project was to gather oral history from tribal and other elders that could document the community knowledge of historical run timing and spawning distribution of eulachon in the lower Columbia River and tributaries. A similar but more extensive project undertaken by the Yurok Indian Tribe of Northern California (Larson and Belchik 1998) was a principal source of information for the Gustafson team regarding the timing, extent, and abrupt decline of the eulachon runs of Mad River, Redwood Creek and Klamath River, CA (Gustafson et al. 2010).

Practitioners of ecological restoration typically search for reference ecosystems or reference conditions to inform their restoration practices (Egan and Howell 2001). As restoration practitioners realized most ecosystems exhibit effects of indigenous strategies of land management, and that the ideal of wilderness absent of humans (per Nash 1967) was faulty, Traditional Ecologic Knowledge (TEK) gained value among scientists and restoration practitioners (Cronon 1995). Indigenous knowledge may offer insight to reference conditions, pre-contact landscape management strategies, and intimate species knowledge (Berkes, Colding, and Folke 2000). TEK now frequently plays a role in synthetic reviews of analyses of landscapes and species, and restoration handbooks or guides typically devote a chapter to the collection of TEK (e.g., Senos et al. 2006).

At the same time the value of TEK is being recognized, and its incorporation into strategies of landscape restoration and species enhancement is advancing, scientists and administrators often fail to understand that TEK can be an intellectual property; contained in the group or family experience, or held within memory and traditions of a wholly sovereign government and akin to state or corporate secrets. If shared, this tightly-held information sometimes may be used only with acknowledgement of the exclusivity of the owner, in the manner of patent or copyright. Permissions for access and guidelines for use, reuse and sharing of information will vary widely from community to community, or family to family.

Methods

We invited elders of the Cowlitz Indian Tribe, members of other tribes who came to fish eulachon in the lower Columbia River and tributaries, and other regional elders, to share what they felt comfortable relating about their personal history of eulachon fishing. Per Krohn (2007), we strived to respect cultural property rights and protected knowledge. Our specific intent was to gather general ecological knowledge relevant to the temporal distribution (run-timing) and spatial distribution (centers of spawning activity) of annual adult eulachon returns. This information may enhance certain aspects of eulachon management, such as the timing of in-water construction work like dredging or pile-driving, as well as identify areas of the river system that are vital or essential to preserve (in the manner of ESA critical habitat) in order to protect eulachon spawning grounds. We also took the opportunity to collect information of cultural and community traditions of eulachon harvest and processing techniques. The latter information is not presented here, but is in development for separate publication.

We sent word through the tribal community via announcements at tribal meetings and weekly lunches held for tribal elders, and by distributing handbills announcing the project and providing contact information. TEK is sometimes not exclusively held in indigenous communities. We therefore researched and contacted other prominent non-Indian elders in the region who held knowledge of eulachon either from long-term fishing, living or working on rivers, or acting as avocational historians. We specifically targeted several individuals and contacted them directly to inquire if they would consent to be interviewed. In some instances they did consent; in other

instances we never heard back from the individual, despite our expectation and belief they likely held valuable information. In one representative instance, a Cowlitz elder declined to be interviewed, responding, “Have you seen how few smelt are out there? I’m not gonna tell you where all my best fishing spots are!” despite our explanation that was not information we desired.

We prepared a basic outline of representative questions, but allowed our informants to speak in any direction and at any length they desired. Often we asked follow-up questions to clarify a previous remark; we also asked open-ended questions that might allow an informant to elaborate on an as-yet unconsidered aspect of eulachon. The basic framework for our eulachon TEK semi-directed interview is presented in Table 1 (after Huntington 1998).

TABLE 1: SAMPLE INTERVIEW QUESTIONS FOR EULACHON ORAL HISTORY

Start up, Introductions etc.:
Interviewer: State name, affiliation, date, location and name of interview subject. Ask interviewee to state name for the record.
Personal Background Information:
Interviewer: Could you tell me a little bit about yourself? For instance where and when were you born? Where did you grow up?
Interviewer: Where do you currently live?
Smelt Fishing History:
Interviewer: What is your earliest memory of fishing?
Interviewer: Did you fish for smelt?
Interviewer: Could you tell me about how you fished for smelt? Do you remember where?
Interviewer: What time of year was the fishing best?
Interviewer: Do you remember any years when there were no smelt caught?
Interviewer: What would you do with the smelt once you caught them? How would they be prepared or preserved?
Interviewer: Did you go to other rivers to catch smelt if there were none locally available?
Interviewer: How high up in the river did smelt go?
Current Fishing Information:
Interviewer: Do you currently fish? If so, where?
Interviewer: How has the fishing been lately?
Interviewer: What do you think will happen to the smelt in the future?
Suggestions For Other Interviews:
Interviewer: Do you know of anyone who used to, or currently fishes for smelt, that might be interested in speaking with us about it?

We interviewed 12 informants in 10 sessions (Table 2). In order to extend informants a modicum of privacy, we identify informants only by their initials and our own as interviewers. Interviews were conducted at locations familiar and comfortable for informants: at Cowlitz Tribal administrative offices, at informant’s homes, at cafés, or other meeting places suggested by the informants. All interviews were conducted in English. Interviews were recorded on handheld digital recorders (Zoom Model H1 or H4, Zoom Corporation, Tokyo Japan) in WAV file format. Audio files were subsequently transcribed by us or by staff of the Cowlitz Indian Tribe’s Cultural Resources Department. First-draft transcriptions were proofed against the original audio files by a second reviewer. Spelling of family names and colloquial placenames was verified by the Cowlitz

Indian Tribe's Cultural Resources Department. Explanatory or clarifying text was added within brackets where necessary. Quotations illustrating specific details are excerpted here; complete audio files and full transcriptions are in the archives of the Cowlitz Indian Tribe's Cultural Resources Department.

TABLE 2. INFORMATION ON THE INFORMANTS INTERVIEWED.

Informants Interviewed	Tribal Heritage:	Gender:	Date:
SA	Cowlitz	Male	22-Nov-2010
EA	Cowlitz	Male	29-Nov-2010
MCH/BF (joint interview)	Non-Indian	Female, Male	24-Jan-2011
CE	Cowlitz	Male	18-Nov-2010
TE	Cowlitz	Female	10-Jun-2011
JJ	Lummi	Female	17-Nov-2010
JP	Cowlitz	Male	18-Nov-2010
EPD	Cowlitz	Female	17-Nov-2010
LR	Non-Indian	Male	10-Jun-2011
DR/KR (joint interview)	Cowlitz	Male, Male	29-Nov-2010

Results of Interviews

To illustrate the type of information generated from interviews, quotations have been extracted and grouped into the following topics:

- General descriptions of distribution
- Descriptions of run timing and duration
- Upper extent of spawning distributions
- Areas of spawning habitat
- Descriptions of physical and behavioral characteristics of the run
- Diminishing size of annual returns.

General Descriptions of Distribution

We observed that many of our informants held personal information about eulachon from only one or two tributary rivers, where they or their families fished. Further, most were only knowledgeable about a certain area of "their" river:

EPD: . . . I lived with my grandparents . . . and so I lived with them right on the Cowlitz [River] where Olequa Creek goes into the Cowlitz River. I lived right there, and we . . . my grandfather went smelting all the time.

CE: . . . I remember when I was in grade school the smelt went up the rivers. The Cowlitz River, the smelt would go way up there. I dipped smelt up above Castle Rock quite a bit. And just below Castle Rock [WA].

...

NR: So did you ever actually dip on the Lewis [River] then?

CE: Oh yeah. We'd dip on the Lewis [River].

NR: So . . . where did you usually go on the Lewis [River]? Did you just go to the Woodland [WA] area?

CE: Yeah, right in Woodland [WA]. I don't know how far up the river they went, but you'd dip right from the mouth, right up to Woodland. That's where that boat launch was, or the boat that had the smelt, he was right across the river from the town of Woodland. Almost underneath the [old Pacific Hwy 99] bridge there.

DR: I was three years old. I was born in 1948. But I can remember seeing people coming in, in pickup trucks, over in Ostrander. They called it Ostrander Creek, right along the Cowlitz River. They would pull in there with their pickups and get a whole pickup load of smelt in the back of their pickup and take them home (Fig. 4).

NR: Okay, so, so where on the Lewis [River] did you go?



Fig. 4: Smelt fisherman filling the back of a pickup truck with their haul. Year, location and names unknown (Cowlitz County Historical Museum photograph 1998.0033.0018, used with permission).

DR: Right out on the dike. Right by where it turns into the horseshoe [Horseshoe Lake, former course of the Lewis River]. Right out there is a point, we'd just park right there at the point, walk down over the bank, and same thing, just dip, dip, dip.
 KR: I dipped on the Lewis River at the East Fork [confluence with North Fork Lewis River], at the railroad bridge, I've dipped at Pekin Ferry, I've dipped on the I-5—under the I-5 bridge on the North Fork, I've dipped under the Woodland [old Pacific Hwy 99] bridge in Woodland, I've dipped at the bend at the seawall in Woodland, and numerous times I've dipped right out of Cedar Creek hole. That's up at the [Merwin] dam.

...

NR: And then you said you went up to Castle Rock [WA] and dipped at Castle Rock, do you know how far up the Cowlitz [River] either of you might have gone?

DR: Castle Rock, the Castle Rock bridge is about as far as I ever went. Between Camelot [WA] and Castle Rock bridge. Lexington [WA]. Anywhere from Kelso [WA] to Castle Rock Bridge. I've never dipped north of the Castle Rock bridge, but they were in abundance there, and they were headed upriver.

NR: Okay,

KR: Uncle [H] might have, (DR: yeah) but he always seemed like he dipped between Lexington and Castle Rock.

DR: Just easier access.

NR: Un-huh, okay. So it doesn't, doesn't necessarily mean they didn't go up any higher, that's just where you guys, that's where it was easy to get to the river.

DR: Right.

KR: If it was easy access, and they were in, you either waited in line, or it was a miracle that there wasn't somebody ahead of you. And it'd take you 5 minutes when they were running heavy to get your limit and be out.

EA: . . . most of my dipping experience comes from the Castle Rock area, not only in-town but further up Westside Highway [former WA SR 411 between Castle Rock and Vader, WA], past Four Corners to Hog Island [immediately east of the intersection of Westside Highway and Pear Lane], or the Olequa [Creek] area.

TE: You had mentioned, um, y'know, how far did the smelt go upriver. Obviously, um, they went up as far as Olequa [Creek]—that's where most of my family fished on, along the Cowlitz River in different sites—but we, they heard of other people catching smelt way, way upriver. Um, I don't know how far up, to the headwaters, they went, but there were so many smelt that you could fish, uh, all up and down the Cowlitz, uh, to where the river becomes more narrow and narrow, and then, at that point, I don't know. But there was no problem of getting however much you wanted to exert yourself for.

NR: Did you ever hear how far up the Cowlitz [River] people would be able to dip for smelt? Were people dipping up past Castle Rock? Were people dipping up near the Olequa?

CE: Oh yeah, I'm sure they dipped in the Olequa. That [is] where all my old cousins lived. The [SG family] lived there near Vader [WA]. And they dipped there around Olequa.

NR: Anything further up than that?

CE: I don't know.

NR: Toledo [WA]?

CE: Well in my time I never did know that there was smelt at Olequa [Creek]. Cause I never did go down there. I always went to Castle Rock [WA].

NR: Did you ever hear of smelt going in to any of the rivers coming in like the Toutle [River] or maybe up the Olequa [Creek] at all? Or were they just in the Cowlitz [River]?

CE: Oh I think they was in other streams. I don't know that there was, but they went up the Lewis River and I'm certain they went up the Kalama River. It seems like I can remember people dipping from the highway in the Kalama [River].

A few informants could speak about eulachon occurring across the range of tributary rivers, but did not do so in terms of broad-scale eulachon ecology (run-timing, distribution etc.), rather they spoke in the economic terms of resource consumers, maximizing opportunity and efficiency:

NR: So tell me about dipping on the Lewis [River] as compared to dipping on the Cowlitz [River]. Um, did you, did you go to the Lewis because it was . . .

DR: . . . closer.

NR: Just closer? What happened? Did the smelt come into both rivers at the same time? Or did they, did it seem to move around? Do you have any sense of what the, what their...

KR: Just depended on whatever river was hottest [describing catching intensity, not temperature]. If the Cowlitz was hotter than the Lewis, wherever dad wanted to go, or as kids, we'd just get in the car and say we are going smelt dipping, and if the smelt weren't hitting in one place, we'd just go to another (Fig. 5).

NR: So did you ever go anywhere else other than the—

DR: Columbia River. Dipping there at the mouth of . . . Mill Creek [WA, West of Stella WA]. There was a big rock out there and kind of a little walkway [possibly "Memaloose Rock" at the confluence of Abernathy Creek and the Columbia River, or the riprapped bank of the Columbia west of the confluence with Mill Creek, along WA SR 4]. You could go out there, but the water was a lot swifter and a lot harder. Dad didn't like us out there.

KR: The sandbar at... Countyline [Park, Wahkiakum County, Columbia River]

...

NR: Uh, okay, did you guys ever go to any other places? Sandy River [OR]?

DR: Castle Rock [WA].

KR: I went to the Sandy, but that was . . . boy, probably 1976, 1977. And that was right there at Troutdale [OR] that we dipped them then. And that's the last big run that I can remember that ever went up the Columbia. And that was at Troutdale. In fact it's right where that dog run [dog park] is now that we went right over the bank and dipped. And it was an abundance at that time.

NR: So you were right then near . . . what's the [Interstate] 84 Bridge [over the Sandy River]?

KR: I-84 in Troutdale [OR], yep



Fig. 5. Eulachon fishers' cars parked along the Lewis River, April 1959 (Clark County Historical Museum, photograph P23.7.2, used with permission).

NR: Um, did you ever hear of smelt going in any other rivers? Either lower like the Grays [River] or the Naselle [River]?

DR: Grays River, yes.

KR: Elochoman [River].

DR: [still speaking of the Grays] Never dipped there, but they were on all the small rivers, the Elochoman, Cathlamet [?—no Cathlamet River, maybe Cathlamet WA area?], the Grays River, the Naselle River, and I have heard reports on the Palix [both Naselle and Palix enter Willapa Bay, not within the Columbia estuary], but the Palix would be a little bit, I would say, out of the way, I don't know.

NR: Okay, um any . . .

DR: They would come up Mill Creek, they would come up Abernathy Creek. Just how far I don't know.

NR: Okay, but they would tuck into those creeks?

DR: Right.

KR: Yep.

NR: So would people be dipping at the mouth of those creeks or would they be up the creek a little ways, dipping in there?

DR: At the mouth. At the mouth is where it'd be . . .

MCH: They ran at different times.

NR: And what time of year did they come in [the Lewis River]?

BF: Oh about—

MCH: April?

BF: Last of February and March, early April?

NR: Okay.

BF: They come in the Cowlitz first, the Columbia of course, they, they net them in the Columbia with just regular nets.

NR: Mm-hmm. Okay. So they come to the Cowlitz first and then to the Lewis, when they did come?

BF: That's the general rule, yeah.

...

BF: It seemed like the Cowlitz had the main run, but when they came in here, they would just head like it was in the Cowlitz and . . . the Sandy was another one that they went up once in awhile, but this river [Lewis River] was pretty regular. Then it got irregular, and . . .

Descriptions of Run Timing and Duration

Most individuals were able to roughly report what time of year they and their families fished for eulachon. Many, however, reported needing to watch the river for initial ecological cues that eulachon "were in," and also reported "test dipping" to confirm eulachon arrival at their traditional fishing site:

NR: So, what time of year did the smelt come in?

EPD: In January usually. Yes, about that time.

MR: So, what time of year would they [eulachon] come in?

JP: From January to March.

MR: Was it variable when they would come or was it the same time every year?

JP: When January would come around people would start watching.

...

NR: So you said that when it got to be January people would start looking.

JP: Start watching. You could stand there along the bank and you could see them. You'd see them swimming up. As soon as you'd see them coming up you'd grab your net.

NR: Is there anything else that would tell you that they were in?

JP: Seagulls. As soon as you'd see the seagulls come in that's another sign. If you see a lot of seagulls you watch where the seagulls are. And that's where the head of the run's at.

EA: They [EA's uncles] were looking for a lot of, y'know, bird activity, um, you'd see a lot of, y'know, big influence of seagulls in the, in the area. Uh, of course the sea lions would move in, um, and that's what you'd see. It'd be watching for, uh, high concentration of seagulls, more than what you see out there now, or any other given day, um, it'd really ramp up with the seagull influence, and then you'd see the seals come in. Um, but I don't ever remember seeing the seals get really high in, in the estuary, y'know, getting all the way up into Castle Rock [WA] and stuff. Now we see them as far as Toledo [WA]. So, um, but that's what they'd look for. They'd watch and they'd look for the, the bird activity, see if there were, um, any kind of abundance of seals coming in, uh, and they'd test dip.

Some individuals were also able to report run duration:

NR: How many days or weeks would a run be in?

CE: Oh, sometimes two or three weeks.

MR: In years when the fish came in, how long would you be able to get them for?

EPD: Oh they were there, it seems like a long time. Maybe about three weeks to a month.

MR: So you could catch smelt for a good long time then?

EPD: Yep.

NR: So, so when a run would come in, you know, when a good size run would come in on the Cowlitz, back in the fifties then, how long would that run last?

DR: Month.

KR: Up to three weeks to a month, yeah. Easily.

NR: Okay. And that includes a pilot run, scout run entry, so (KR: yeah) the whole entry would be . . .

DR: Start to finish.

NR: Okay. And could you basically just go down at any time during that month and catch yourself . . .

KR: Yeah, there was no limit at that time, you could dip 24–7 and now they've got the limitations on where you can only dip certain days and certain hours, but back then, you just—if you decided you wanted to go, away you went.

A few individuals were able to describe some apparent variability in adult returns, typically regarding the entry of a “pilot run” or an “initial entry,” which they described being principally composed of males, therefore exhibiting an asymmetrical sex ratio:

CE: . . . and sometimes they'd leave and come back later.

JP: And when the pilot run would come in, everybody would want to get down and hit the pilot run first. And when the main run would come through they'd hit 'er again.

MR: So, typically how long would the pilot run last?

JP: The pilot run used to last a week or more. And then it would be a few days and then the main run would come in. So you're looking at damn near a month.

EA: Yeah, there always seemed like there was a pilot run, and the pilot run generally was made up mostly of males. It'd be, um, a run that would come in and it usually, y'know, when it'd come out smelt season, y'know, everybody would start watching the lower Cowlitz [River] and that's what you'd see, you'd see the pilot run come in.

NR: Interesting. What about, I've heard reports of, you know, maybe, pods [eulachon aggregations] making multiple entries into a river, so any sense that there would be an entry and then an entry again later? A pilot run?

DR: We called it a scout run. Scout run'd come in and they were usually mostly males and mostly bigger. It might last for 2 or 3 days and then right behind them would come the main run. But yeah, there was what we called a pilot run.

NR: So how many days then would separate the pilot run . . .

DR: Sometimes none. Sometimes 2 or 3, but not very long at all. It depended a lot on your weather. Your weather had lot to do with it.

KR: Yeah.

DR: Your water temperature.

NR: So was it water temperature or was it your weather?

DR: It was water temperature, and, uh, rain, just basically everything.

Upper Extent of Spawning Distributions

As noted in the general conclusions, because of typical informant's consumer-oriented desire to maximize their catch of eulachon, few paid close attention to fringe areas of distribution where they expected abundance to be lower. Most could not report an upper extent of eulachon adult return distribution, unless there was a known physical barrier, obstacle or constraint to upstream passage:

Columbia River:

NR: And so what—How old were you when he [SA's father] was dipping there?
[Columbia River, just below Bonneville Dam]

SA: Ah, 4, 5, 6, 7, you know.

NR: So if you were born in 1930, that'd be...

SA: '35, '36

NR: The dam was built right in about there.

SA: '36

NR: So is this just right after the dam is completed, then?

SA: Yeah, Yeah.

NR: So the smelt were right below the dam?

SA: Yeah.

NR: They just couldn't go anywhere?

SA: Yeah.

NR: Okay. And so how much, how much would he dip?

SA: Oh, I don't know. Maybe 50 pounds, you know. We'd have a few, a couple meals of smelt, and wait for the next year . . .

...

NR: So let me ask a little bit more, so when the smelt would come in, in the Stevenson area [WA just above Bonneville Dam; SA's father went to dip below the dam], then, would the town go dip? Would other folks go?

SA: There'd be, there'd be, quite a few people down to get smelt, and uh, they really, I think they [eulachon] quit coming in 1940. Somewhere around there.

NR: So you don't—they quit coming you said?

SA: Yeah. They didn't go up that far, anyway.

NR: So after about 1940, did you ever see them again?

SA: Ah, well we'd go, go down to the Cowlitz River and catch smelt. Or Lewis River. Or . . . go over to the Oregon side, they used to go up the Sandy River. But that was a real production, you know?

Lewis River:

NR: So, so tell me a little, so one of the things that we're interested in knowing is where smelt actually went, because since there, since there, you know, seems to be few now . . .

KR: They went as far as Merwin Dam, I'll guarantee that.

DR: Couldn't get farther than the dam.

NR: Have you ever heard from anybody in the region, that the smelt went up even further than Merwin before Merwin was put in?

KR: No, no.

NR: But you dipped at . . .

KR: Cedar Creek hole.

NR: So how far below the dam is Cedar Creek hole?

KR: A thousand feet [map-verified as approximately 19,000 feet].

DR: Yeah.

NR: And do you know when, what years that was that you were dipping there?

KR: The last time I dipped out of Cedar Creek hole would have been 19 . . . probably '73, '74.

DR: They were up there, they were up there at Merwin, 'cause I went up there to pick up salmon, from the Merwin Hatchery [below the dam] in—last big run we had, just 4, 5 years ago [2005?]. They went as far as the intake at Merwin [Hatchery]. They couldn't get past the intake, but they were literally plugging the intake at Merwin Hatchery. The water intake.

NR: Okay so the smelt were plugging the water intake, and that was 4, 5 years ago? So that was the last . . .

DR: . . . big run we had. Decent run.

BF: Well, they went at least as far as the dam and [the] river was pretty rough before that dam was put there. There was some, you wouldn't say waterfalls, but pretty . . . I don't think they could get up them, had to go, isn't that right, [MCH]? They had to go to get up about to Speelyai [Creek, confluence with the North Fork of the Lewis River, now inundated under Merwin Reservoir, map verified as approximately 9.3 miles above the Merwin Dam site along the old river channel], they get that far up?

MCH: I know that, I, it seems like my mind plays tricks, but I do know, I asked my son, who is an engineer at 67, he told me he definitely remembers them at our home, down below our home, 'in 71 [approximately 1 mile above the WDFW Hatchery, not the Merwin Hatchery. This location is approximately 2.4 miles below Merwin Dam].

NR: Okay.

MCH: That was one year. There wasn't very many times, that far.

NR: Okay.

MCH: That was just above, about a mile above the, that, where the hatchery is.

. . .

BF: You remember [CC], she took the water really down to her every day to, uh—

MCH: Yeah, she did.

BF: —Pacific Power and Light, right where they built Merwin Dam [Shirt-Tail Canyon], for a year or so.

MCH: Mm-hmm. She's dead.

BF: Well I remember seeing her comin' up, saying "There's smelt! There's smelt up here."

MCH: There's smelt there. Then that's just below the dam.

BF: That's just there, below the dam.

MCH: Mm-hmm.

NR: Okay. But no, no recollections of smelt going up any, any higher than the dam, prior to, like you said, Speelyai Creek, or, uh—

BF: I doubt if they ever got to Speelyai. I, I think the river raised pretty fast right in there. I don't mean maybe. It was places you could almost call a waterfall . . .

Cowlitz River:

JP: My brother was telling me that he seen [eulachon] clear up there at the barrier dam [Cowlitz River barrier dam, approximately river mile 49, one mile south of Salkum, WA]. This would've been years ago. He used to fish all along the Toutle River and all over. He fished all over the country.

NR: When he saw them up there, did he see them in the water when he was fishing for something else? Was he dipping up there for them?

JP: He said he was up there fishing. He seen guys up there with them. I don't know if they were dipping up there or what. But he seen smelt up there in the river.

MR: And just to clarify this, when you're talking about the barrier dam you're talking about on the Cowlitz [River] at the [Cowlitz River] salmon hatchery?

JP: At the salmon hatchery.

MR: Downstream of the [Mayfield] Dam?

JP: Yeah. Right there below the dam and then you've got the trout one [hatchery] below that [river mile 43]. But my brother fished up there all along Blue Creek [river mile 42], drift fishing. He fished all up along there.

Areas of Spawning Habitat

Most individuals did not specifically report known areas of spawning habitat and could not offer any information regarding habitat features that might be associated with spawning. Few reported even observing spawning. Most simply relied on abundance as a proxy measure and re-reported regions of a river or areas where eulachon could be easily caught:

NR: . . . have you seen areas where smelt spawn? Do you know where they are?

LR: Not realistically, no. I can't say that I do because . . . if a commercial fishery comes in at the mouth of the Cowlitz, and with, and catches every fish that comes up the Cowlitz, essentially. . . you can't tell. That's why the kind of research that I know is being done now needs to be done.

BF: [Lewis River] I remember wading out there in the riffles, just below the part of the fish hatchery [unknown which hatchery BF refers to] is now up there. Those riffles were so solid, in fact there was little, and they were spawning. They were this deep on the bottom there, you, you met some kids like us, we

must've got a sack-full right there, n' that's all we could carry when we was kids.

EA: They're, y'know, they've got a, a destination in mind, wherever that is, and they're, they're goin', so they're constantly comin' in and it's not like they're schooling around in an area. Um, they're on the banks, and they're all heading one direction. Um, I think, at the later end of the run, after they've actually, y'know, laid their eggs and, and, uh, the males have all spermed out, now the ones that are left over, before they die, y'know, you can see them, they're going to be hanging out in that area, wherever they spawned. Or the river is bringin' 'em back down.

Descriptions of the Physical and Behavioral Characteristics of the Run

Several individuals were able to describe the appearance of the adult return as it ascended the river, and described it as a snake-like column of ascending fish:

MR: So can I get back to, you said something earlier that is pretty interesting. You said it was a ribbon of smelt when you were dipping.

CE: Yep.

MR: So tell me a little bit about that, because some people have said "Oh the smelt were so thick it was across the river." But I've heard other people say that when they come up it's a thick line of them.

CE: Oh, there was a ribbon of smelt about that wide [holds hands out wide], just black. Not room for any more, just solid [reported on the Cowlitz River].

NR: So how long would that ribbon go then?

CE: Oh, I don't know.

NR: They'd just keep coming?

CE: Yeah! Oh hell yeah. They don't pay no attention to ya. You just take what you want and the ones behind them, they don't know what you're doing. I mean solid smelt. You can't see nothing but smelt. You can't see through them, or the bottom of the river, or nothing, there were so many.

NR: So you'd just stick your net right in the middle of that? Fill it up, pull it out?

CE: Yeah.

KR: And my youngest recollection is probably '53, '54. We'd all get in the car and away we'd go. And like [DR] said, there was no shortage. You'd look out in the river and it was nothing but a solid 18 inch, 24 inch stream of fish, for as far as you could see, probably 3 feet deep.

NR: Okay, So, I'm sorry to interrupt, but tell me a little more about that, because I've heard people say sometimes the river is full of fish, but then I've heard people say there was a ribbon that was moving up the river, and you could dip out of the ribbon.

DR: When they say the river is full of fish, they mean it's that funnel of fish that's coming up the river . . . [reported on the Lewis River].

LR: . . . you could go down here on the highway, say, uh, opposite the mouth of the Toutle [River confluence with the Cowlitz River; Cowlitz river mile 20] and

. . . stand up on the bluff and look down at the water, when the water's really clear, and it actually looked like a snake. You see from, maybe from here to that, uh, out there for two hundred feet, you could see . . ., they weren't just spread out, scattered through the water . . ., as they were coming up the river, they traveled in a condensed, uh, form, you know? Maybe, maybe the, snake might been, fish are pretty small, but maybe the snake was two feet in diameter or, or something like that, and so it's quite visible from quite a long distance. You're looking at solid fish. For foot-and-a-half or two feet in diameter, and you can see 'em for, as far as the water's clear, you can see 'em for two or three hundred feet length. This . . . from where you're standing, if you're up on a bluff.

JP: . . . I remember standing on the [Cowlitz River] banks down here near Castle Rock [WA] over by the Lions picnic ground there. We stand up on the banks there and we see a black streak coming up the river. We'd see that black streak and then we'd put our net down there and just hold it in one spot. And they'd run right into that net. You brought it in and you'd have a net full of fish. And we'd just see schools of them. It would be a solid black line.

NR: So it would be like a black line coming up the river then?

JP: Yeah a black streak.

NR: How far across would that [streak be]?

JP: I seen 'em 8, 10, 12 foot wide. Yeah a black streak right alongside the banks. You'd see 'em come right up [along] the banks. At some times you'd have to go out and deep [to catch them]. And other times you go right beside the bank. And you'd feel them hitting. Ya know, 2-3 foot out it drops off quite a bit, and you could sit there and you'd feel 'em hit the net. We'd sit there and watch the streaks, they'd come, then we'd get down there and "Boom" we'd hit them. Soon as it quieted down, they'd go out and we'd stand there and watch them. Pretty soon you'd see them come back in, that ol' black streak and "Boom" we'd hit them again.

NR: Do you know why that streak would come in against the bank like that?

JP: Just something they did. They'd stay in shallow water. They wouldn't go out in the deep water, I mean they would go out in the deep water, but a lot of them would come right up alongside the bank.

Informant JP also reported eulachon present in many places in the river, however, even after reporting the snake-like phenomenon near river banks:

MR: So the commercial guys would get the ones in the deep water?

JP: Yeah. Down there by the railroad bridge [Kelso, WA river mile 6.5], down there by Carnival Market [on Westside Hwy, WA SR 411]. They'd get out there. There's channels out there. And they go deep in those channels. And that's where they were getting theirs.

Several other individuals also reported alternating diurnal behavior of the adult returns, moving from the center of the river in the day, to nearer the river bank at night. In addition, a few informants reported eulachon being attracted to lights during the night time; fishers apparently tried to use that to their advantage:

EA: They'd test dip [reported for the Cowlitz River] not only during the day, but they'd test dip at night, too. They'd go down with lanterns and, um, because during the day, the smelt can actually move away from the banks, where at night, you can draw them back in closer to the banks with a, with a fire or a lantern. And that's what they do, y'know. If they were working, um, swing or graveyard, they'd get off and go down and, and do some test dipping, um, with lanterns—build a fire or with lanterns—and then give the report back to the ranch and then we'd have, uh, a weekend go of it.

DR: . . . and nighttime. More in nighttime than day [reported for the Lewis River]

KR: Yeah.

NR: So tell me, what changed between nighttime and daytime, then?

DR: Couldn't tell you.

KR: I think during the daylight they'd stay further out in the river, then at night, everybody with their lights, they'd move closer to the shore. Anticipating what that light was, I don't know. But they'd always move in, from say noon, early morning till 3 in the afternoon they'd be further out in the river, then at night they'd be 10, 15 feet out.

Another informant dismissed light attraction, however, attributing night fishing to additional social and family opportunities:

MR: So do you notice a difference in catch from day to night? Are they easier to catch at night?

JP: Oh it's just something to do. Just being out there at night. You build a bonfire, get a hot fire going and everybody stands around talking. And you see people you hadn't see since the year before.

Diminishing Size of Annual Returns:

Most individuals directly reported knowing about declines in the size of population returns; many knew the declines started in the 1990s or spoke in general terms of declines beginning some years ago. Some informants, while telling their story, directly related the decline in abundance with either over-fishing or environmental conditions they believe potentially caused the declines:

MR: So, when did they start to become so rare and how was it? Was it fewer fish or were the runs a lot shorter?

JP: I think when they really started to show up is when we started to get more commercial fishermen in the river. That's within the last 15 or 20 years. That's when they were making money selling the fish back east to the zoos. I was always wondering about that because here we are taking 20 pounds or something like that. Then we got down to half of a bucket. A couple dozen fish is all you're getting out of it. Then here the commercial fishermen are going after tons of fish. I always wondered, "Well how long is this gonna last?" These guys are hauling tons of fish out. We see what it's like right now. There's hardly any

smelt going up the rivers. They're here one day and gone the next, and that's the season.

MR: But it took a little while then. You said the commercial boats started showing up in the late '60s . . .

JP: '60s, '70s.

MR: And it's been 20 years since, that would be about 1990s . . .

EA: It was very noticeable after the mountain blew [eruption of Mount St. Helens in 1980], and I think a lot of that is just the influence of the silt. The, uh, sediment that was traveling down the Cowlitz, I think it, uh, it changes the whole estuary, and so, the first year after the Cowlitz blew, there was so much going on the river as far as the dredging [of the river channel to remove accumulated silt] and everything, that, um, now whether the smelt were in or not, you don't know because there was, y'know, just so much turmoil that was happening out on the river. And they might even seen as much of that sediment coming out, that they just went to the Lewis, um, y'know, it's, um, where, like, my uncles would go up to the Lewis and dip up there. Um, but after the mountain blew, it just seemed like there was a hard decline. We just didn't have them runs coming in. Um, and the 2003 run—I actually thought we were gonna be back in order, 'cause the river'd had enough chance to actually somewhat get back to somewhat-normal, but, and I don't have any idea what influenced that, that heavier run in 2003. Um, but then, after 2003, we haven't really had anything, y'know? There's some smelts been had, but it hasn't been, y'know, like my younger years, when I was a kid, and it hasn't been like the 2003.

MR: Just to make it clear, when you were a kid, you didn't see years like last year where there were no fish. Every year was consistent?

JP: They were always there, every year, within a certain period of time, they were in the river at that time. January to early March, within that range, there was always a big run of smelt. You're looking at near a month of fishing. People got to go down there, dip when they wanted. There was always someone down there dipping all the time. More during the day then there was at night. There were a lot more people during the daytime. Some of them would come in late at night, they'd try and dip and head on home. They drove all day too, to get here.

Conclusion

Traditional Ecological Knowledge (TEK) is typically qualitative information, not quantitative data. It can be elusive, as it is rarely written or otherwise citable information. TEK can be challenging for biologists to acquire, as access to TEK held within a community may require social science methods, and may require years of working within a community to develop trusting and valuable relationships with individuals who hold knowledge. Finally, the qualitative information gathered, even by skilled TEK-collection practitioners, is typically less publishable in key scientific journals, because it does not look like hard science data. TEK is also highly contextual or experiential; information may be highly time- and place-sensitive. Nonetheless, TEK information can be used to improve science research and management by focusing or narrowing investigation, by identifying new paradigms through which we can better understand the

ecological world and the role of humans within it, and by pursuing a more fully-realized, integrated and holistic understanding of complex natural systems.

In this instance, TEK collection efforts, in the form of semi-directed interviews of tribal and regional elders with long-standing cultural knowledge of ESA-listed eulachon or Columbia River “smelt,” revealed a complex base of community knowledge identifying the general distributional patterns of eulachon within the lower Columbia River and tributary systems, run-timing of adult returns, and ecological cues indicating run arrival. Inquiry also revealed the upper extent of distribution in some river systems, the apparent absence of readily-identifiable spawning grounds, and the physical and behavioral characteristics of the adult return. Finally, informants re-verified the diminished size of spawning adult returns in recent decades.

This information may ultimately support management actions, such as the review and adjustment of critical habitat established for the species. The information presented here may also inform questions and research currently underway regarding timing of adult returns, and any association of spawning behaviors with certain regions of rivers, or ecological attributes that may affect habitat quality and ultimately affect spawning success. Finally, the reporting of certain behaviors: the ascending “ribbon” of smelt, diurnal movement within the river from the center to the bank, and the possible attraction to light sources; these are all aspects deserving further critical investigation. Such inquiry might substantially benefit conservation management opportunities for eulachon, which could ultimately lead to the de-listing of the species if returning run-size substantially increases, and consistently stays large for several years.

Though not elaborated in the quotes selected for inclusion here, it was apparent during our interviews that a fundamental component of Cowlitz Tribal identity is directly related to the aboriginal landscape of the Tribal community, and the components of the landscape that make up the material culture, as gathered in a seasonal round (Curtis 1913; Irwin 1979; Hunn 1990; Reynolds 2007). Informants spoke at length of the deep value that eulachon fishing has within the community, and for families, describing the annual bankside/bonfire/catching and processing as a “festival,” or a “reunion.” The Cowlitz people view eulachon as a very important cultural, as well as natural, resource, and they are deeply committed to proper management and recovery of the species.

While the Cowlitz Indian Tribe has likely the longest, and most expansive history of eulachon fishing among Indian Tribes within the United States, there are several other tribes that have fished (and/or currently fish) for eulachon outside the lower Columbia River system, including the Quinault, Quileute, Lower Elwha Klallam, and Coquille Indian Tribes. Very little is known about eulachon distribution within the ancestral lands of these tribes. An effective next step is to expand the application of this TEK-collection project to willing tribes and individuals, and collect oral history of eulachon fishing from further afield. This expansion will greatly augment our integrated and holistic understanding of eulachon ecology across the entire region of the Pacific Northwest.

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A Multidisciplinary Perspective on the
2011 Ethnography *The Spokane Indians*,
with a Response from the Author, John Alan Ross

Abstract

The publication of *The Spokane Indians* by John Alan Ross in 2011 represents a major accomplishment in the history of Pacific Northwest ethnography. The work, over 800 pages in length, represents four decades of work and service by the author with members of the Spokane Tribe, who live on the Spokane Indian Reservation on the upper Columbia River in north-central Washington. To honor this achievement and explore its contribution to anthropology and other disciplines and interests, five scholars representing different backgrounds and interests provide their perspectives on the culmination of Ross' lifetime of work and thought.

Introduction

Darby C. Stapp

In recent years, the editors of the *Journal of Northwest Anthropology* have considered inviting discussion and commentary on contemporary topics to complement the research articles regularly published in each volume. Our discussions have centered on the potential value and appropriateness of documenting contemporary issues, opinions, and debates occurring among anthropologists conducting and applying anthropological research in the Pacific Northwest. Many anthropological journals publish such items in the form of commentaries, book reviews, book review essays, and point/counterpoint remarks, but the *Journal of Northwest Anthropology* typically has not. We believe it is time to change. Giving light to contemporary thought and ideas, even when controversial, increases the numbers of people thinking about an issue, leads to additional research, and often improved understanding. The challenge for us as editors now becomes deciding on the formats and the process we want to use to encourage our readers to participate.

An opportunity to begin down this path appeared in 2012, when we learned that John Ross's ethnography *The Spokane Indians* had been published (Ross 2011). This work, 872 pages in length, is the culmination of four decades of Ross's work and friendship with the Plateau group that today is centered in and around the Spokane Indian Reservation, located on the Columbia River in north-central Washington. Ross began fieldwork on the reservation in 1968 and essentially never stopped. Working with tribal elders and colleagues, Ross amassed an enormous amount of information, less than a third of which, he tells me, made it into his 2011 ethnography.

We selected Ross's work for several reasons. First, as an ethnography, it is a major accomplishment and deserves to be recognized as such. Pacific Northwest anthropologists of all sub disciplines should be aware of this work, and by devoting space in the journal for its review, we can increase awareness. Second, Ross's work is not just valued by anthropologists, but by

people from other disciplines and backgrounds as well. As a result, Ross's work can help us understand better how anthropological research and knowledge can contribute outside of our discipline. Third, and following this train of thought, Ross' work is a good contemporary case study for examining the place of anthropology in twenty-first century indigenous society, especially as it relates to collecting and disseminating sensitive cultural information. As John tells it, the motivation for the tribal elders, most of whom are now gone, to share this sensitive information was to save it for the young ones; to preserve the information in some way so that it might not be lost, and in some way might help perpetuate Spokane culture and the Spokane people. It is a fact of life however, that not everyone in contemporary Indian society agrees that sensitive cultural information should be shared with outsiders, especially not in a published ethnography available to the public.

To examine Ross's work and address these goals, the *Journal of Northwest Anthropology* editorial team approached colleagues from different backgrounds who we knew were familiar with the book and who could provide different perspectives. The collection begins with an introductory essay by Jack Nisbet, an educator/historian who works with elders and children on the Spokane Indian Reservation. Jack has published major works on early travelers to the Plateau, most notably the geographer David Thompson (Nisbet 1994, 2005) and the botanist David Douglas (Nisbet 2009, 2012). Following his overview essay, is a contribution by Tina Wynecoop, a teacher/librarian and local writer who has had the privilege to work with John Ross in recent years. Wynecoop married into a Spokane family several years ago and spends time with Indian women conducting and learning various traditional activities, such as collecting tules. Tina provides a perspective on the importance of Ross's ethnography to her Colville and Spokane tribal friends and to herself as an appreciator of Spokane culture.

Next is a contribution from a fisheries biologist, Dennis Dauble, whose research includes collecting observations made about aquatic animals from the Columbia Basin by early explorers and early ethnographic accounts of Native American ways of procuring, processing and consuming fish. Dauble has published a number of public-oriented works (e.g., Dauble 2005, 2009) in addition to scientific studies on the life history and ecology of resident and anadromous fishes. Following Dennis's review is a commentary from the Northwest ethnographer Jay Miller. Miller, perhaps best known for his preparation of Colville Indian writer Mourning Dove's autobiography (Miller 1994), focuses on three of his own favorite subjects: horses, lamprey and images.

The final perspective is a commentary by Deward E. Walker Jr., founder and co-editor of the *Journal of Northwest Anthropology*. Deward worked with John Ross over 40 years ago on the Colville Indian Reservation and shares some of those experiences as it relates to Ross's long-time work with the Spokane. As an ethnographer of Plateau culture in his own right (Walker 1998), Deward is well positioned to discuss the significance of *The Spokane Indians* in the context of contemporary ethnography in the Northwest and elsewhere.

We conclude with a response from the author, Professor John Ross. John gives us additional information on how the ethnography came to be, and the contributions made by various individuals. He also responds to some of the comments that were made by our contributors, and shares his thoughts on the overall idea of the multi-authored collection.

Readers are encouraged to evaluate our initial approach to reviewing an important anthropological work from a multidisciplinary perspective. We welcome ideas and recommendations for future publications of this journal. There are many issues and debates ongoing in northwest anthropology and we remain committed to exploring ways to capture and further these debates using the pages of the *Journal of Northwest Anthropology*.

Soothing an Itch: John Alan Ross's Ethnography of *The Spokane Indians*

Jack Nisbet

John Alan Ross's *The Spokane Indians* draws on the author's four decades (1968–2008) of field notes, manuscripts, and published articles to examine the Spokane world. He embeds his own material in a matrix that includes the entire range of historical primary sources, the published ethnographies of the early twentieth century, and especially the seminal unpublished field notes of Alan H. Smith and William W. Elmendorf from the 1930s. For those who, along with Ross, have lamented that “traditional Spokane culture has not been studied as extensively by anthropologists and historians as some other Plateau groups,” (Ross 2011:12) this 892-page tome offers solid data to set beside familiar ethnographies of other Interior peoples.

Ross presents the written primary documents as they stand, a method that occasionally demonstrates the confusion of early white visitors to the Spokane Indians. In a section on fish nets, for example, a source describing the common use of dip nets at Spokane Falls is followed by another claiming that “Dip nets were seldom or never used.” One anthropologist asserts that Spokane utilized Indian hemp (*Apocynum cannabinum*) for “all netting material,” while two historic writers connect net cordage with flax (presumably Western blue flax, *Linum perenne*) (Ross 2011:388–389).

For Ross, the way to reconcile such contradictions is to ask the people who were actually doing the fishing, and this is where the true spirit of his work comes through.

The book begins with a dedication to Nancy Flett, a Spokane elder who shared her significant knowledge of plants and culture with Ross over a period of many years (Fig. 1). A few pages further on, Ross is pictured with Norbert and Christine Abrahamson, another pair of elders, sharing a smile and a gift of smoked salmon. The acknowledgments section names a dozen and a half more tribal members who aided Ross over time, and nods to others who preferred to remain anonymous. The front matter includes a letter from Spokane tribal member George Hill, who writes that “Our tribal Elders would not have divulged this knowledge to John if they did not trust in his heart to do what was best. They entrusted John to ensure our people did not lose a part of their spirit” (Ross 2011:7).

In recent personal conversations, descendants of people named in these acknowledgments make it clear that their family members thought of themselves not as anthropological informants but rather as personal friends of Ross. Two siblings, whose mother worked extensively with Ross, recalled that he visited their home so often that they took to calling him “Brother John.”

In fact, the stories these descendants tell about their culture, passed down from their elders, sound very much like John Ross describing his own time on the reservation. One daughter described driving for her mother and assorted elder friends as they visited root grounds, berry patches, funerals, and social events throughout the region. These companions ranged across the spectrum of kinship and tribal designations; the languages and laughter that buzzed through the car included all kinds of Interior Salish and Sahaptin words, but emerged mostly as a fluid mixture of Spokane and English. The women shared information as they compared old family ancestries and recipes they had heard about, detailing the ongoing and dynamically changing traditions of the culture that is Spokane.

Several of these descendants emphasized that their parent or grandparent, rather than playing any key role in the research, was only one of many people who had a long-term relationship with Ross; they insisted that credit should be shared among them all. This attitude



Fig. 1. Nancy Flett digging roots near Wilbur, Washington, April 1974 (photograph by Darnell Hanson, from the Wynecoop Collection).

remains consistent with Ross's own approach: throughout the many hundreds of quotes and stories that inform his text, the author follows respect and tradition in not identifying his sources by name. "In writing this monograph," Ross writes, "every attempt was made to report accurately on what was told to me by each elder, without making any conjectured interpretations or conclusions" (Ross 2011:14).

Working closely with Salish linguist Steve Egesdal, Ross keeps language in a position of primary importance throughout his accounts, peppering each paragraph with Spokane Indian words and idiomatic phrases related to the delicate knowledge the elders are imparting. In a section on infant skin irritation and diaper rash (Ross identifies himself as a medical anthropologist, and it shows), he recounts treatments concocted from powdered clay mixed with bear grease, sturgeon oil, grease from the neck area of a lamprey, the powdery spores of two different puffballs, and a suffusion of snowbush branch tops and leaves, not to mention a modern salve prepared from wheat flour and water. The list imparts Spokane words for diaper rash and a baby's rump before describing the "soft pliable growth of vegetative mycelium felt-like membrane referred to as *nqa?qe?mín*," which can be found beneath the bark of a buckskin tamarack snag, that was carefully peeled off to serve as a cradleboard diaper (Ross 2011:110–11).

This approach allows Ross to move through time, capturing nuances and complexity in the spiral of tribal changes both before and after white contact. When topics of a sensitive nature arise, Ross follows the wishes of the tribal person who shared it, either to be presented without varnish or deemed unsuitable for print. As both Ross and living descendants point out, there remain volumes of cultural material and stories that are not included in this book.

Those same descendants think that the elders who befriended John Ross imparted their knowledge specifically for the Spokane people, and hope that they learn to use it. No matter what angle future generations use to approach their Spokane world, they will find Ross's contribution to be a central resource, and each page brimming with the energy of true and dedicated hearts.

“The Thing Speaks for Itself”

Tina Wynecoop

“A major activity of all women in the late fall was the laborious but often enjoyable activity of collecting great amounts of bundled tules and cattails from ponds, seeps, and mostly shallow lake edges.” (Ross 2011:247)

In the landscape wedged between the Kettle and Columbia Rivers near the International Boundary sits a hidden little lake rimmed with hydrophytes. This August (2012) a small band of women and one man collected tules (*Scirpus validus* and *S. acutus*) at Taylor Lake. For three of the women this was a new experience and we were honored to be included in the traditional gathering expedition. First, the man sang a blessing and a thanksgiving to the tules, and then the instructing, cutting, bundling, and laughter began. The tules were so abundant that we soon had enough cut, bundled, stacked and ready to take home to dry for next year’s use. Meanwhile, dried and re-moistened tules were provided by our Salish hostess/teacher and we spent the afternoon in her home learning how to sew them into mats. We were also taught how to twine Indian hemp into the cordage traditionally used to bind the individual stalks together. Being a long process to acquire enough twine for our work, we substituted jute string. Metal darning needles substituted for the bone sewing needles traditionally used to perforate the tules for stitching. Who, today, besides museum collections, have implements for this use—tools which were procured from fractured sections of polished deer femur leg bones? Our pocket knives replaced the chert tule-cutting tool pictured in Fig. 2. By late afternoon our mats, sturdied with red osier sticks at each end, took shape and we then took the finished mats outside—walking and dancing on our works of art/utility in order to flatten the lovely reeds into submission to their purpose.

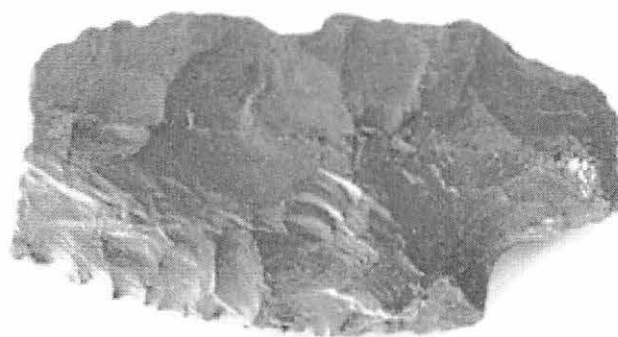


Fig. 2. Photograph of tule-cutting lithic tool from the collection of John Ross, given to him by John B. Flett, Spokane.

How heady was the glimpse into the cultural ways as we did this women's work! The August day was woven with laughter, for no matter what personal burdens we carried, the laughing was—and always has been—the weft and warp overshadowing activities among native women. Our teacher, Patti Bailey, a descendant of the *Sinixt* (Arrow Lakes Indians), observed, “There is a lot of medicine when there are strong women, laughter, and the gifts from our Mother” (Pearkes, personal communication 2012).

On tule-gathering, Patti adds, “There is varying information from the Kalispel's, Spokane's, Mid-Columbia and Canadian sources . . . all I know is what I know. I like figuring it out each time I collect and weave, that in itself is a gift. I, too, love the spots and character of the tules [referring to Ross's ethnographical descriptions] as they are gathered [after a frost]. A native master basket-weaver showed me their way, when the tule jumps into your hands at the perfect gathering time—you don't always have to cut it. That comes earlier than when we collected [late August]. I was able to pull a few the day we collected in such a manner, but you have to really be ‘in touch’ with the tules on a daily basis and understand them to catch that time” (Pearkes, personal communication 2012).

Following this day-long glimpse into tule technology among the Plateau women (Figs. 3 and 4), I turned to Professor John Alan Ross's ethnography, *The Spokane Indians* (Ross 2011), to learn more what his informants and his research could teach me of the processes involved. His book includes recollections from Nancy Perkins Wynecoop (1875–1939) a *Sinixt* (Arrow Lakes Indian), adopted by the Spokane people. She provided “descriptions of her [grand]mother making . . . mats for covering tipis. . . . There were different ways of weaving the grass mats . . . circular [conical—sewn to be wider at the bottom end] mats were made for the round teepee [sp]. . . . Stalks were used, all the stalk ends together, making it narrower at one end. Other mats were woven by alternating the ends, first a small end, then a large.” (Ross 2011:217; Wynecoop 1985:65). Nancy explained, “It was a fine time for gossip, exhibition of skill, and for eating liberal repasts laid out by the hostess” (Elmendorf 1937:100).

Patti taught our little group of novices how to make mats by placing seven stalk ends side by side parallel to a Red-osier dogwood (*Cornus stolonifera*, *C. sericea*) stick, and then securing them with stitches of jute twine, repeatedly alternating them with slender stalk tips of seven, until we had a table-sized four-cornered mat (Fig. 5). And then we, too, had dinner ‘laid out by the hostess.’

Fine fellowship in the pantheon of Northwest ethnographers among which includes Edward Curtis, James Teit, T.T. Waterman, Melville Jacobs, Allan Smith, Robert May, and William W(elcome) Elmendorf (Ross's friend and mentor), now belongs to Ross with this “massive undertaking” to preserve on record “at least the most obtainable aspects of indigenous cultures in the northwest” (Egan 2012:50). Nearly a half century of the author's life has been devoted to a tribal people whose hearts and minds longed to share the way it always was, or, as Egan writes, to “capture the essence of their lives before the essence disappeared” (Egan 2012:50). Curtis and Ross both realized, “The passing of every old man or woman means the passing of some tradition, some knowledge of sacred rights possessed by no other; consequently the information that is . . . gathered, for the benefit of future generations, respecting the mode of life of one of the great races of mankind, must be collected at once or the opportunity will be lost for all time. It is this need that inspired the present task.” (Egan 2012:140).

An ethnographer captures the facts. In doing his field work, Ross tells me, he “felt like a grandson listening to his grandparents”—that his work in ethnography became “not only of the head, but of the heart.” Most poignantly, he repeats, “I didn't do it for myself. I did it for the old



Fig. 3. Kaye Perkins Hale (*Sinixt*), cutting tules, assisted by teacher Patti Bailey (*Sinixt*), August 2012 (photograph by Tina Wynecoop).



Fig. 4. Tule gatherers at the end of the morning August 2012 (photograph by Tina Wynecoop).

people—people who had lived successfully for 13,000 years. They asked me, ‘John, will they ever know these things? Will you write them down for us?’”

These “things” are especially important to one who always longs to step back in time, to pick huckleberries, dig roots, view the untrammelled landscape, walk the old trails, speak in a language so descriptive of their way of looking at the world. In 1970, I came to the Spokane Indian Reservation to teach in the public school. I married Nancy Perkins Wynecoop’s grandson, gained life-long friendships and an extensive family, as well as insight into a culture experiencing profound and unrelenting change. I gained an insider’s perspective few *suye’pis* have. With Ross’s book I can dig deeper into a subject, accessing it easily with the help of the detailed table of contents. My tule gathering experience was illuminated by exploring further about it in his book; and, I appreciate that his informants were using Ross as a ‘basket’—a repository for all they remembered. They cared deeply about the preservation of their life-ways, and if not possible in day-to-day living, at least in its record in his replete ethnography of the Spokan Indians.



Fig. 5. Kaye Perkins Hale finishing her tule mat in August 2012 (photograph by Tina Wynecoop).

Ross carries so much more ethnographic material than is contained in his book. If published the information would fill an encyclopedia. It remains in his heart and mind—and it is a special privilege to sit with him and listen to his explanations of life-ways drawn from the countless interactions he had with people who had become not just informants but family.

Special attention needs to be brought to the superb drawings found throughout the book. As noted, without drawing attention to himself on the figure page in the front matter, they were all drawn by the author.

Finally Ross's ethnography is published—it was eagerly anticipated. The sequel—the “book” that will not see the light of day is now being “written” at night when John turns in for rest which is often elusive. “Who,” he asks, “shall I interview tonight? And, one of the old ones will come to mind and [we] have a visit.” (T. Wynecoop, personal communication 2012).

Today, we might think of Ross as one of the “old ones” who is the reader's informant about a people we all wish we had known. One of his students expressed it this way about the professor who introduced him to anthropology, who taught him to “look at the world and other cultures—the incredible diversity of humanity—the joy and appreciation. What began as a student/teacher relationship [was] transformed into a friendship. . . .” (Osterman 1995:vi).

When I look at the photograph of Ross—a package of fish tucked under his arm gifted from the elders he stands next to, Norbert and Christine Abrahamson (Fig. 6), I think of George Bird Grinnell's sage advice to his friend, Edward Curtis, who was driven to record what appeared at that time to be the ‘the vanishing race’: “It was important, [Grinnell] cautioned, not to come on too strong, too eager. Relax. Soak it all in. Smile. These people are not specimens, not fauna to be categorized and put under microscopes. . . . They are just human beings. No more complicated or simplistic than others, no more heroic for their survival or tragic for their loss. Laugh at yourself. . . . Take time to get acquainted” (Egan 2012:46).

“Take time to get acquainted.” Ross, my mentor, guide and friend, sharing a common bond of appreciation for the traditional ways of a people deeply cared for, has done just that. Even though his bloodline does not match those of the indigenous, his heart and mind resonate with theirs, whose ancestors lived so intelligently along the rivers, plateaus, and mountains of Interior Salish country.

Res ipsa loquitur, “the thing speaks for itself.”

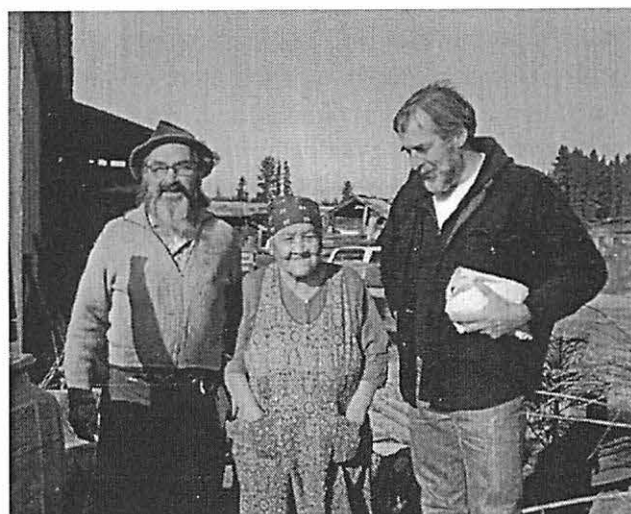


Fig. 6. Photograph of John Ross, 1989, with Spokane elders, Norbert and Christine Abrahamson (photograph by Dale Potter; Ross 2011:8).

Review of *The Spokane Indians*, by John Alan Ross

Dennis D. Dauble

There is much to learn from reading and studying this comprehensive, fact-filled account of the Spokane Indians by John Alan Ross. I found both the breadth of topics and the amount of detail provided on this important regional culture to be impressive. Overall, the book is well-organized with narrative text that is easy to follow. That it is thoughtfully embedded with original quotes and historical records makes for an interesting and informative read. There is also a vast amount of source literature as identified by citations.

I purchased this book with particular interest in learning more about historical fishing practices, important regional fish populations and tool-making/gathering. Consequently, my review focused on Chapters VI to XII, which included tool making, subsistence, hunting, gathering technology, fishing and cooking/food preservation. I was not disappointed with what I found. For example, I learned much about the complex relationships among tool-making and subsistence lifestyles dependent on hunting and gathering. The book also provided several detailed accounts of early explorers and naturalists to the region. Some I was familiar with, some not. Chapter XI, "Fishing," was quite impressive. It provided considerable detail on preparation and storage of salmon, much of which is not documented in other sources. Included in this chapter was estimated run size of Chinook salmon based on diet preference and daily consumption rates. This information is valuable in helping establish population estimates of salmon and steelhead numbers prior to the white settlement period. Fishing methods and seasonality were also covered.

Several species of salmon are described, however, it is unlikely that chum salmon were ever an important part of Spokane Indian diet. Perhaps there was confusion with "dog" salmon, a term often associated with late-run fall Chinook salmon that often arrived to upper Columbia River tributaries in poor condition. In addition, some updating of fish names should be noted, such as Dolly Varden, which is now considered to be a coastal species different from the inland form of the same genus, bull trout.

There is limited detail on fisheries other than salmon. For example, mullet or suckers and members of the minnow family, including redbreasted shiner, peamouth, chiselmouth and northern pikeminnow, were exploited where they were available. I had hoped for more detail, but perhaps these fisheries were not important to the Spokane people except for when salmon were not available. It is notable that Ross provides one of the more complete accounts of lamprey use in the Columbia Plateau region. There were some inaccuracies for species accounts in the text, likely due to confusion over common names used to describe fish by early explorers to the region. For example, "bullhead" is a term often used by regional Indian tribes to describe sculpins. Thus, is not necessarily limited to members of the catfish family, which were not introduced to the region until the turn of the twentieth century. Mid-Columbia Indian mythology and legend includes origin of the bullhead (i.e., sculpin in this case, see Hunn 1989). In addition, the carp of David Thompson and Wilkes (i.e., red and black carp; McPhail and Lindsey 1970; Scott and Crossman 1973) were almost certainly a species of sucker, thus would not be included as members of the minnow family. As noted by Ross, common carp were not introduced to the region until several decades after these early explorers passed through the region.

Nitpicks aside, the fishing technology section provides one of the more complete accounts to be found anywhere with more than 20 pages of detailed descriptions of weirs, traps, nets, spears and line fishing. Unfortunately, few pictures and illustrations were provided to support the narrative (Fig. 7). The fishing technology section was followed by several pages on major Spokane

fisheries, emphasizing Kettle Falls on the Columbia River and the Spokane River and tributaries. The context for these fisheries was informative, as was related history of human development changes in the upper Columbia River and Spokane River watershed.

Despite my bias toward fish and fishing, I kept reading and found several fascinating anecdotes on fish use in other chapters of the book. For instance, the not-so-insignificant dental issues encountered as a result of chewing “sanded” salmon (Chapter XVII. Medicine and Health) and the procedure used by a shaman for removing partially swallowed fish bones (Chapter XVIII. Religion and Mythology). I expect to uncover more interesting fish facts with careful study.

The back cover describes this book as Ross’s “magnum opus.” I could not agree more. The book is original, unique in terms of detailed historical accounts and comprehensive in scope. I would heartily recommend it to anyone interested in the history of resource use and Native American culture in the Pacific Northwest.

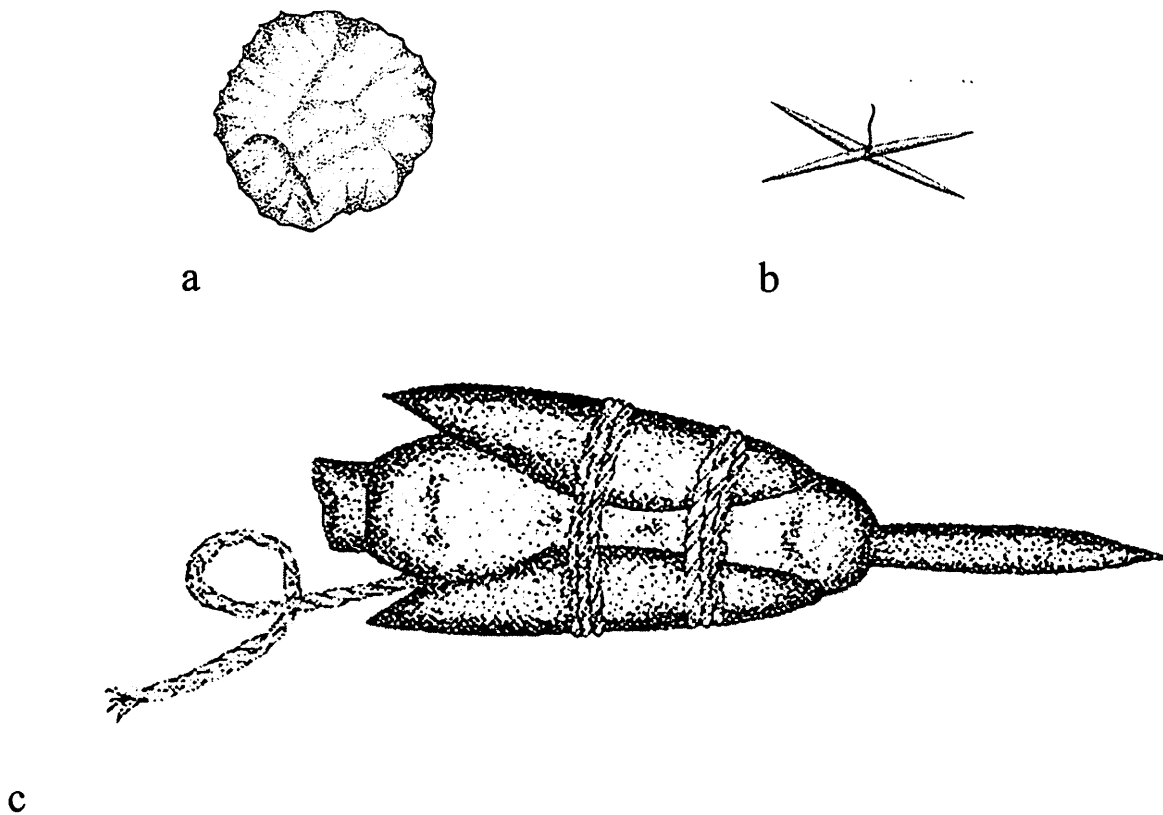


Fig. 7. Three illustrations of fishing technology from *The Spokane Indians* (Ross 2011). a) serrated flint fish knife, 3 cm (pp. 367); b) articulated fishhook, 3 cm (pp. 397); c) fish spear head, 13 cm (pp. 394). Drawn by John Ross. Not to Scale.

Ross's Monumental *Spokan* Study: Grasping—Galloping—Graphics

Jay Miller

The Spokan Indians, John Ross's life's work, is truly encyclopedic; the most comprehensive Plateau ethnography we are ever likely to have. As a standard reference for some time to come, there are also specific features that are particularly well done and useful for comparative purposes. It is these that I want to address: lampreys, horses, and images. They have long been interests of my own, calling for greater attention in Plateau and Native American studies because they are less understood and doomed in various senses.

Lamprey, after existing for half a billion years on the planet, are seriously endangered; native fishers supported by their tribal governments are especially concerned (Miller 2012). Columbia Basin tribes have contributed casino funds and elder expertise to document and restore these environmental mainstays. Anadromous like salmon, they return in the spring to spawn and die, decomposing quickly because they have no bones to slow distribution of nutrients back into the land and water. Primitive (Class Agnatha) jawless fishes, they were and are used as food and medicine by Northwest tribes. A lamentably passing final glimpse of Kettle Falls black with lamprey in the week before the salmon run in 1932 calls attention to the enormity of the losses caused by the construction of Grand Coulee Dam.

The Spokan eelery is particularly well described (pp. 371–73), with its use of drops of blood to release the mouth sucker to allow its capture. Live penning within woven willow frames for a few days is only reported for *Spokans* and *Numipu*, and has long been denied for the entire region. The meat was mixed with huckleberries as a treat. The taboo on eating lamprey (also red meat and turtle) by a first menstruant appears in an earlier section (pp. 137).

Indeed, data such as these, combined with increasing research, highlights the importance of lamprey oil for treating children with earaches, sore muscles, and other ailments. Well aware of the great antiquity of lamprey by their very appearance and habits, native people used this ointment in the clear hope that the survival strengths of this species would be passed along to their own progeny.

Horses need much more attention in Northwest ethnography (pp. 458–465). Their peaking importance during the early fur trade, surpassing canoes as a means of travel, has been underappreciated. Ross does an excellent job of pulling together early sources, especially for a Southwest source by the mid-1700s. Horse trappings and gear are usually vaguely mentioned only in passing, so the careful consideration of bridle, halter, bits, quirt, saddles, stirrup, and tack is all the more welcome. The early use of wooden stirrups, consistent with ancient woodworking traditions needs further study. The joys of horse racing get their due, as well as careful husbandry through castration of geldings. Remarkable is the discussion of horse farming, with plow, an ignored aspect of the historic economy of the Plateau.

Missing from this discussion, however, is careful treatment of the role of horses in fostering intertribal confederacies on the Plateau, such as that of Weowich for Yakamas and other Sahaptians and the Moses family for Salishans, with Spokan participants.

The discussion of images in natural settings adds useful detail, especially in Ross's distinctions among pictographs, petroglyphs, dendroglyphs, and geoglyphs (Fig. 8). The overview, however, would benefit from comparisons with existing literature. The meaning and context for Plateau pictographs now relies on the work with Annie York, the Thompson elder and medical translator, published under her title: *They Write their Dreams on the Rock Forever* (1993). Similarly the cursory mention of the elk geoglyph, where only adults may approach it, is clearly

related to the wide spread association of elk with fertility (Walker, Jahner, and DeMall 1980:121). The story of hunters honoring their fallen prey nicely disguises this deeper meaning. Other geoforms, possibly overlooked, or, at least, not denied, are any earthen fortifications in Spokane territory, as they are known for the region, such as at the fork of the Simcoe among Yakamas (Miller 2011:83).

Unique to this work, outstanding for the Plateau and elsewhere, is the thorough discussion of medical aspects of Spokane culture. In this and other topics, the careful linguistic and vocabulary contributions of Dr. Steve Egesdal and Ann McCrea (Spokane) deserve special mention, as does the willingness of the late William Elmendorf to share his fieldnotes from the extraordinary Sam Boyd, Delia Lot, and Nancy Wynecoop. An independent check for these linguistics is provided by the life-long work of Dr. Barry Carlson with Pauline Flett and sixteen fluent elders, who together produced a grammar and dictionary.

Given that this is such a monumental work of almost 900 pages, some repetition and formatting gaps are expectable. The crux, at base, is to have it done, out, and used for many years to come. Input from reviews can motivate further questions and research, but more than enough has already been provided to increase our understanding and appreciation for decades.

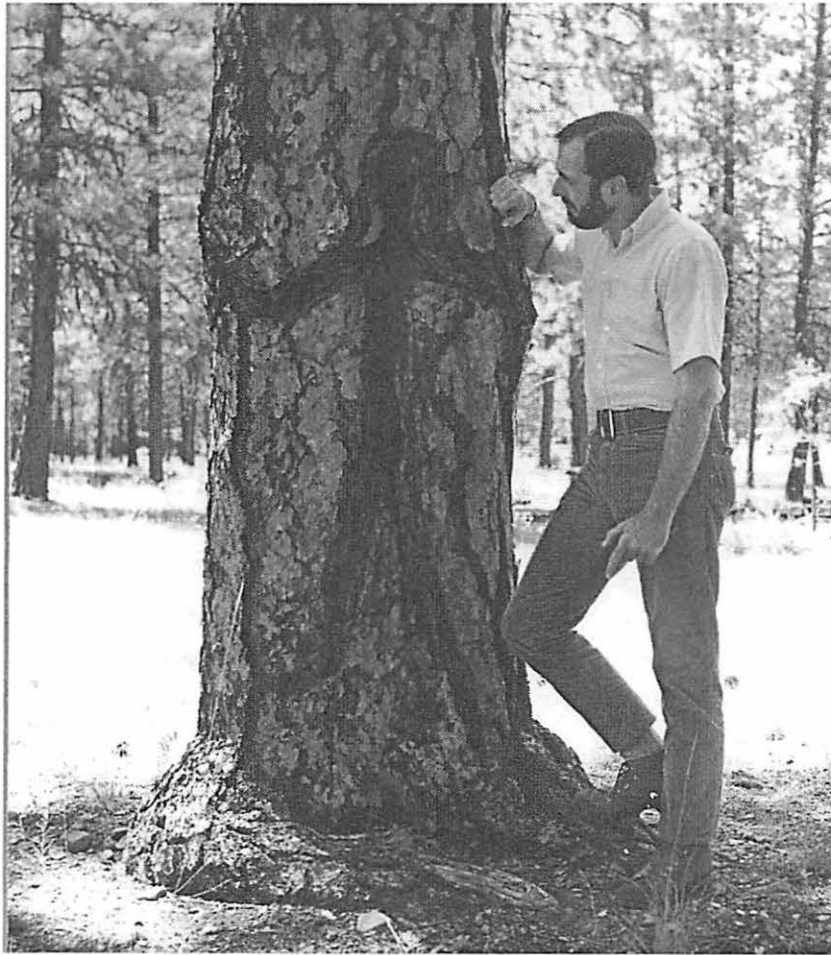


Fig. 8. John Ross standing near one of six pine trees having dendroglyphs, July 1968, Colville Reservation, San Poil River watershed. The trees have since been destroyed (Photograph by Harvey Rice).

John Alan Ross and *The Spokane Indians*

Deward E. Walker, Jr.

My own familiarity with John Ross began in 1965 at Washington State University when we worked together with Jack Schultz on a multi-year study of acculturation on the Colville Reservation. I served as Ross's Master's thesis advisor in which he examined the Colville factionalism that was threatening to terminate the Colville Reservation. We continued to work together after I became chairman of the anthropology department at the University of Idaho. Later, I was able to secure Ross's contribution on the Spokane for Volume 12 of the Smithsonian Institution's Handbook of North American Indians, which I edited (Walker 1998). As always, Ross's work was both careful and detailed in this task as well. I also wish to call attention to Ross's impressive research on Spokane burial practices appearing in *Journal of Northwest Anthropology* in the Spring of 2008 (Ross 2008:17), which we were pleased to publish as an important addition to the comparative burials research of Roderick Sprague. The reader will also find many other examples of Ross's commitment to ethnographic excellence in the bibliography of *The Spokane Indians*, where his many publications are listed.

It is a pleasure to read John Ross's 892-page ethnography published in 2011, *The Spokane Indians*. It is constructed in a manner typical of the classic, and I would add, definitive, ethnographies of the Plateau and Great Basin. Further, it is also characteristic of many classical ethnographies in that its completion has occupied decades of Ross's professional life. His long-term commitment to detailed ethnographic description in *The Spokane Indians* is rare and will endure as a standard reference work for the Spokane while serving as a model for future ethnographers. This work resembles but goes much further than the exhaustive organization of the Culture Element Distribution Lists, inspired by Alfred Kroeber, and will be a fitting legacy for Ross.

Although *The Spokane Indians* is an ethnographic *tour de force*, it also addresses many of the methodological and theoretical issues Ross has had to face in his forty-year research for this volume. It should be read as much for these contributions as for its ethnographic content. As well, Ross addresses important historical and cultural controversies and questionable interpretations of various prior publications dealing with the Plateau that should be considered by all Plateau anthropologists and interested tribal members.

Ross's research also exhibits the influence of several anthropologists such as Allan H. Smith and especially William Elmendorf, whose earlier Spokane research was available to Ross. In addition are the many Spokane tribal members with whom Ross formed lifelong friendships. *The Spokane Indians* is dedicated to tribal member Nancy Flett, and is praised by George Hill, a Spokane artist, for its accuracy and acceptance by the Spokane people.

Concluding Remarks from the Author

John Alan Ross

I am delighted to be able to personally acknowledge the colleagues and friends who have so kindly devoted time and effort in critically reviewing my recent ethnographic publication, *The Spokane Indians*. But before doing so, I should briefly explain some of its origins.

Without the encouragement and influences of other people, this book likely would never have been written or published. Prior to graduate school, I had received no instruction in conducting ethnographic fieldwork. However, my wife had graduated from the University of Oregon with a major in anthropology. Soon after, we were hired by the Public Health Department of the Australian Government to conduct a pilot project in the introduction of peanut cultivation among the Chimbu of New Guinea, in the Eastern Highlands province, where kwashiorkor was endemic among the young children. This multiyear project involved extensive fieldwork, which I found to be intensely interesting, and ultimately of benefit to the Chimbu families.

Upon leaving New Guinea, my wife and I enrolled in graduate school, first at Montana State University and then Washington State University, where I decided to major in anthropology. I was most fortunate to become a teaching assistant of Dr. Deward E. Walker, Jr., for approximately six semesters, during which time I had the benefit of his expert instruction in ethnography, in both the classroom setting and out in the field—primarily with the Nez Perce and Colville Indians. It was because of Dr. Walker's devotion and skills in ethnographic fieldwork that I benefited from his well-established contributions to both Salish-and Sahaptin-speaking Native American Indians.

With a master's degree in anthropology, I was hired on at Eastern Washington University, where I taught for 32 years in the Department of Anthropology. During this time, I focused on ethnographic fieldwork on the Spokane Indian Reservation.

The one person who was most responsible for the successful direction of my fieldwork with the Spokane, and the eventual publication of my Spokane People monograph, was undoubtedly the brilliant Salish ethnographer, Dr. Steven M. Egesdal, who is arguably the most devoted and accomplished Salish linguist in our era. To confirm this, one need only read his remarkably comprehensive work with the Flathead, Spokane, and Thompson Indians.

It was quite by chance that one of my favorite students, Deane R. Osterman, Jr., happened to bring Steve Egesdal to our home, which commenced a long and intense friendship. On this occasion, Steve convinced me to continue my fieldwork with the Spokane and to publish my findings. During the subsequent nine years of organizing and expanding my Spokane field notes, Steve spent literally hundreds and hundreds—perhaps thousands—of hours reviewing and correcting the Spokane linguistics in my book. Upon my completion of the first draft, he kindly offered to do a final review, which sadly I declined because of illness and a longing to publish the ethnography in a timely fashion.

Darby C. Stapp, the innovative editor of the *Journal of Northwest Anthropology*, is to be complimented for his publicly encouraging the readers and contributors of this journal to evaluate various articles of interdisciplinary anthropologic study, particularly to facilitate the relationships among indigenous groups and concerned anthropologists. This may culminate in a critical multidisciplinary review of the major ethnographic and diachronic studies of the Spokane people and other contemporary and seemingly-homogeneous native groups. It would undoubtedly reveal the existence of attitudes and practices of ethnographic behavior, rituals, and beliefs that are no

longer functional. These peoples' current predicament is due to the regrettable dynamics of deculturation and selective assimilation of certain cultural traits and beliefs.

The ongoing deculturation also undermined the efforts of ethnographers, because with every passing year, there were fewer surviving Spokane Indian elders who could accurately describe the language, rituals, and other cultural elements of which only those elders had firsthand experience. Moreover, far too many ethnographers conducted primary research for no more than two or three summers, which greatly limited not only their abilities to gain the trust of sources, but also the number and extent of interviews they could conduct. As a consequence, an ethnographer's conclusion as to the causes for any given cultural change and belief, could be quite erroneous, based upon differentially acquired knowledge by the elders.

In considering my own four decades of fieldwork with the Spokane people, and being cognizant of the different rates of deculturation and the acquiring or replication of *suyápi* cultural influences, I was usually taught once-universal beliefs or rituals of which only my elder mentor had linguistic and cultural knowledge. Sadly, when an elderly Spokane lady died, no one else in her group might be knowledgeable of the words and rituals she had acquired during her lifetime. Her children and grandchildren had no interest to learn them, for television was their pastime. After all the thousands of hours with the wonderful, kind, and knowledgeable elders, I can only agree with Darby Stapp's meaning of objective comparative critiques. After all, it is the basis for all anthropological disciplines.

Although it had been only on two occasions that I had the distinct pleasure and honor of meeting Jack Nisbet, this internationally-acclaimed scholar and historian is respected by the Spokane people, who speak of him with well-founded admiration. His universal acceptance is based upon his commitment that every Spokane—young and old alike—now has an opportunity to learn of their once-dynamic culture, as well as the Spokane's adaptation to an environment they understood and attempted to protect.

Perhaps what is most important in Jack Nisbet's evaluation, is when he states how an inquiring anthropologist should "move through time, capturing nuances and complexity in the spiral of tribal changes both before and after white contact."

Without having the opportunity to discuss the idea with Jack Nisbet, I suspect that his commitment to the study of Native Americans is to a great extent a result of his many years of study of the early English and Scottish explorers David Douglas and David Thompson, and of their selective acceptance of Native American survival skills. Jack Nisbet's deep understanding of ethnobotany—which is the basis for the Native Americans' survival—has permitted him an intimate and thorough appreciation of a people who have accepted his gifts of knowledge.

Whenever I open my magnum opus, I am always aware of my deep and sincere gratitude to Tina Wynecoop, a thoughtful and delightful lady who always shared her time and kind efforts to encourage me while collecting Spokane ethnography and during the—sometimes difficult—sessions of writing. Both Tina Wynecoop and her Spokane husband 'Judge' frequently suggested people on the Spokane Indian Reservation who they felt could assist me in learning more about Spokane beliefs and practices.

For many years, Tina Wynecoop has assiduously collected often obscure newspaper clippings as well as semi-professional accounts of the Spokane Indians. She probably has the most complete archival collection of material concerning the Spokane people. It should be noted that both Tina and Judge Wynecoop have for many years given generously of their time and efforts by volunteering their services and knowledge to local museums and other organizations concerned with Native Americans.

It was during a conversation between Tina Wynecoop and Darby Stapp that the idea of a multi-disciplinary review of my Spokane ethnography, which thankfully the editors of *The Journal*

of *Northwest Anthropology* have completed. I am convinced that the exchange of ideas and evaluations by authors of different backgrounds and research interests is of considerable value.

I was most impressed with the kind and well-written review by Dennis D. Dauble, of *The Spokane Indians*. He is absolutely correct that I should have been more explicit in identifying certain fish species as well as providing more illustrations of fishing technologies.

Unfortunately, during the latter phase of writing this manuscript, I was confronted with the dilemma of limited time and space—time for further writing and research, and the space limitations of a printed book. On numerous occasions, my detailed fieldwork revealed variations and alternative interpretations of ethnographic evidence, usually based on the informant's age. Also, when interviewing, for example, an elderly lady from a different Indian group, her ethnographic description or linguistic phrasing could differ considerably from that of the local Spokane.

Dennis Dauble, a fine scholar, is correct that certain ethnographic topics could have been better summarized. I am afraid that that was an ongoing problem during the writing of the book. Even today I recall aspects of activities, such as religious rituals, that I could have included in my writing. There was also the dilemma of determining to whom I was writing the book: anthropologists, historians, the Spokane Indians, or the reading public.

I was impressed with Dennis Dauble's concern with traditional subsistence and lifestyles dependant upon and well-adapted to hunting and gathering, but which the arrival of Europeans would change forever. The resulting deterioration of the indigenous medical profile remains a serious situation, one that is exacerbated by a generally inadequate diet that seldom utilizes the more healthy indigenous animal and plant foods of the Spokane ancestors.

I am most grateful to Jay Miller, an ethnographer whose extensive and comprehensive writing I have enjoyed for many years. I regret not acknowledging more completely his understanding of the lamprey and eel among certain Plateau groups—ones critical to a group's medical profile. His knowledge, like that of Nancy Turner, of plant and ethnomedical uses is most impressive.

Jay Miller has, over the years, no doubt gained a remarkable understanding and appreciation of various curing shamans. Since there were at least five or even six specializations of shamanistic diagnostic and curing powers, I suspect one could have, at one time, identified certain diagnostic conditions or traits critical to making a patient's meaningful diagnosis.

During my time as a fieldworker with the Spokane, as near as I could discern, there was only one active curing shaman, with whom I made a number of visits to the Flathead Indian Reservation. However, I was fortunate to record numerous accounts of past curing rituals once conducted among the Spokane and by several Spokane who had traveled to several southern non-Salish speaking groups.

Jay Miller is correct in noting that I should have devoted more attention to a discussion of images in natural settings. Sadly, many pictographs and geoglyphs have been destroyed—most notably dendroglyphs, as an unfortunate consequence of logging. Although I frequently inquired about early earthen fortifications in Spokane territory, I knew of none. However, roughly 40 meters north of the Spokane River, I photographed one major displacement of a circular ring of excavated earth, which the locals claimed had been built many years ago by a Nez Perce man, to secure the base of an unusually large tipi.

Again, I wish to express my gratitude to the people who helped in the development of my Spokane monograph, as well as to those who have continued the discussion in the articles to be found in this publication.

The Spokane elders would have undoubtedly appreciated this dialogue, for they themselves were steeped in an oral tradition like no other. This was demonstrated to me on countless

occasions, when I was interviewing such mentors. Because their children and grandchildren did not speak the language—and few showed any interest in learning—these elders felt quite isolated, and expressed great delight when they had a chance to talk about the old ways, to patiently answer my questions, to hear themselves again speak Spokane, and to softly sing a curing song. These wonderful people did not feel at ease trying to explain to the youth about their past rituals and traditions, because the young, living in Western culture, cared nothing of the reasons for those traditions and the language itself. In fact, the elders tended to remember those traditions only in the Spokane language. Recounting the old ways and what had been lost, could bring many of these people to tears, and yet it was clearly cathartic for them, just as it was memorable for me. I always felt fortunate that they were kind enough to entrust to me what was in their hearts.

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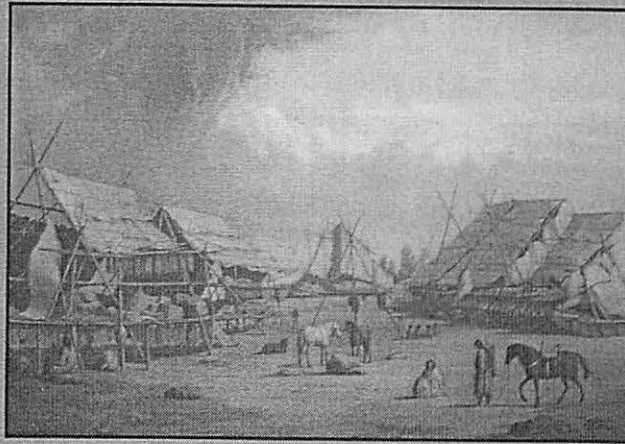
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THE SPOKAN INDIANS



JOHN ALAN ROSS

For more information see: <http://www.ross.ws/Spokan/?page=home>

The 64th Annual Northwest Anthropological Conference, Moscow, Idaho, 21–23 April 2011

The *Journal of Northwest Anthropology* has a longstanding tradition of publishing the abstracts from the Northwest Anthropological Conference. This tradition began in 1968 in Volume 2 of *Northwest Anthropological Research Notes* with the printing of abstracts from the 21st Northwest Anthropological Conference held in Portland, Oregon (NARN 1968). Volume 2 also published the titles of papers presented at the previous twenty annual Northwest conferences (Sprague 1968). Only abstracts from individual papers were published until Volume 46, when symposia, workshops and panel abstracts were included, as were poster abstracts.

Publishing the abstracts has been an important addition to Northwest anthropological literature for several reasons. One important reason is that in many cases, an abstract is the only published record of a specific piece of research or activity or idea; for this reason, such abstracts are cited in other publications from time to time. By publishing the conference abstracts we are make them accessible to researchers who otherwise may never have been aware of the conference and the papers that were presented.

Several forces have converged that necessitate a change in the journal's policy concerning continued publication of the Northwest Anthropological Conference abstracts. Among these forces are the increasing number of papers being presented, the increasing length of the abstracts, the increasing cost of publishing pages in the journal, the desire to devote more pages to research articles, and the availability of other mechanisms to make the conference material available, namely the internet.

Taking everything into consideration, beginning with Volume 47, we will continue to publish abstracts from symposia, workshops, and panels, but will only publish titles and authors of contributed papers and poster presentations, listing them according to the session in which they appeared. Abstracts of all papers will be published electronically on our website (www.northwestanthropology.com), where they will be searchable by author and keyword. We feel that this compromise will provide better context for each annual conference as represented in the journal by identifying the symposia and sessions along with the contributors and titles of papers. The new policy will facilitate research because by including the full abstracts on the website, researchers will be able to search for key words and more easily find pertinent material. We welcome comments from our readership on this new policy and anticipate further improvements as we adapt to the changing world of anthropological publishing.

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Forum, Panel, and Symposia Abstracts

Tribal Initiated Ethnohistorical Research in the Northwest. [T5a] This session reviews collaborative research between Western Washington University, the Confederated Tribes of Grand Ronde and the Quinault Indian Nation. Tribal initiated research centers around issues of ceded lands and treaty rights to resources. What can ethnohistorical research contribute to the ongoing dialogue between the tribes, the legal community and academia? Organizer: Daniel L. Boxberger (Western Washington University)

Boxberger, Daniel L. (Western Washington University) Introduction

Pederson, Nora K. (University of Alberta) “‘Heirs not Determined’: Inheritance and Allotments at Grand Ronde”

Lewis, David (Confederated Tribes of Grand Ronde Cultural Resources) and Daniel L. Boxberger (Western Washington University) “Grand Ronde Ceded Lands Research”

Boxberger, Daniel L. (Western Washington University) and Larry Ralston (Quinault Indian Nation Tribal Council) “Incident at Punta de los Martires”

Boxberger, Daniel L. (Western Washington University), Nora K. Pederson (University of Alberta) and Justine James, Jr. (Quinault Indian Nation Cultural Resources) “Quinault Indian Nation Ocean Fisheries Oral History Project”

Tribal Initiated Ethnohistorical Research in the Northwest Roundtable.

Working with THPOs: Tribal Historic Preservation Officer Symposium. Tribal Historic Preservation Officers (THPOs) from Washington and Idaho present how their various programs operate and what is expected from and offered to CRM contractors and/or other researchers working on the reservations and within the Tribes’ traditional territories. As with SHPOs, each THPO and office has unique operating procedures, confidentiality requirements, resources, and so on, at their disposal. As a result, there is no one-size-fits-all approach to working with THPOs. This symposium is an opportunity for CRM contractors, academic professionals, and students to understand what each THPO has to offer to and requires from researchers along with the chance to interact directly with the THPOs. Organizer: Jill Maria Wagner (Coeur d’Alene Tribe)

Wagner, Jill Maria (Coeur d’Alene Tribe) “Introduction to Tribal Historic Preservation Offices”

Pleasants, Camille (Colville Confederated Tribes of the Colville Reservation) “Colville Confederated Tribes Historic Preservation Office Overview”

Lewarch, Dennis (Suquamish Tribe) “Suquamish Tribe Historic Preservation Office Overview”

Baird, Keith Patrick (Nez Perce Tribe) “Nez Perce Tribe Historic Preservation Office Overview”

Wagner, Jill Maria (Coeur d’Alene Tribe) “Introduction to Tribal Historic Preservation Offices”

Working with THPOs Discussion

Cultural Resources Management in Pacific Northwest Transportation: A Joint IDT-ODOT-WSDOT Symposium. This symposium is a joint presentation of the Idaho Transportation Department (IDT), Oregon Department of Transportation (ODOT), and Washington State Department of Transportation (WSDOT) cultural resources programs to highlight projects and issues in transportation projects over the past year. Participants include DOT staff and consultants

and will cover a range of topics including archaeology, agency cultural resources management, and historical investigations. Organizer: Scott S. Williams (Washington State Department of Transportation)

Williams, Scott S. (Washington State Department of Transportation) “Challenges in Transportation CRM”

Hodges, Charles (Pacific Geoarchaeological Services) “Geoarchaeological Investigations Along the I-5 Crossing, Puyallup Delta, Tacoma, Washington: A Combined Lithostratigraphic and Allostratigraphic Approach”

Ruiz, Christopher L. (University of Oregon-Museum of Natural & Cultural History) and Thomas J. Connolly (University of Oregon-Museum of Natural & Cultural History) “The Archaeology of a 19th Century Pre-allotment Native Homestead on the former Klamath Indian Reservation, Beatty, Oregon”

Rose, Chelsea (Southern Oregon University Laboratory of Anthropology) and Katie Johnson (Southern Oregon University Laboratory of Anthropology) “On and Onwards’: Finding and Mapping the Applegate Trail”

O’Neill, Brian (Museum of Natural and Cultural History, University of Oregon), Paul Baxter (Museum of Natural and Cultural History, University of Oregon), and Christopher Ruiz (Museum of Natural and Cultural History, University of Oregon) “The Harris Homestead: A Rogue Indian War Battle Site in Southwest, OR”

Huber, Edgar (Statistical Research, Inc.), Robert Wegener (SRI), Kevin Bartoy (WSDOT), and Sarah Van Galder (SRI), “Deep Explorations in the AWVRP North Access Area, Seattle”

Elder, J. Tait (ICF International), Patrick Reed (ICF International), and Stacy Schneyder (ICF International) “Context is Everything: Case studies for Using Expectations to Guide Archaeological Investigations”

“Meaningful Consultation, Anthropological and Archaeological Research and Results: Managing Cultural Resources within the Traditional Territories of the Colville Confederated Tribes” [F2a] The Confederated Tribes of the Colville Reservation (Colville Confederated Tribes [CCT]) History/Archaeology Program assists federal agencies with cultural resources management compliance for the 1.4 million acre reservation and throughout the 25 million acres of Traditional Territories in the northwest United States. Different perspectives from the various agencies and CCT require early consultation to attempt to achieve cultural resources management objectives. The CCT History/Archaeology Program contributes to regional research objectives by combining tribal knowledge with anthropological and archaeological methods. The symposium presentations are a collection of cultural resources management projects, anthropological and archaeological research results and History/Archaeology staff duties which assist both agency compliance and attempt to promote the interests of the CCT. Program Manager and Tribal Historic Preservation Officer: Camille Pleasants. Organizer: Jon Meyer (Confederated Tribes of the Colville Reservation)

Marchand, Mary (Confederated Tribes of the Colville Reservation) Prayer and Opening Remarks.

Marchand, Amelia (Confederated Tribes of the Colville Reservation) “Native Ground: Collaboration Efforts to Preserve a Century-old Sweatlodge Site”

Meyer, Jon (Confederated Tribes of the Colville Reservation) “Common Ground . . . with Restricted Access”

Covington, Brenda (Confederated Tribes of the Colville Reservation) “Ongoing Adverse Impacts to Cultural Resources at the Grand Coulee Dam Reservoir, Lake Roosevelt”

Shannon, Donald (Confederated Tribes of the Colville Reservation) “Salish Place Names on the Eastern Slopes of the Cascades”

Harry, Lawrence (Confederated Tribes of the Colville Reservation) “Duties of the Traditional Cultural Property Technician—Perspectives from a Tribal Member”

Panel: Three-Year Retrospective on the Cultural Resource Protection Summit: What We’ve Said, What We’re Saying, and Where We’re Going. [F5a] Since 2008, the nonprofit program Applied Preservation Technologies (APT) has helped produce the annual “Cultural Resource Protection Summit” at the Suquamish Tribe’s Kiana Lodge near Poulsbo, WA. The Summit is designed to promote collaborative cultural resource planning as an effective means of finding resolution to issues related to the intersection of cultural resource and land use before they escalate into emotionally-charged, divisive, expensive stalemates or lawsuits. Through keynotes, panels, and networking, attendees representing all parties affected by this intersection explore the most pressing issues with the goals of building relationships between diverse interest groups and designing practical solutions to common problems. You are invited to participate in an open discussion about: 1) issues discussed at the first three Summits regarding successes/failures in the Cultural Resource Management (CRM) profession; 2) a preview of the fourth annual Summit to be held May 23–24; and 3) ways the CRM profession can improve its methods and outcomes. Organizer: Mary Rossi (Applied Preservation Technologies). Panel members: Mary Rossi (Applied Preservation Technologies), Lynn Compas (HRA), Dennis Lewarch (The Suquamish Tribe), Julie Longenecker (Confederated Tribes of the Umatilla Indian Reservation), and Darby Stapp (Northwest Anthropology LLC)

The Sanak Island Biocomplexity Project and Related Research. [T2b, T6] Long-term multidimensional research on Sanak Island and the Western Alaska Peninsulas focused on humans as part of the northern ecosystems where the modern and the prehistoric, the terrestrial and the marine, the local and the regional, and the empirical and theoretical are all interrelated. We suggest that this multidimensional approach is not only possible but necessary to our understanding of the North Pacific region. We also suggest that through multifaceted social dynamics the Aleut conditioned the structure of complex ecosystems. They were not simple and passive harvesters, but were rather active participants in a regional system that included them at the top of the food chain. The implications of this type of approach are profound and require the integration of anthropology, archaeology, geology, ecology, oceanography, and history, the perspective of all spatial and temporal scales, new methods of analysis, and the seamless merging of various theoretical approaches from the most humanistic to the most deterministic. Organizer: Maschner, Herbert D.G., Anthropology Research Professor; Director, Idaho Museum of Natural History; Director, Center for Archaeology, Materials, and Applied Spectroscopy; Idaho State University.

Maschner, Herbert (Idaho State University) “An Introduction to the Biocomplexity of the Western Gulf of Alaska”

Russell, Roly (Sandhill Institute), Spencer A. Wood (Stanford University), Amber Tews (Idaho State University), Dieta Hanson (Cal Poly Pomona), and Herbert Maschner (Idaho State University) “Uniting Ancient Midden Archaeology and Modern Intertidal Ecology: Patterns of the Intertidal Ecosystem of Sanak Island, Western Gulf of Alaska over 5,000 years”

Tews, Amber (Idaho State University) and Herbert Maschner (Idaho State University) “Temporal Variation in Foraging Behavior: A Niche Construction Approach”

Misarti, Nicole (Oregon State University), Herbert (Idaho State University), Kelli Barnes (Idaho State University), Spencer Wood (Stanford University), and Bruce Finney (Idaho State University) "Exploring Changes in Stable Isotope Ratios of Sea Otters over Thousands of Years on Sanak Island, Alaska"

Barnes, Kelli (Idaho State University), Herbert Maschner (Idaho State University), Bruce Finney (Idaho State University), and Nicole Misarti (Oregon State University) "Isotopic Analyses of Shell and Bone from Sanak Island, Alaska, and their Relevance for Understanding Ancient Environments"

Wood, Spencer (Stanford University), Jennifer Dunne (Santa Fe Institute), Roly Russell (Sandhill Institute), Herbert Maschner (Idaho State University), and Nancy Huntly (National Science Foundation) "Food-webs as Tools for Understanding Historic and Prehistoric Roles of Humans as Consumers in Marine Ecosystems"

Maschner, Herbert (Idaho State University), Matthew Betts (Canadian Museum of Civilization), Corey Schou (Idaho State University), Robert Schlader (Idaho State University), Nicholas Clement (Idaho State University), and Jonathan Holmes (Idaho State University) "Democratizing Faunal Analysis: The Virtual Zooarchaeology of the Arctic Project"

Schlader, Robert (Idaho State University), Nicholas Clement (Idaho State University), Herbert Maschner (Idaho State University), Corey Schou (Idaho State University), and Matthew Betts (Canadian Museum of Civilization) "The Virtualization Process at the Idaho Virtualization Laboratory: Making the Physical Digital"

Clement, Nicholas (Idaho State University), Herbert Maschner (Idaho State University), and Corey Schou (Idaho State University) "Virtual Repositories: Discussing Methodologies for Integrating Access to Museum Collections"

Benson, Buck (Idaho State University) and Herbert Maschner (Idaho State University) "Geochemical Analysis of Volcanic Materials from the Lower Alaska Peninsula: A Study of Comparative Techniques and Human Demographics"

Maschner, Herbert (Idaho State University) "An Introduction to the Biocomplexity of the Western Gulf of Alaska"

Current Perspectives on Technological Organization and Social Complexity. [F1] What constitutes "social complexity" in small scale societies and how can we infer it from the archaeological record? One fruitful approach toward these fundamental questions in archaeology is through the study of technological organization. Technological organization examines the behaviors patterning the ways in which peoples made, used, and transported material culture. Drawing on a diverse set of case studies across different regions, time scales, and technological practices, shifts in the patterns of tool production, retouch, and discard are examined for insights as to how they inform our knowledge of social organization. Each paper provides perspectives on what social complexity entails from social inequality to specialization, and how these social processes may be visible in the archaeological record. The approaches used include experimental studies, the examination of formed tools and their byproducts, and agent based models; highlighting the methodological diversity in the approaches to answering these fundamental questions in archaeology. Organizer: Adam Rorabaugh (Washington State University)

Williams, Justin (Washington State University) "Debating the Complexity of Clovis: Insights into the Complexity Paradigm"

Rorabaugh, Adam N. (Washington State University) "Keeping Things in Line: Modeling the Impacts of Demography on Social Learning in the Pacific Northwest"

Osiensky, Whitney S. (Western Washington University) "Tracing the Stone: Microphenocryst Analysis as a Sourcing Approach for Dacites and other CVRs"

Dolan, Patrick (Washington State University) "The By-Products of Production: Lithic Debitage from a Marpole-phase Plank House"

Safi, Kristin (Washington State University) "Assessing Prehistoric Salt Processing and Small Scale Production in Minimally Specialized Ground Stone Technology"

Palmer, Jamie (Western Washington University) "A Fresh Look at an Old Artifact: A New Interpretation of Edged Cobbles at Cherry Point, WA"

The Sandpoint Archaeology Project. [F4b, F8] The Sandpoint Archaeology Project is the largest data recovery project in the history of the state of Idaho. Three years of excavations ahead of Idaho Transportation Department's reconstruction of U.S. Highway 95 around Sandpoint, Idaho, yielded 568,447 artifacts recovered from several sites and features. The project recovered large portions of historic Sandpoint's original townsite including artifacts associated with prehistoric Kalispel occupations, the overseas Chinese, several saloons, restaurants, and bordellos in Sandpoint's Restricted District, various features associated with former commercial businesses including a former Northern Pacific Railroad hotel, and remains from a former blacksmiths/machine shop associated with the Humbird Mill. This symposium presents the results of some of the analysis and reporting work now in progress. Co-Organizers: James C. Bard (SWCA Environmental Consultants) and Robert M. Weaver (The Environmental History Company)

Weaver, Robert M. (The Environmental History Company) and James C. Baird (SWCA Environmental Consultants) "Introduction to the Sandpoint Archaeology Project Symposium"

Betts, Robert C. (Vanguard Research) and James C. Bard (SWCA Environmental Consultants) "From Time Immemorial: The Prehistoric Record in the Sand Creek Byway, Sandpoint, Idaho"

Bard, James C. (SWCA Environmental Consultants) and Sylvester L. Lahren, Jr. (SWCA Environmental Consultants) "Was There a Village at Sandpoint? – Digging Deeper into the Archaeological and Ethnographic Record"

Wegars, Priscilla (SWCA Environmental Consultants) "The Chinese in Sandpoint, Idaho"
Kisling, Breanne (SWCA Environmental Consultants) "Childhood Treasures: The Toys of Sandpoint, Idaho"

Mitchell, Joseph C. (SWCA Environmental Consultants) "Developing an Artifact Coding System and Database for Blacksmith/Machine Shop Sites: A Case Study from Sandpoint, Idaho"

Bielmann, Oliver R. (SWCA Environmental Consultants) "The Quantity not Quality: Foodways of a Late 19th Century Boardinghouse Residents, Sandpoint, Idaho"

Swords, Molly (SWCA Environmental Consultants) "Smoking Allowed: An Examination of Tobacco Usage in Historic Sandpoint, Idaho"

Emmick, Jamelon (SWCA Environmental Consultants) "Evidence for Dental Health in Historic Sandpoint Gathered from Human Remains, Isolated Teeth, and Artifacts"

Warner, Mark S. (University of Idaho) "Status in a Box(car): Consumer culture in Sandpoint, Idaho"

Weaver, Robert M. (Environmental History Company) "Why the Heck Dig There?—Targeting Cultural Resources in an Urban Environment"

Forum: Lickety Split: Sandpoint's Artifacts in Three Minutes. A Special 2.5 Hour Forum of Three-Minute Papers with Discussions. Sandpoint, Idaho is one of the largest sites excavated in the Northwest and includes a plethora of artifacts, some unique to Sandpoint while others are found throughout the West. This exciting forum will explore individual artifacts unearthed in Sandpoint in a forum setting of three-minute papers. Often artifacts are skimmed over in reports or lumped into classes rather than giving those interested a detailed look at the individual pieces which contributed to the everyday lives of the past. During this forum presenters will showcase an artifact every three minutes, revealing the details and asking the bigger questions that will not only shape the history of Sandpoint but will aid archaeologists in our region with identification and interpretation of common and not-so-common artifacts found throughout the American West. Time will be allowed for questions and discussions throughout this forum. Co-Organizers: Amanda Haught (University of Idaho) and Molly Swords (SWCA)

Cultivating Sustainability through Archaeology: The University of Idaho's Campus Trash Project. [T7a] A sense of civic duty and responsibility for one's surrounding environment is best cultivated through one's interaction with and daily observation of it. The Campus Trash Project, an archaeological study of trash accumulation on the University of Idaho campus, was designed with this principle in mind. The Campus Trash Project involves undergraduate and graduate students enrolled in an archaeological methods and theories course studying areas or zones that have dense trash deposits. Students work in archaeological teams assigned to each zone, in the process gaining vital archaeological and ethnographic skills such as mapping, participant observation, artifact cataloging, analysis, and interpretation. Students have used their findings to inform campus waste management strategies, including the placement or relocation of trash cans and the curtailment of student littering through new recycling initiatives. This symposium reviews the pedagogical and applied components of the Campus Trash Project, focusing on how the project can be replicated at other universities to assist in both sustainability efforts and imparting archaeological methodologies to students of anthropology. Organizer: Stacey Camp (University of Idaho)

Camp, Stacey Lynn (University of Idaho) "Teaching with Trash: Archaeological Insights on University Waste Management"

Allen, Josh (University of Idaho), Elaine Rose Bayly (University of Idaho), Jamie Capawana (University of Idaho), and Meaghan Jones (University of Idaho) "Waste Not Want Not: A Study of Indoor Campus Trash"

Galbraith, Sara (University of Idaho) and Clay Pleasant (University of Idaho) "Waste Not Want Not: The University of Idaho Arboretum and Botanical Garden"

Henry, Shea (University of Idaho), Heather Sargent (University of Idaho), Tracy Schwartz (University of Idaho), and Rachel Stokeld (University of Idaho) "Bottles, Boxes, Cans, Oh My!: Recycling and Litter among New Greek Row Fraternities at the University of Idaho"

Petrich-Guy, Mary (University of Idaho), Kyle Parker-McGlynn (University of Idaho), and Joe Redden (University of Idaho) "Zone 8: Tailgating in Kibbie Dome Parking Lot #57"

Beyond Tyvek Suits: Hazardous Materials On-Site and In the Lab. [S1] Archaeology and hazardous materials are increasingly intersecting in the field and in the lab. Archaeologists need to plan for the potential of contaminated cultural deposits (such as shell middens exposed to petroleum or more inherently contaminated sites such as industrial historic sites) and for the safety of the people working around hazardous materials both in the field and afterwards. Archaeologists

and museum professionals discuss their attempts to face these new realities, including developing policies and procedures to address the seemingly contradictory process of preserving data while potentially compromising the collections. Co-Organizers: Laura Phillips (University of Washington, Burke Museum) and Paula Johnson (Paragon Research Associates)

Phillips, Laura (Burke Museum of Natural History and Culture), Steven Denton (Burke Museum of Natural History and Culture), Kelly Meyers (Burke Museum of Natural History and Culture), and Megan Noble (Burke Museum of Natural History and Culture) "Inherited or Inherent Vice?: Archaeological Collections that Pose a Harm"

Williams, Scott S. (Washington State Department of Transportation) "Cultural Material or Hazardous Waste? What to Do When Your 'Site' is Both"

Dellert, Jenny (Historical Resources Associates) and Jen Gilpin (Historical Resources Associates) "How to Work in Haz Mat Sites, Now and in the Future(?)"

Lockwood, Chris (Paragon Research Associates) "Digging Danger: Doing Archaeology Amid Hazardous Waste"

Parvey, Michele (Northwest Archaeological Associates, Inc.) "This Site Stinks, Dealing with Petroleum Contamination from the Field to Lab"

Wilson, Katie (Paragon Research Associates) "When the Bottle Isn't Empty: A case study from the King Street Station Monitoring Project, Seattle"

Weaver, Robert (The Environmental History Company) "Looking for a Job?: Opportunities for Applied Archaeology in the Environmental Industry"

General Sessions

General Session: Global Issues. [S4a] Chair: John R. Wagner (University of British Columbia Okanagan)

Wieland, Josef (Portland State University) "Agendas and Ontologies: 'Dietary governmentality' in Oaxaca, Mexico"

Trusler, Kate (University of Leicester) "Downpipes and Sanitation: Indications for Population Dynamics, Urbanization and Household Behavior in Pompeii"

Anwar, Mohammad Hossen (UBC Okanagan) and John R. Wagner (UBC Okanagan) "Transboundary Water Governance, Human Rights and Food Security: A comparison of the Ganges and Columbia River Basins"
Jatel, Nelson (University of British Columbia Okanagan) and John Wagner (University of British Columbia Okanagan) "Addressing the Wicked Problem of Water Governance: The Okanagan Basin Water Board, a Case Study of Distributed Multi-level Governance"

Adjepong, Godfried Kwakjo (Central Washington University) "Sustainable Water Resource Management in Ghana, A Case Study From the Birim River Sub-Basin"

General Session: Culture and Identity. [F5b] Chair: Leah Evans Janke (University of Idaho)

Bermensolo, Kylie (University of Idaho) "Disappearing Identity: Rock Art of Northern Tanzania"

Fitzgerald, Kevin (Western Washington University) "Integrating Psychological and Sociological Approaches to Heavy Metal Music"

Evans-Janke, Leah (University of Idaho) and Ariana Burns (University of Idaho) "Shop 'Til You Drop: A Diachronic Study of Rural American Purchasing Habits in the Early 20th Century"

Eastley, Jessica (Washington State University) and Mageo, Jeannette (Washington State University) "U.S. Parent/Child Alienation Dreams: Autonomy and Dependence"

Leaf, Francesca (Western Washington University) "Foca, Bosnia-Herzegovina: Wartime Rape and the Stigmatized Identity of Victims"

General Session: American Indian Identity, Rights, Resistance, and Implications [F2b]. Chair: Rodney Frey (University of Idaho)

Luttrell, Charles T. (Washington State Parks) "Did They or Didn't They: Spokane Indian farming to 1887"

Wood, Rebecca (University of Montana) "Developing Community Relationships and the Pursuit of Language Socialization Understanding among the Salish"

Mueller, Emma Jean (Washington State University) "Controversies of Native Art Appropriation in the Puget Sound Region"

Heiner, Christina (Cryse) (University of Montana) "You All Know that I Won't Sell a Foot of Land: Tribal Resistance and the Allotment Process on the Flathead Reservation"

Frey, Rodney (University of Idaho) "The Turning of the Wheel: The Interplay of Human Diversity and Shared Humanity—Lessons for an Ethnographer"

General Session: Primate Studies. [F3] Chair: Donald Tyler (University of Idaho)

Zager, Lindsay (Central Washington University) and Mary Lee Jensvold (Central Washington University) "An Experiment in Zoo Visitor Education: Encouraging Friendly Chimpanzee Behaviors"

Enlow, Grace (Central Washington University), Lori K. Sheeran (Central Washington University), Susan M. Cheyne (Oxford University), Mary Lee Jensvold (Central Washington University), and Megan D. Matheson (Central Washington University) "Vocalizations and Pair-bonding Behaviors in Bornean Agile Gibbons (*Hylobates albibarbis*) in Sabangau National Park, Indonesia"

Hendershott, Rebecca L. (Central Washington University), Megan D. Matheson (Central Washington University), Lori K. Sheeran (Central Washington University), R. Steven Wagner (Central Washington University), and Jinhua Li (Anhui University) "Sociosexual Behaviors of Tibetan Macaques (*Macaca thibetana*)"

Winters, Sandra (Central Washington University), Megan D. Matheson (Central Washington University), Lori K. Sheeran (Central Washington University), R. Steven Wagner (Central Washington University), and Jinhua Li (Anhui University) "Social Recruitment in Tibetan Macaques (*Macaca thibetana*) at Mt. Huangshan, China"

General Session: Archaeological Methods and Technology. [T4] Chair: Brian Schneider (University of Idaho)

Black, Jill (Central Washington University), Susan Kerr (Modesto Junior College), Lourdes Henebry-DeLeon (Central Washington University), and Joseph G. Lorenz (Central Washington University) "Dental Calculus as a Non-destructive Source of Mitochondrial DNA for Analysis of Skeletal Remains"

Harder, David (Plateau Archaeological Investigations, LLC), Michael Drews (Gnomon, Inc.), Christopher Noll (Plateau Archaeological Investigations, LLC), and Jeremy Hall (Gnomon, Inc.) "LiDAR as an Effective Tool for Locating Historic Mining Features at Buckhorn Mountain in Northeastern Washington"

Jerofke, Linda (Eastern Oregon University) and Erik Harvey (U.S. Forest Service) "Camp Carson Mining District: A cooperative archaeological project between the Wallowa Whitman Forest and Eastern Oregon University"

Alsoszatai-Petheo, John A. (Central Washington University) "Of Cracked Rocks, Flakes, Psychology, and Falsifying N-Rays"

Jankowski, Stephen Todd (Central Washington University) "Methods in Archaeological Data Collection: A Field Recordation Form for Rock Features"

Mace, Timothy (University of Idaho) "Archaeological Techniques for Understanding Metallurgy and Why We Care"

McFarland, Doug (Pacific Northwest National Laboratory) "Magnetic Susceptibility: Sediments and Compliance with Geophysical Science"

Schneider, Brian (University of Idaho) "From Work to Play: An Examination of an 18th/19th Century Work Complex at James Madison's Montpelier"

General Session: Faunal Analysis in the Northwest [T7b]. Chair: Daniel Gilmour (Portland State University)

Tierney, Angus (Western Washington University) "Reconstructing Canopy Cover Over 5,000 Years through Stable Isotope Analysis of Elk"

Gilmour, Daniel M. (Portland State University), Virginia L. Butler (Portland State University), Douglas J. Kennett (University of Oregon), Brendan J. Culleton (University of Oregon), and Edward Byrd Davis (University of Oregon) "Chronology and Ecology of Extinct Mammalian Fauna of the Pleistocene/Holocene Transition in the Northern Willamette Valley, Oregon"

Stevenson, Alexander E. (Portland State University), Virginia L. Butler (Portland State University), Jessica A. Miller (Oregon State University), Donya Y. Yang (Simon Fraser University), Camilla F. Speller (Simon Fraser University), and Nicole Misarti (Oregon State University) "Anadromous salmonids in the Upper Klamath Basin? Identification of Pacific Salmonid (*Oncorhynchus* spp.) Species and Life History through mtDNA and Geochemical Analysis"

Wojcik, Kathryn (Portland State University) and Shoshana Rosenberg (Portland State University) "Using Vertebral Morphometrics to Determine Salmonid Species (*Oncorhynchus* spp.) at Two Archaeological Sites on the Lower Columbia River"

Manning, Cassandra (Portland State University) "The Role of Salmon in Middle Snake River Assemblages: A Re-examination of the Hetrick site"

General Session: Northwest Coast Archaeology. [S3] Chair: Kenneth Ames (Portland State University)

Hawes, Kathleen L. (The Evergreen State College) "Environmental Reconstruction and Climate Change through Analysis of Archaeological Wood Charcoal Macro-Remains"

Cvekić, Rastko (University of Toronto) "Shell Middens and the Sacred?"

Croes, Dale R. (South Puget Sound Community College and Washington State University) "Salish Sea Wet Site Archaeology: Ancient Basketry, the Key to Defining Long-term Salish Heritage throughout Their Sea"

Holmberg, James M. (South Puget Sound Community College) "An Analysis of Archaeological Recovery, Conservation, and Identification of Clam Drying Sticks Found at the Qwu?gwes Cultural Site"

Chatters, James C. (AMEC Earth & Environmental, Inc.), Jason B. Cooper (AMEC Earth & Environmental, Inc.), Philippe Letourneau (King County, Washington), and Linda Scott Cummings (Paleo Research Institute) "Understanding Olcott: Findings of the Granite Falls Alternate Route Data Recovery Project, Snohomish County, Washington"

Ames, Kenneth M. (Portland State University), H. Kory Cooper (Purdue University), and Loren Davis (Oregon State University) "Analyses of Contact-era Cupreous Artifacts from the Meier and Cathlapotle Archaeological Sites, Lower Columbia River"

Grier Colin (Washington State University) and Meghann Stevens (Washington State University) "There Goes the Neighborhood? The 2010 Household Excavations at the Dionisio Point Locality, Galiano Island, Southwestern British Columbia"

Cannon, Jacqueline (Western Washington University) "Nuu-chah-nulth Fishing Technology in the Archaeological Record & Its Place in the Repatriation Process"

General Session: Idaho Archaeology. [F7] Chair: Lee Sappington (University of Idaho)

Griffith, Tabitha (Geo-Marine) "Contextual Approaches to Cultural Resources Management in Southern Idaho"

Lohse, E.S. (Idaho State University) "Where are the Early Paleoindian Sites? Building a Predictive Model for Late Pleistocene Site Encounter"

Frederick, C. D. (Consulting Geoarchaeologist) and T. L. Griffith (Geo-Marine, Inc.) "Geoarchaeological Investigations on the Owyhee Plateau, Idaho"

Gilbert, Hollie K. (Idaho National Laboratory) "Italian Immigrants Baking Under the Desert Sun"
Altman, Julia (University of Idaho) "Shield Bearing Warriors in Idaho Indian Rock Art"

Trosper, Tabitha (Central Washington University), Lisa Ely (Central Washington University), Steven Hackenberger (Central Washington University), and Kenneth Reid (Idaho State Historic Preservation Office) "Relationships between Snake River Paleofloods and Occupational Patterns at Redbird Beach Archaeological Site (10NP55) in Lower Hells Canyon, Idaho"

Root, Matthew J. (Rain Shadow Research), Kenneth C. Reid (Idaho State Historical Society), Daryl E. Ferguson (Rain Shadow Research), Joy D. Mastrogioseppe (Washington State University), John Mattoon (Washington State University), Keith E. Miller (U.S. Forest Service), Jan Boles (The College of Idaho), Nakia Williamson (Nez Perce Tribe), and Sarah M. Moore (Rain Shadow Research) "The High Bar Textile Cache, Hells Canyon, Idaho"

Longstaff, Laura (University of Idaho), Robert Lee Sappington (University of Idaho), and Bruce Ellis (Clearwater National Forest) "Preliminary Results from the Kelly Forks Work Center Site, Clearwater National Forest, North Central Idaho"

Carlini, Daniel P. (University of Idaho) "A Craig Mountain Phase Precipitation Record of the Lower Salmon River Canyon: Analysis of *Margaritifera falcata* Shell $\delta^{18}\text{O}$ from the Heckman Ranch Site, Idaho"

Dennis, J. Corey (University of Idaho) "Obsidian on the Move: An Examination of Obsidian Artifacts in the Clearwater River Drainage, North Central Idaho"

General Session: Washington/Oregon Archaeology. [T8] Chair: Brian O'Neill (Museum of Natural and Cultural History, University of Oregon)

Fernandez, Trish (ICF International) "Buena Vista Monitoring: Lessons Learned"

McCutcheon, Patrick (Central Washington University) and Kevin A. Vaughn (Central Washington University) "Tool Stone Extraction and Resource Density in the Saddle Mountains, Grant County, Washington"

Purdy-Silbernagel, Sarah (Natural Resources Conservation Service) "Preliminary Results of the Pro-Bono Archaeological Investigations at 35MA278, Talbot, Oregon"

Koziarski, Ralph (University of Wisconsin-Milwaukee/Drayton Archaeology), Garth Baldwin (Drayton Archaeology), and Stephanie M. Neil "New Insights on the Old Cordilleran: Recent advances in early Holocene archaeology in Northwestern Washington"

O'Neill, Brian (Museum of Natural and Cultural History, University of Oregon) "The Pre-Mazama Component at the Williams Creek Site, Southwest Oregon"

Gall, Alexander (Archaeological Services of Clark County) "45CL435: Evaluation of a cobble chopper site within the Vancouver Lake/Lake River Archaeological District"

Vargas, Estanislado (Central Washington University) "Radiocarbon Chronology for the Hole-in-the-Wall and French Rapids Archaeological Sites, Middle Columbia River"

Lewis, Patrick C. (Central Washington University), Patrick T. McCutcheon (Central Washington University), and Kevin A. Vaughn (Central Washington University) "Intra-Site Analysis at the Sunrise Ridge Borrow Pit Site (45PI408)"

Blukis Onat, Astrida R. (BOAS, Inc.) "The Art of Archaeology"

General Session: Archaeology of Historic Forts. [S2] Chair: Caroline Carley (University of Idaho)

Holschuh, Dana (Portland State University) "The Archaeology of Capitalism: Ideology in the Material Culture of Kanaka Village"

Mullaley, Meris (Portland State University and ICF International) "Architectural Variation and Community-Building in Fort Vancouver's Village, ca. 1829-1860"

Marcotte, Jacqueline (East Carolina University) "Maritime Archaeology in the Columbia River: The Fort Vancouver Waterfront"

Wilson, Douglas C. (National Park Service) "Exploring the Roots of Diversity In the Far Northwest: The National Park Service Public Archaeology Program and Fort Vancouver's Village"

Manion, Mollie (Oregon State University) “Still Worth Digging After All These Years: Excavations at Fort Hoskins 2010”

Eichelberger, Justin E. (Oregon State University) “Archaeological Symbols of the Rank and File: Metal Uniform Insignia from Fort Yamhill and Fort Hoskins, 1856–1866”

Brauner, David (Oregon State University) “‘The Past Disappears like the Morning Mist’: A primer on Historic Sites Taphonomy”

French, Jamie (Oregon State) “Use of LIDAR Bare Earth Data to Extrapolate Structure Dimensions of Historical Archaeological Features”

Sargent, Heather (University of Idaho) “Bullets, Buttons and Beads: The History and Archaeology of Fort Spokane, Washington”

Brunson, Tiffany (University of Idaho) “Making Farmers and Wives: Historic Archaeology at the Fort Spokane Indian Boarding School”

General Session: Contributed Papers in Historical Archaeology. [T3] Chair: C. Sheas Henry (University of Idaho)

Valentine, David (Idaho Power Company) “Condoms in the Countryside”

Griffin, Dennis (Oregon State Preservation Office) “Remnants from an Ill-fated U.S. Naval expedition or Early British Shipwreck? Results from the Conservation Efforts of Oregon’s Arch Cape Cannon”

Bowden, Bradley (Historical Research Associates, Inc.), Michael Falkner (Historical Research Associates, Inc.), Jennifer Olander (Historical Research Associates, Inc.), and Derek Shaw (Historical Research Associates, Inc.) “Trails to Rails: Transportation in the Historical Archaeology of Southern Pierce County”

Yunker, Trevor (South Puget Sound Community College) and Cassandra Johnson (South Puget Sound Community College) “Foster Railroad, a Look into Our Campus’ Past”

Graham, Tyler (South Puget Sound Community College) and Jamie Voss (South Puget Sound Community College) “The George Bush Homestead: An Analysis of Artifact Types and their Distribution”

Kenmotsu, Nancy (Geo-Marine Inc.), Rose Ferri (Yakama Nation), and Kelsey Doncaster (US Bureau of Reclamation) “Controlling Water – Understanding Settlement, the Impact of *Small Irrigation Systems in the Yakima Valley*”

Horton, Beth (National Park Service, Washington State University) “Foodways within Captain Jack’s Stronghold During the 1873 Modoc War”

Lee, Kelsi (University of Idaho) “Alcohol Consumption at the Kooskia, Idaho, Japanese Internment Camp (1943-1945): Historical artifact analysis”

Henry, C. Shea (University of Idaho) “Overseas Chinese Foodways of the Western United States: From California to Idaho”

Gleason, Eric (NPS) “Test Excavations at 35WS453 Chinatown, The Dalles, Oregon”

General Session: Urban Archaeology [T5b]. Chair: Erik Anderson (Northwest Archaeological Associates)

Anderson, Erik D. (Northwest Archaeological Associates) "The King County Potter's Field: Locating a possible archaeological resource in the Georgetown area of Seattle"

Merrill, Christie (Paragon Research Associates) "Integrating Construction Monitoring with Landmark Rehabilitation: King Street Station as a Case Study"

Rooke, Lara C. (AMEC Earth & Environmental, Inc.) "The Washington Park Landfill: The Archaeology of a Residential Community"

General Session: Archaeology and the Public Sector. [F6] Chair: Stan McDonald (Oregon-Washington BLM)

Kester, Lindsey (SWCA Environmental Consultants), Nicci Barger (SWCA Environmental Consultants), and Tanya Johnson (SWCA Environmental Consultants) "Developing Methods for Assessment of Visual Impacts to Cultural Resource Sites in Utah"

Jenkins, Chris (Tribal Relations Specialist Seattle District, USACE) "Working with the Corps' Regulatory Branch-Things You Need to Know"

McDonald, Stan (Oregon-Washington BLM) "Cultural Resource Management on Public Lands in the Northwest: A status report"

Mawhirter, Matthew (Washington State University) "Federal Agency Cooperation and Cultural Influence in the CCC"

MacDonald, Doug (University of Montana) and Elaine Hale (Yellowstone National Park) "The Montana Yellowstone Archaeological Project"

Poetschat, George (Oregon Archaeological Society), James D. Keyser (USDA Forest Service Retired), and David A. Kaiser (Oregon Archaeological Society) "Making Order out of Chaos: The Bear Gulch and Atherton Canyon data base"

Lohse, E.S. (Idaho State University) "Sites and Sites: Making Sense and Assigning Significance"

Campbell, Bethany Hauer (University of Montana) "A Collective History: The Curation 'Crisis' and the Emergence of a New Paradigm"

Henebry-DeLeon, Lourdes (Central Washington University) "Columbia Plateau NAGPRA Database: A Cultural Affiliation Resource"

Poster Presentations

Amador, Raquel (University of Idaho) "The Arrow Beach Affair"

Corn, Tyrone (Idaho Power Company) "The Possible Link Between Solar Radiation and the Selection of Talus Pit Storage Feature Locations"

Dampf, Steven (Historical Research Associates, Inc.), Leonard Kempf (Geo-Marine, Inc.), Jennifer Gilpin (Historical Research Associates, Inc.), and Todd M. Ahlman (Historical Research Associates) "Frontier and Border Archaeology of the Old Boundary Townsite (45ST632), Stevens County, Washington"

Galm, Jerry R. (Eastern Washington University), Tiffany Fulkerson (Eastern Washington University), and Stan Gough (Eastern Washington University) "Revisiting the Haskett Complex in the Pacific Northwest: New perspectives from the Sentinel Gap site"

Leeds, C. A., A. Davis, M. Jensvold, and D. Fouts (Chimpanzee and Human Communication Institute, Central Washington University) "Evidence for Menstrual Synchrony in Captive Chimpanzees"

Ozbun, Terry (Archaeological Investigations Northwest, Inc.) "Beyond Pretty Colors: Technological and functional qualities of Oregon obsidians for ancient stone tool production"

Steingraber, Aubrey (Western Washington University) "Identifying Salmonid Species Using Vertebral Morphology at 45WH34 and 45SK46"

Wendel, Ryan E. (University of Montana) and Maggie E. Schirack (University of Montana) "Victorian Secrets: What outhouse artifacts reveal about the gender and class spaces of an early 1900s mining camp"

Beasley, Virgil Roy III (GeoMarine) and Emily Ragsdale (HRA) "The Joint Base Lewis McChord Archaeological Predictive Model"

Cascella, Melissa (ICF International) "Demystifying GIS: An Archaeologist's Perspective"

Covington, Brenda (Confederated Tribes of the Colville Reservation) "Ongoing Adverse Impacts to Cultural Resources at the Grand Coulee Dam Reservoir, Lake Roosevelt"

Ferry, Joy (Central Washington University) "Analysis of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ Data Acquired from *Margaritifera falcata* Shell (Site 45KT315, Kittitas County, WA): Holocene environmental change on the Columbia Plateau"

Lewarch, Dennis E. (Archaeology and Historic Preservation Program, Suquamish Tribe), Stephanie E. Trudel (Archaeology and Historic Preservation Program, Suquamish Tribe), and Leonard A. Forsman (Archaeology and Historic Preservation Program, Suquamish Tribe) "Updating Thompson's Settlement Model: Clustering Central and Southern Puget Sound assemblages"

Rorabaugh, Adam N. (Washington State University) "Paying Lip Service: Labrets, identity, and defeats of hierarchy on the southern Northwest Coast"

Yamamoto, Christopher (Northwest Archaeological) and Brian Boggs (Northwest Archaeological Associates) "Exploratory Lithic Investigations at Pussyfoot Creek: 45-KI-938"

Cooper, Jason B. (AMEC Earth & Environmental) and Tim Gerrish (AMEC Earth & Environmental) "U.S. 101 Bone River Bridge Replacement Project, Pacific County, Washington"

Coutts, Allison (Eastern Washington University) and Matthew Cox (Eastern Washington University) "Early Irrigation Attempts Along the Middle Columbia"

Drews, Michael (Gnomon, Inc.), David Harder (Plateau Archaeological Investigations, LLC), Christopher Noll (Plateau Archaeological Investigations, LLC), and Jeremy Hall (Gnomon, Inc.) "Work Beneath the Canopy: LiDAR as an aid in locating historic mining features in areas of marginal surface visibility"

Elder, J. Tait (ICF International) and Kurt Perkins (ICF International) "Fish Traps and Data Gaps: A preliminary synthesis of fish capture features in Washington State"

McClure-Mentzer, Kari (Eastern Washington University) and Jerry R. Galm (Eastern Washington University) "The Case for a Single Period of Late Paleoindian Occupation at the Late Sentinel Gap Site"

Sterling, Sarah (Portland State University), Kristine Bovy (University of Rhode Island), Virginia Butler (Portland State University), Sarah Campbell (Western Washington University), and Michael Etnier (University of Washington) "Beyond the Palimpsest: Using high resolution excavation techniques to evaluate household scale economic strategies and earthquake response on the Northwest Coast"

Williams, Louise (Simon Fraser University) "Refitting the Locarno Beach Site (DhRt-6): A spatial and temporal analysis of previous collections"

Wilson, Katie (Paragon Research Associates) and Jackie Ferry (Samish Indian Nation) "Making the Most of Collections: Revitalization of the Samish Indian Nation's Archaeological Collections"

Crabtree, Stefani (Washington State University) "There is No Such Thing as a Free Lunch: Costly exchange in the Village Ecodynamics Project, a network analysis"

Heckelman, Amber (Washington State University) "The Applied Anthropological Perspective on the Current State of Natural Resource Management: The case of the *Manicaria saccifera* in the Tortuguero region, Costa Rica"

Hofkamp, Anthony (Portland State University) and Virginia L. Butler (Portland State University) "'Ground Truthing': The use of radiographic analysis of annular growth rings for age determination in Pacific salmon (*Oncorhynchus* sp.)"

McFarland, Doug (Pacific Northwest National Laboratory) "Magnetic 'Fabric' as a Way to Measure Disturbance of Buried Archaeological Deposits"

Oliver, Kali D. V. (University of Idaho) "Kooskia Japanese American Internment Camp Medical Standards and Safety Research Project"

Stokeld, Rachel (University of Idaho) "*Good for One Fare*: From Tacoma's Japanese Town to Kooskia Internment Camp"

Wilson, Erin (University of Idaho) "GET TO THE POINT: Challenges with Predicting Relative Age Using Projectile Point Technologies at the Weitas Creek Site"

Taylor, Amanda (University of Washington) "Defensive Sites on the San Juan Islands? An Application of Martindale and Supernant (2009) Defensive Index Approach"

Taylor, Joanne (University of British Columbia), and Erica Sure (University of British Columbia) "Social, Environmental and Cultural Impacts of Flooding: Four case studies"

Derr, Kelly (Washington State University) "Pre-Contact Fire Use and the Implications for Modern Forestry Management in the Pacific Northwest"

Henry, C. Shea (University of Idaho) "'Sweet Tooth? Keep Society Hard Candies Handy' Candy Purchasing and Consumption at the Kooskia Internment Camp"

Kienholz, Mary (University of Idaho), Molly Swords (University of Idaho), and Amanda Haught (University of Idaho) "Hot off the Press: The printing plates of Sandpoint, Idaho"

Meidinger, Brett N. (Drayton Archaeological Research) "Kelp and Eelgrass: Indirect Evidence for Marine Plant and Algae Utilization at 45WH9, *Strav-a-wa*, 'The Place for Clams'"

Schuster, Katrina (Western Washington University) "The Spatial Analysis of Chipped and Ground Stone Artifacts at 45-WH-4"

Simons, Noah D. (Central Washington University), Joseph G. Lorenz (Central Washington University), Lori K. Sheeran (Central Washington University), Megan D. Matheson (Central Washington University), R. Steven Wagner (Central Washington University), and Li, Jinhua (Anhui University) "Methods and Implications of the Noninvasive Collection of Saliva from Nonhuman Primates"

Snyder, Charles (Washington State University) and Keri B. Snyder (Washington State University) "Aces in their Places: The role of the anthropologist in collaborative praxis"

Note: All abstracts for contributed papers and posters can be found at <http://www.northwestanthropology.com/volumes.php>

Journal of Northwest Anthropology 2013 Publication Style Guide

This abbreviated style guide for the *Journal of Northwest Anthropology* (*JONA*) is provided to facilitate manuscript submission, peer review, formatting, and publication. Prospective authors should use this guide to begin the process. In general, *JONA* follows the Chicago Manual of Style and Webster's Dictionary. Authors can always write the editorial offices to inquire as to a specific style question <jona@pocketinet.com>

Submitting Manuscripts to the *Journal of Northwest Anthropology*

Manuscripts (one copy) should be submitted in their original form on double-spaced typescript on 8½ x 11 in. paper to the editorial office (P.O. Box 1721 Richland, WA 99352-1721) and in electronic form, on a CD accompanying the hard copy or in Microsoft Word sent via e-mail (jona@pocketinet.com). Authors are required to submit original figures and tables in both in the hard copy and electronic version, apart from the main text, upon submission of their article. Prior to submission, authors are responsible for proofreading their files for unexpected omissions or problems, and authors will retain both an electronic and a hard copy identical to their submission. No text copies, CDs, or artwork for published papers will be returned to the authors. All artwork remains in the property of *JONA* and Northwest Anthropology LLC, Inc.

When producing a manuscript for submission to *JONA*, the author will keep the format of the manuscript in **its most basic** format in Microsoft Word. The manuscript should have 1 in. margins and minimal formatting. The author will not put in any additional grammar or style commands in the document. Upon submission, the manuscript **will include**: a title, the author(s) names (exactly how it is to appear published), an abstract, main topic headings (i.e. introduction, findings, conclusion, etc.), acknowledgments (if any), references cited, and author contact information and author(s) professional description. Do not insert page numbers. Figures, drawings, and tables will be submitted in a different electronic file than the file containing the manuscript text. The manuscript should be left justified double spaced, and no headers or footers. Only one space is needed following a period. The font size and style must be 12 point and Times New Roman. Format, citations, and references will follow the style of the example provided in this style guide.

The author(s) will submit the following information to be published at the end of their article: author(s) name, affiliation (if affiliated), address, e-mail address, and brief professional description of each author

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Title of the Manuscript—A good title gives a clear description of the content. Cute titles are discouraged.

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Main Headings—Each section of the manuscript needs to have a topic heading and will be at the beginning of the section flush left. Manuscripts should have an Introduction, headings for each major part of the manuscript, a Summary or Conclusion, and a References Cited. Main heading are 14 pt.

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Acknowledgments—Acknowledgements are optional, and can contain personal pronouns.

References Cited—The references cited section will contain all the references cited throughout the manuscript. Examples of *JONA's* style for typical references are provided below.

Example of a Manuscript Submission

As mentioned above, manuscripts are submitted with minimal formatting and therefore will not look like the published product. Below is an example of how a manuscript submission might appear.

A Window on the Past: Pane Glass at the Beatty Curve Archaeological Site, South-Central Oregon

Thomas J. Connolly, Mark E. Swisher, Christopher L. Ruiz, and Elizabeth A. Kallenbach

Abstract

Pane glass thickness increased incrementally throughout the nineteenth century, and archaeologists have found that glass thickness may be a useful chronological tool. Excavations at the Beatty Curve archaeological site (35-KL-95), located on the former Klamath Indian Reservation in the Sprague River Valley of south-central Oregon, revealed the remains of a nineteenth century cabin with abundant window glass fragments.

Introduction

Research by a number of historical archaeologists has established that the thickness of pane glass increased throughout the nineteenth century, and thus pane glass thickness has the

potential to be a useful indicator of initial construction or subsequent modifications of nineteenth century structures (Walker 1971; Chance and Chance 1976; Roenke 1978; Moir 1987). Prior to the 1800s, pane glass technology was in development and pane thickness was highly variable. After the early 1900s window glass production was standardized, and thickness became more a function of type than time (Roenke 1978; Day 2001).

Chance and Chance (1976) proposed a chronology of pane thickness, based on their investigations at the Kanaka Village at the Hudson's Bay Company's Fort Vancouver. Roenke (1978) tested and broadened this chronology, using several additional trading post and mission sites in Washington and Idaho. These studies proposed age ranges associated with incremental thicknesses (Fig. 1).

Moir applied the equation to the mean thickness of an assemblage, and noted that, to avoid skewing, the equation should be applied to occupations of limited duration, and structural additions should be sampled separately. He cautioned that the equation should not be used for structures with specialized glass, possibly including some upper class homes where specialty glass may have been used, but he reported a confidence interval of ± 7 years when appropriately applied.

The Beatty Curve Site

The Beatty Curve site straddles a dangerous curve on Oregon Highway 140 in south-central Oregon between the communities of Klamath Falls and Lakeview. Following extensive consultation with the Klamath Tribes, and numerous design changes, a mitigation plan and archaeological data recovery were approved by Oregon Department of Transportation in 2007. The site has a long history of occupation spanning some 8000 years, and a historical cultural

record that spans both pre-and post-reservation times, including the Allotment era of the late nineteenth and early twentieth centuries.

Methods

All excavated fill was screened in the field through 1/8-in. mesh, from which most glass shards (i.e., except those plotted in situ) were recovered. Glass was initially separated from other recovered materials in the laboratory, and then flat glass was sorted from other glass artifacts (bottle glass, colored and frosted glass, mirrored glass, and textured glass, etc. Following this sort, a quarter-inch mesh screen was used to remove tiny glass particles from the analyzed sample. All window glass sorted in this manner was then weighed in aggregate by provenience unit, and this measurement was used to generate density contour maps of pane glass distribution.

From this larger site sample, pane glass from five 2 x 2 m units was further measured for this study. Pane glass from three units straddling the north end of the cabin (Units V, W, and B, the “Cabin Units”) was measured ($n = 2133$). Two spatially discrete glass concentrations outside the cabin area were also sampled; one area to the southwest (Unit A, $n = 287$ measured shards) and one to the northeast (Unit I, $n = 130$ measured shards) of the cabin area. These areas produced large amounts of glass indicating the possible presence of other structures, but no architectural features were noted in these areas, and the overall pane glass density was significantly lower than in the cabin area.

Conclusions

Pane glass thickness has the potential to aid in the chronological assessment of archaeological assemblages associated with nineteenth century historic structures. We examined an assemblage of pane glass from the site of a cabin structure built near the community of Beatty on the former Klamath Indian Reservation in the latter nineteenth century. The assemblage was

evaluated with several proposed chronologies reported in the literature, to estimate ages for the construction of the Beatty cabin. Estimated ages ranged from the 1850s (Roenke 1978; Day 2001) to the mid-1880s (Moir 1987), a critical period which extends from before formation of the Klamath Reservation (1864), to after establishment of the Yainax Subagency (ca. 1870).

Acknowledgments

The Beatty Curve studies are motivated by a highway improvement project, and is supported by the Oregon Department of Transportation; we thank ODOT archaeologists Carolyn McAleer, Hal Gard, and Tobin Bottman. The work has been possible with the support and participation of dozens of Klamath Tribal members; we especially thank Perry Chocktoot and Les Anderson. The work Doug Deur and Dennis Jenkins are among the many others who have contributed directly or indirectly to this article.

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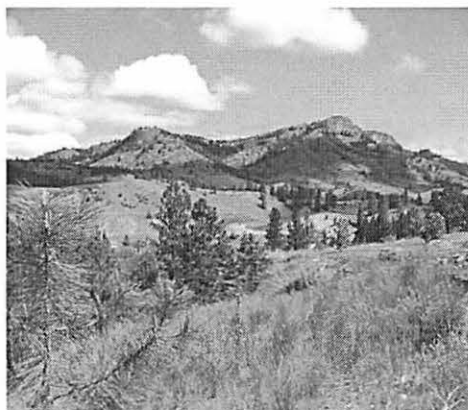


Fig. 5. View of Mount Elizabeth from the Julian Bay Site (photograph taken by Christopher Noll, April 2011, and used with permission).

Tables

TABLE 3. FREQUENCY OF TOOLS BY RAW MATERIAL FROM THE JULIAN BAY SITE EXCAVATED ASSEMBLAGE (Reference information).

Tool Type	Raw Material	
	Andesite	Chert
Hafted Biface	8	2
Non-hafted Biface	34	0
Retouched Flake Tool	56	7
Non-retouched Flake Tool	23	10
Core-Bifacial	12	5
Core-Multidirectional	21	6
Core-Unidirectional	2	0
Total	156	30
<i>Shannon-Wiener Index</i>	<i>1.66</i>	<i>1.51</i>
<i>Richness</i>	<i>7</i>	<i>5</i>
<i>Evenness</i>	<i>0.852</i>	<i>0.936</i>

Reference Examples

Single author book—

Brown, William C.
1961 *The Indian Side of the Story*. C.W. Hill, Spokane, WA.

Reprint of an earlier edition of a book—

Chittenden, Hiram M.
1986 *The American Fur Trade of the Far West*. Reprint of 1935 edition, originally published in 1902. University of Nebraska Press, Lincoln.

New edition of a book—

Fagan, Brian M.
1988 *In the Beginning: An Introduction to Archaeology*, 6th edition. Scott, Foresman/Little, Brown, Boston, MA.

Edited Book—

Jackson, Donald, editor
1962 *Letters of the Lewis and Clark Expedition with Related Documents, 1783–1854*. University of Illinois Press, Urbana.

Volume(s) in a multi-volume publication—

Curtis, Edward S.
1911 *The North American Indian*, Vol. 8. Plimpton Press, Norwood.

Article or chapter in an edited book or monograph—

Roderick Sprague
1998 Palouse. In Plateau, *Handbook of North American Indians*, Vol. 12, edited by Deward E. Walker, Jr, pp. 352–354. Smithsonian Institution, Washington, D.C.

Article in a journal or magazine—

Andrefsky, Jr., William
1994 Raw-Material Availability and the Organization of Technology. *American Antiquity*, 59(1):21–34.

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1972 An Introduction to Flintworking. *Occasional Papers of the Idaho State Museum*, 28, Pocatello, ID.

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1984 *The Relative Economic Status of Black and White Regiments in the Pre-World War I Army: An Example from Fort Walla Walla, Washington*. Doctoral dissertation, Washington State University, Pullman. University Microfilms International, Ann Arbor, MI.

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