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Science and Fiction: Kennewick Man/Ancient One in Latter-day Saint Discourse

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Abstract  In June of 1997, Orson Scott Card, a popular science fiction author and prominent Latter-day Saint, seized upon the news of the erosion of an ancient skeleton out of a riverbank along the Columbia River in eastern Washington during the previous summer. Card prematurely suggested to a Mormon audience that this Kennewick Man represented an ancient founding Caucasoid population displaced by ancestors of American Indians. Indigenous peoples called this ancestor the Ancient One and participated in a long and contentious struggle between a team of scientists and the U.S. Army Corps of Engineers over repatriation. This article critically examines the deployment and evolution of images of Kennewick Man in Latter-day Saint discourse about Native Americans, DNA, and the Book of Mormon. Despite cautionary warnings from the Church of Jesus Christ of Latter-day Saints and Latter-day Saint scientists, the latest pseudoscientific resurrection of a Latter-day settler colonial narrative about ancient America appears as David Read’s Face of a Nephite (2020) featuring a racialized and creationist distortion of the scientific analysis and facial reconstructions of Kennewick Man. Read’s book feeds into a larger discourse advocating a Heartland setting for the Book of Mormon in North America advocated by Rodney Meldrum’s misnamed Foundation for Indigenous Research and Mormonism (FIRM). These authors anachronistically racialize both scripture and human DNA, misrepresent archaeological and genetic science, draw from fraudulent and looted materials, and disregard Indigenous perspectives on the Ancient One, now firmly established as ancestral to American Indians.

Keywords  Ancient One, anthropology, Book of Mormon, DNA, Kennewick Man, Mormonism, Native American, racism, repatriation.

Introduction

In June of 1997, the popular science fiction writer and prominent Latter-day Saint, Orson Scott Card (1997), seized upon the news of the erosion of a skeleton out of a riverbank along the Columbia River in eastern Washington during the previous summer. Card expressed excitement at the discovery and frustration with the Umatilla Nation and others who sought repatriation of this Ancient One through the Native American Graves Protection and Repatriation Act (NAGPRA). The science fiction author used the skeleton to suggest that Native Americans had inflicted “exactly the kind of displacement... on their predecessors” as Europeans had done to Indigenous peoples in their conquest of the Americas. He depicts these predecessors as “racially different people” from
“native-Americans.” Seeking to undermine the autochthonous heritage of American Indians he proclaimed, “We are all immigrants to the New World.” He directed particular animosity toward the “Umatilla Indians” who he feared “may succeed in hiding away this skeleton that could never have belonged to a member of their or any living tribe.” In contrast to his negative characterizations of repatriation efforts, Card expressed “pleasure” in the report of a skeleton of presumed “Caucasoid physical structure” from ancient America and its implications for “Book of Mormon culture and archaeology.” Card inappropriately racialized the skeleton and then used that interpretation to insinuate that American Indians were the first to commit genocide and that Indigenous claims to repatriation must therefore be invalid.

Card’s perspective is representative of widely held beliefs the authors have heard expressed in Latter-day Saint communities around the turn of the century. Card, though, does note that “some Mormons will take no comfort from any of this, being unwilling to consider any artifact dating before 4,000 bc as genuine.” He contrasts those young earth creationists from himself and other Latter-day Saints like him “who take a more flexible view of the calendar.” He suggests that “the 9,000 year-old dating of Kennewick man dovetails nicely with the probable date of Jaredite-era migrations” assumed by Latter-day Saint apologist Hugh Nibley. The Jaredites were the earliest of three migrations from the ancient Near East to the Americas described in the Book of Mormon. Joseph Smith (1830), recognized as a prophet by the various branches of the Mormon Restoration, first published this purportedly scriptural account of ancient America in Palmyra, New York, in 1830.

In the years that have followed Card’s blog, Latter-day Saint interpretations of the Book of Mormon have shifted dramatically. DNA evidence challenged the traditional interpretation of the text as a hemispheric history of ancient America providing a simplistic explanation for the origins of American Indians. The genetic evidence demonstrated the antiquity of Indigenous occupation of the Americas, millennia before the events described in the Book of Mormon. Shared DNA lineages indicate that the closest relatives to modern American Indians can be found in North and East Asia, not the ancient Near East (Murphy 2002, 2003a, 2003b, 2004; Murphy and Southerton 2003; Southerton 2004, 2020; Baca 2008; Murphy and Baca 2016, 2020). References to Kennewick Man have recurred throughout subsequent Latter-day Saint literature reinterpreting the Book of Mormon in response to DNA evidence. This article offers a critical review of depictions of the Ancient One in four branches of Book of Mormon discourse: 1) a Mesoamerican limited geography; 2) a Heartland limited geography; 3) the official statements and essays of the Church of Jesus Christ of Latter-day Saints (LDS, the largest Mormon denomination); and 4) decolonizing scholarship.

Both the Mesoamerican and Heartland advocates inaccurately racialize ancient human remains such as Kennewick Man. Mesoamerican advocates and the LDS Church’s official essays reinterpret the historical narrative of the Book of Mormon and minimize hemispheric teachings of early church leaders. Heartland proponents respond by resurrecting widely discredited archaeological frauds and selectively reasserting earlier interpretations of the Book of Mormon that supported a North American setting while also minimizing the previously predominant hemispheric models. They deceptively point to a mitochondrial lineage known as X2a, found among some North American Indians, as an indication of a Book of Mormon era immigration from the ancient Near East to North America. Patent attorney David Read’s *Face of a Nephite* (2020) has recently joined the Heartland narrative by reasserting a creationist reading of the American past like that decried by Card two decades earlier. Read misleadingly employs dates of carbonates in and on Kennewick Man’s skeleton to undermine its antiquity and offers disputations of the molecular clock to advocate for a timing of X2a’s appearance that is more compatible with the Book of Mormon.
Meanwhile, the LDS Church’s official essays have encouraged spiritual over historical readings of the Book of Mormon, repudiated the racism underlying both Mesoamerican and Heartland models, and cautiously discouraged efforts by Heartland advocates to misuse the DNA evidence.

Decolonizing interpretations of the Book of Mormon offered by Latter-day Saints of Indigenous heritage provide an alternative to the juggernaut of limited geographic settings that are dependent upon misrepresenting either the science or the scripture. Indeterminate or figurative readings of the Book of Mormon eschew the racism and nationalism inherent in the determinate settler colonial interpretations that see the scripture as the one and only true narrative of ancient America. Indeterminate, or figurative, readings of the Book of Mormon allow for both science and fiction, requiring that neither displace each other nor that either displace the varied narratives of origins coming from Indigenous peoples across the hemisphere.

**Archaeology and the Book of Mormon**

The view of American antiquity in Joseph Smith’s Book of Mormon complemented common nineteenth century settler colonial speculations about Israelite ancestry of American Indians. These Israelites called Nephites, Mulekites, and Lamanites purportedly came to the Americas in two migration events around 2600 B.P. (before present). These migrants found the records of a previous population (known as Jaredites), who had brought plants and animals over from the ancient Near East shortly after a world-wide Noahic flood, but had destroyed themselves in an ancient cataclysmic battle (Murphy 2003b). Climaxing with a visit to the Americas from Jesus Christ four centuries before the Lamanites reportedly destroyed the Nephites, the Book of Mormon is heralded today as a sacred text by the Church of Jesus Christ of Latter-day Saints, the Community of Christ, and other Mormon or Restoration traditions that trace their origins to Joseph Smith’s prophetic message (Givens 2002; Gutjahr 2012).

The ancient migration events and historical claims of the Book of Mormon have met with significant skepticism and charges of fraud from anthropologists, archaeologists, and historians (Pierce 1899; Silverberg 1968; Coe 1973; Vogel 1986; Williams 1991; Mann 2010; Colavito 2020; Fenton 2020; Watts 2020). Even professionally trained scholars from within Restoration and Mormon traditions have raised considerable concerns about the historicity of the text. LDS archaeologist Dee F. Green (1969:74) critiqued Latter-day Saint defenses of the historical claims of the Book of Mormon (Hunter 1956; Hunter and Johnson 1959) as “inadequate, from a professional archaeologist’s point of view,” noting their neglect of time and space and misrepresentations of archaeological evidence. Wayne Ham (1970), a scholar from the Reorganized Church of Jesus Christ of Latter Day Saints (RLDS, now called Community of Christ), pointed to the lack of archaeological support for the plants, animals, and technology described in the Book of Mormon; its reliance on the King James Bible; and its questionable morality linking divine curses to skin color and justifications of colonial conquest as sufficient for treating the scripture as “a nonhistorical treatise in much the same manner as modern critics view the books of Jonah, Ruth, Job, and Daniel in the Old Testament.” The private writings of theologian Brigham H. Roberts and attorney Thomas Stuart Ferguson, early and mid-century defenders of the Book of Mormon, revealed that even they had significant doubts about their public stances (Madsen 1992; Larson 1996).

Anthropologist John A. Price (1974:38–39) provided a succinct summary of key problems with the Book of Mormon’s historical and ecological claims. “An impressive feature of New World prehistory is the extent to which it developed independently of the Old World,” Price continues, “The aboriginal New World did not have wheat, barley, cows, oxen, horses or elephants (after about 5000 B.C.), asses, sheep,
or domesticated goats or swine. No Native Americans made grape wine or wheat bread.” To the contrary, “native plants and animals were domesticated corn, beans, squashes, potatoes, tomatoes, manioc, turkeys, llamas, etc.” He stated more emphatically, “The Jaredites and Nephites are portrayed as having had plow agriculture of wheat and barley and pastoralism of sheep and cattle, but nothing remotely resembling this kind of culture has ever been found, either archaeologically or ethnographically, in the aboriginal New World.” Price finds similar mismatch with the buildings, housing, clothing, metallurgy, tools, weapons, vehicles, writings, languages, and religions described in the scripture. He does note, however, that “the forts and burial mounds described in the Book of Mormon are, in fact, like those of the Iroquois.” Anthropologists, archaeologists, and other scholars coming from outside and within Mormonism questioned the Book of Mormon’s historical and ecological claims long before the emergence of DNA evidence.

**Mesoamerica**

The proposal that the events in the Book of Mormon occurred within a limited regional setting in Mesoamerica rather than across two hemispheres, as the sacred text seems to describe them, first appeared in the writings of an RLDS scholar, Louis E. Hills (1917, 1918, 1919). Despite such an early proposal, this perspective would not receive widespread support until almost a century later. References to a narrow neck of land separating a land southward from a land northward, along with geographic footnotes pointing to locations spread across North and South America in the 1879 LDS edition of the Book of Mormon, hampered broad acceptance of a limited geographic setting, despite the removal of the footnotes in 1911 (Sorenson 1992:141–142; Givens 2002:106; Murphy 2003b:111–113). The Mesoamerican proposal received a boost in 1984 with publication of anthropologist John L. Sorenson’s changing understandings of the Book of Mormon’s ancient setting in the *Ensign*, a widely read LDS magazine. Sorenson (1984a, 1984b, 1996, 2013), though, competed with a more prominent claim that Lamanites “are the principal ancestors of the American Indians” that LDS church leaders had placed conspicuously in the introduction to their 1981 edition of the Book of Mormon (Murphy and Baca 2020:74). A broader acceptance of a smaller Mesoamerican setting would not come until new DNA research pushed this limited geographic interpretation into the forefront of twenty-first century apologetics.

Despite publication of Sorenson’s proposal in a church magazine and press, peer review by his colleague Thomas Stuart Ferguson, an LDS founder of the New World Archaeological Foundation, had found it wanting for failing plant-life, animal-life, metallurgy, and script tests (Larson 1996; Murphy 2003a). LDS archaeologist and former Brigham Young University (BYU) faculty member, Deanne Matheny (1993), subsequently reaffirmed Sorenson’s failure to adequately address problems with European flora, fauna, and technology and disputed his distortion of directional terminology necessary to fit his proposed setting into the isthmus of Tehauntepec. She found the archaeological record at the site of Santa Rosa, Chiapas, proposed for the Book of Mormon city of Zarahemla inconsistent with descriptions of the infrastructure, population, ecology, economy, and destruction in the text. Matheny (1993:322) describes Sorenson’s method as “a bits-and-pieces approach involving a larger area and all time periods rather than the specific area and time he has selected, failing to take into account the specific cultural processes and developments in that area.” The proposal that the archaeological site of Kaminaluyu in Guatemala is the city of Nephi also fails critical analysis and problematically credits Mayan cultural accomplishments to foreign influences (Southerton 2020:56–57).

Proposed alternatives to Sorenson’s Mesoamerican model have included reading the Book of Mormon as “spirit writing” (Dunn 1985, 2002; Taves 2020), a “modern expansion of an ancient

DNA research summarized by anthropologist Thomas W Murphy (2002, 2003a, 2003b, 2004) and geneticist and former Mormon bishop Simon G. Southerton (2004) accelerated debate about the Book of Mormon’s historicity by demonstrating no close affinity between Native American populations and those of the ancient Near East. Murphy and Southerton (2003) found that 99.4% of mtDNA from published samples of 7,300 Native Americans demonstrated their closest affinity with populations in north and east Asia rather than the Middle East. The mtDNA lineages A-D were only found in the Americas and northern and eastern portions of Asia. While the lineage X could also be found in Europe, Africa, and the Middle East, the American branch separated from the others millennia before the migrations described in the Book of Mormon. The remaining 0.6% showed affinities to lineages found in Africa and Europe, most likely the result of recent admixture, long after the events of the Book of Mormon. The remaining 0.6% showed affinities to lineages found in Africa and Europe, most likely the result of recent admixture, long after the events of the Book of Mormon. Biological anthropologist Michael Crawford stated the case more bluntly, there is not “one iota of evidence that suggest a lost tribe from Israel made it all the way to the New World. It is a great story, slain by ugly fact” (Egan 2000). Biologist Scott Woodward, then at Brigham Young University (BYU), acknowledged that BYU’s tests of 6,000 Native Americans, primarily from Peru, were consistent with those of other researchers (Fabrizio et al. 2002).

Two documentary films (Kramer and Reyes 2003; Baca 2008) and widespread news coverage of the LDS Church’s efforts to discipline Murphy and Southerton for their academic publications drew significant attention to the lack of genetic support for the Book of Mormon (Lobdell and Stammer 2002; ICTMN Staff 2002; Lyke 2003; Dobner 2005; Associated Press 2005a, 2005b; Lobdell 2006). A flurry of articles from the Foundation for Ancient Research and Mormon Studies (FARMS) at BYU and the Foundation for Apologetic Information and Research (FAIR, now known as Faithful Answers, Informed Research) employed a limited geographic setting in which a small group of immigrants entered a much larger Mesoamerican population. Authors then proposed dilution by gene flow, genetic drift, and founder effects as possible explanations for the lack of genetic markers connecting Near Eastern populations to the Americas (Gardner 2003; Stewart 2006; Peterson 2008).

Kennewick Man would figure prominently in writings by Latter-day Saints employing a limited geographic setting as a possible explanation for the lack of genetic evidence. Anthropologist D. Jeffrey Meldrum and biologist Trent Stephens (2007:22), both from Idaho State University (ISU), acknowledged that “DNA data lend no obvious support” to Book of Mormon populations as the source for “all pre-Columbian inhabitants of the Americas,” but held out hope for smaller migrations. Much like Card, however, these LDS authors racialized the Ancient One and portrayed Umatillas as hostile to science. Calling features of the Kennewick skull “Caucasoid,” they raised the question of “an earlier population” lacking ties to Asians “that predated modern Native Americans.” They accused Umatilla of ignoring “data coming out of the earth” and denigrated Umatilla “oral histories” by equating them with “folklore” and questionable interpretations that “have strayed beyond the Book of Mormon story.” Meldrum and Stevens (2007:22–23, 79–80) present themselves as open to science and willing to reconsider previous interpretations while they portray Umatillas as dismissive of scientific theories and the Book of Mormon.

Other Latter-day Saint scholars also echo some of Card’s early claims. Religion and literary
professor Terryl Givens (2002:148–149), from the University of Richmond, asserted that the Army Corps of Engineers covered the site where Kennewick Man was found "under a politically motivated directive of the Clinton administration." He deployed this story as an example of an allegedly more widespread effort to suppress evidence for “transoceanic contact with the Americas long before Columbus (whether Semitic injections or other kinds)." Givens suggests that suppression originates from fear that such revelations might damage “Native identity.” Anthropologist John Sorenson (2008:8) and biologist David McClellan (2008:137), both from BYU, suggested that Kennewick Man’s “European-like” appearance could be “due to a Haplogroup X people from Europe who reached America” or at least “allow for the possibility of Caucasoid habitation in the Americas.” Although Kennewick Man and Native Americans carrying the X lineage lived far away from their favored setting in Mesoamerica, Latter-day Saint scholars repeated problematic racialized characterizations of Kennewick Man from the media and the presence of the X lineage in Europe and the Middle East as support for the plausibility of their regional interpretations of the Book of Mormon (Figure 1).

Heartland

DNA evidence fostered movement away from hemispheric toward more limited settings for purported Book of Mormon migrations. A geographic disconnect, though, appeared between

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**Figure 1.** Key locations mentioned in the article: 1) Kennewick, WA; 2) Santa Rosa, Chiapas; 3) Kaminaljuyu, Guatemala; 4) Hill Cumorah, NY; and 5) Nauvoo, IL.
favored forms of genetic and skeletal evidence and a Mesoamerican setting for the Book of Mormon preferred by prominent Latter-day Saint scientists and scholars. A similar disjuncture existed between statements in scripture and from early church leaders that seemed to link some events and peoples in the Book of Mormon to places in North America, especially that of Hill Cumorah in New York and Zarahemla in Iowa, purportedly adjacent to the Mormon settlement of Nauvoo, Illinois (Duffy 2008; Neville 2015). This incongruity, combined with a creationist skepticism toward science more generally and an embrace of white nationalism among some Mormons, created an environment ripe for the flourishing of a limited geographic setting in North America.

Calling their proposed geography the Heartland model, new authors built upon the work of earlier advocates of a North American setting for the Book of Mormon (Olive 2000; Goble and May 2002). Rod Meldrum (2009, 2011), a business developer who claims to be a “senior scientific researcher” because of his work on a creationist “natural science textbook,” began his studies after watching the video, DNA vs. the Book of Mormon (Kramer and Reyes 2003). Latter-day Saint purveyors of a North American setting for the Book of Mormon draw liberally from known archaeological frauds (Newark Holy Stones, Bat Creek Stone, Michigan relics, elephant pipes and effigies, etc.) to make their case for a Semitic presence in ancient America (see Feder 2006 for discussions of these frauds). Meldrum (2009) assigns Book of Mormon peoples to a European race; attributes the dark skin of Lamanites (and by implication American Indians) to a curse for their wickedness; blames the unrighteousness of Jews and Native Americans for bringing holocausts upon their own populations; inaccurately claims that the X mtDNA lineage is not found in Asian populations; and repeatedly calls the X lineage “Caucasian,” “white,” and “European” despite its widespread distribution in Africa, Europe, Asia, and the Americas. Meldrum founded the misnamed Foundation for Indigenous Research and Mormonism (FIRM) to advocate for this racialized interpretation of the Book of Mormon.

Steven E. Smoot (2010), President of the Family First Foundation, featured the Heartland claims in a deceptively produced film, The Lost Civilizations of North America. The anthropologists and historians interviewed in the film issued a collective statement (Atalay et al. 2010) exposing the film maker’s deception and prodigious use of fraudulent artifacts. “None of us was asked directly for our opinion on what turned out to be its underlying claim; that Old World civilizations played an active role in the development of Native American cultures, especially the mound builders.” The anthropologists stated their actual views forthrightly, “there is no compelling archaeological or genetic evidence for a migration from the Middle East to North America a few thousand years ago, nor is there any credible scientific evidence that Old World civilizations were involved in developing Native American cultures in pre-Columbian times.” They attested to “overwhelming evidence that Native Americans were independently responsible for designing and creating the Newark Earthworks, Cahokia Mounds, and the myriad other pre-Columbian sites across the United States.” Deborah Bolnick, one of the biological anthropologists interviewed for the film, teamed up with geneticist Jennifer Raff (2015) for a peer reviewed evaluation of the Heartland advocates’ claims about mtDNA haplogroup X. They demonstrated, “X2a is not found in the Middle East” and “none of the X2 lineages present in the Middle East are immediately ancestral to X2a.” They continued, “the data of coalescence for X2a (14,200–17,000 cal yr B.P.) significantly precedes the hypothesized migration from the Middle East.” They conclude, “X2a does not provide any evidence for an ancient Hebrew migration from the Middle East to North America.”

Archaeological evidence calls into question the assertions of a Heartland Moundbuilder setting for the Book of Mormon. Meldrum’s association of Jaredites with Adena or Early Woodland cultures and Nephites with Hopewell
or Middle Woodland cultures is problematic. None of the Eurasian grains or domesticated livestock portrayed in the Book of Mormon appear in those cultural traditions. Neither does plow agriculture nor pastoralism. Woodland peoples cultivated sumpweed, sunflower, squashes, goosefoot, knotweed, maygrass, little barley, tobacco, nuts (acorn), fruits, and berries. They ate migratory waterfowl, deer, raccoon, turkey, shellfish, fish, and dogs. An indigenous form of barley is found, but it could not have come from the Near East with Jaredite or Nephite colonies. Corn, the only American domesticate mentioned in the Book of Mormon, only has sporadic occurrences during the Middle Woodland period. Nor is there evidence of population scale displacements like those resembling the destructions of Jaredite and Nephite cultures in the Book of Mormon (Larson 1996; Fagan 2000; Murphy 2003b). The Heartland proposal fails critical examination.

Ian Thompson, Choctaw and Creek archaeologist, sees parallels between Kennewick Man and Moundbuilder controversies. Both assert an unwarranted discontinuity between living Native Americans and their past. Thompson (2008:208) states, “These mounds are still revered, used, and constructed today (e.g., by the Choctaw Nation of Oklahoma Capitol Grounds), and there is no intervening point during which they were not.” BYU archaeologist John Clark (2004:151) observed concurrently, “the archaeology of New York is persuasive evidence that Book of Mormon peoples did not live in that region.” Regarding the Hill Cumorah where Joseph Smith claimed to find gold plates, he clarified, “Archaeologically speaking, it is a clean hill. No artifacts, no walls, no trenches, no arrow-heads.... Pre-Columbian people did not settle or build here.” Latter-day Saint medical doctor Gregory Smith (2010) critically reviewed Meldrum’s Heartland proposal, calling it “pseudoscientific snake oil and strained proof-texting.” Flora, fauna, technology, and cultural continuities in the archaeological record are incompatible with a Heartland setting for the Book of Mormon.

The publication of Kennewick Man’s genome further undermined the foundational Heartland claim that Indigenous X2a mtDNA was derived from Middle Eastern migrations 2600 B.P. Analysis of the genome revealed the Ancient One carried a version of the X2a lineage that was directly ancestral to all modern Native American X2a lineages (Rasmussen et al. 2015). The problem for Heartland advocates is that there has not been any scientific dispute about Kennewick Man’s antiquity. His teeth were cavity free and worn down to their roots, characteristics of prehistoric hunter-gatherer teeth. He also carried an ancient projectile point embedded in his hip. Radiocarbon dating of a well-preserved finger bone revealed the skeleton’s antiquity. Good quality collagen purified from the bone was found to be about 9,000 years old (Burke et al. 2008). The presence of the X2a lineage in an individual who lived in North America over 6,000 years before the Nephites in the Book of Mormon presented a serious challenge to Latter-day Saint claims of its Semitic origins.

Digital Legend recently responded to this problem by publishing Face of a Nephite: DNA Studies and the Book of Mormon by patent attorney David Read (2020). A major focus of the book is to cast doubt over the age of Kennewick Man. Read takes advantage of the fact that Kennewick Man’s bones had been washed out of the soil profile. Consequently, painstaking forensic analysis was required to determine the original context of his burial. The study included detailed isotope analysis of the bones, examination of skeletal morphology and the projectile point embedded in the hip bone, and matching the soil attached to the bones with the nearby soil profile. Read’s book advocates a creationist rebuttal of the Ancient One’s age, as presented in Kennewick Man: The Scientific Investigation of an Ancient American Skeleton (Owsley and Jantz 2014).

Read takes full advantage of the controversial facial reconstruction by anthropologists Karin Bruwelheide and Douglas Owsley (2014).
Cree and Metis archaeologist Paulette Steeves (2021:39) calls their reconstruction “very problematic.” The cover of *Face of a Nephite* features a light-colored image of the second stage reconstruction with a full beard and wavy long hair. Without informing his audience of the discrepancy, Read selected an image from an earlier step in the process rather than the final facial reconstruction to which the artist Rebecca Spivak had added “weathered dark skin” (Bruwelehide and Owsley 2014:527). Not only is Read’s selection a pale misrepresentation of this particular facial reconstruction, but even the final version has come under criticism from Steeves (2021:39) because “cranial features do not inform experts as to the color of the skin, hair, or eyes or the shape of the ears or mouth.” This image graces the cover of Read’s book “without informing readers that soft tissue reconstructions are created through the assumed racial categories of the skulls, created by those doing the reconstructing.” Steeves (2021:39) countered, “Genetic research has shown that human variation is incredibly diverse and that race is not a valid biological category for anything, including ethnic identity.”

In order to discredit the scientific research on Kennewick Man, Read spends much of his time misinterpreting the radiocarbon dating of the skeleton and the analysis of soil particles attached to the bones. Read misrepresents the detailed radiocarbon analysis of Kennewick Man carried out by geologist Thomas Stafford (2014). Stafford’s analysis yielded a further nine collagen radiocarbon dates that were all close to the original estimate of 9,000 years old. To understand the burial context more fully, Stafford also dated “secondary geological carbonates” derived from rainwater that had crystallized on bone and in bone cavities. The carbonates yielded dates in the vicinity of 2500 B.P. Because these dates align well with the proposed arrival of Book of Mormon migrations at approximately 2600 B.P., Read (2020:32) incorrectly concludes that the carbonate dates reflect the true age of Kennewick Man.

To cast further doubt over age, Read (2020:36–38) also claims Mazama ash (tephra) was attached to the bones. He uses this claim to advance the proposition that Kennewick Man was buried more recently than the Mount Mazama eruption which took place about 7,700 years ago. This claim is also plainly incorrect. In his study of the skeleton, archaeologist James Chatters (2014:46) observed “a concretion” on the bones that contained “allophane, a by-product of tephra weathering.” The occurrence of allophane on the bones is entirely consistent with the burial position of the skeleton, which detailed soil analysis had shown to be 10 to 20 cm below the Mazama ash layer. The same water carrying dissolved carbonates weathered the tephra and carried microscopic particles of allophane down the soil profile, depositing them on the bones.

Read’s errors in *Face of a Nephite* are not simple oversights. Prior to publication, Read shared sections of his book with Chatters, the forensic archaeologist who recovered Kennewick Man’s bones in 1996. Chatters pointed out Read’s mistaken carbonate and Mazama ash claims in emails to Read that he subsequently shared with Southerton.¹ Despite being informed about these fundamental errors Read made no retreat from his faulty conclusions.

The scientific study of Kennewick Man has provided conclusive evidence that the Heartland movement’s interpretation of the Book of Mormon is based upon falsehoods. Kennewick Man’s geological and archaeological timestamps are impeccable, and he provides compelling evidence that he, and the X2a mtDNA he carried, were present in the Americas about 6,000 years before the Book of Mormon claims Nephites first existed.

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¹ "The ca. 2000 year dates you cling to are actually dates on soil carbonate, which deposits continuously from water percolating down from the surface. They are not dates on the skeleton at all”—Jim Chatters 2020, pers. comm.

"No Mazama ash was found in sediment around the skeleton, and believe me it is ubiquitous in younger sediments. Therefore, the skeleton if buried, went into a pit dug before the ash fell”—Jim Chatters 2020, pers. comm.
Formal responses to DNA research from the LDS Church are much more nuanced than simply pursuing disciplinary actions against scientists and encouraging apologetic scholarship. The LDS Church actually aborted disciplinary actions against Murphy in response to publicity and tried to reframe those against Southerton to make them appear as if they were not retaliation for scientific publications (Lyke 2003; Associated Press 2005a; Moore 2007; Lindholm 2011). In 2003 BYU dismissed biologist Scott Woodward who had been involved in amassing one of the largest private collections of DNA samples from Indigenous peoples, some of which were collected without adequate ethical review (Perego 2009; Murphy and Baca 2016:713–716; Southerton 2020:89–90). Despite the early rebuke of scientists, changing approaches took hold in the LDS Church less than a decade later. The Neal A. Maxwell Institute at BYU would absorb FARMS and in 2012 dismiss Daniel Peterson from his editorial role at *Mormon Studies Review* (Haymond 2012). Earlier support at BYU for divisive apologetic scholarship has declined over subsequent years, and new philosophies of respectful engagement with broader academic fields exemplified by the Maxwell Institute have tempered conflict (Hodges 2013). Several scholars from BYU have published in and/or edited recent anthologies that forthrightly acknowledge nineteenth century content and ideas in the Book of Mormon (Colvin and Brooks 2018; Fenton and Hickman 2019; Hafen and Rensink 2019; MacKay et al. 2020).

The LDS Church also modified the controversial claim linking the Book of Mormon to Native Americans that had appeared prominently in its editions of the scripture since 1981. The claim that Lamanites were “the principal ancestors of American Indians” became “among the ancestors of American Indians,” beginning with a Doubleday edition in 2006, and then in its own English editions in 2013. The 2013 edition also softened racial language in chapter headings (Stack 2007, 2013). In June of 2016, President Russell M. Nelson told a gathering of mission presidents that the Book of Mormon “is not a textbook of history, although some history is found within its pages. It is not a definitive work on ancient American agriculture or politics. It is not a record of all former inhabitants of the Western Hemisphere, but only of particular groups of people” (Sterzer 2016). The Church subsequently suspended its Hill Cumorah Pageant in New York that had featured actors in redface playing Lamanite characters from 1937 to 2019 (Baca 2008; Murphy and Baca 2020; Taylor 2021).

In October of 2021, Nelson announced a $2 million donation to the First Americans Museum in Oklahoma City and again clarified that the Book of Mormon “is not a textbook” (Swenson 2021). These changes make some dramatic departures and important gestures distancing the Church from the previous positions linking all American Indians to Lamanites.

There is some evidence indicating lay membership is also changing its perspectives on the Book of Mormon, race, and evolution. The Next Mormons Survey, a recent large scale, national study of four generations of Mormons, demonstrates that confidence in the truth of the statement, “The Book of Mormon is a literal, historical account,” drops from 62% of Boomer and Silent generations, to 53% of GenX, and only 50% of Millennials. Confidence in a statement attributing earlier racial bans to God dropped from just 44% of Boomer and Silent generations, to 30% of GenX. Millennial confidence falls in between at 37% (Riess 2019:19). The same survey also shows nearly half of Mormons in the United States support evolution as the best explanation for the development of life on earth, while the remainder doubt or reject it. The support for evolution is strongest among Millennials at 58% versus 38% for older generations (Riess 2019:286). These data suggest that the Heartland movement may be, at least in part, resistant to changing social attitudes among younger generations of lay membership. Generational differences accent a review by BYU graduate
student and member of GenZ, Hanna Seariac (2021), who critiques the Heartland movement for its overt American nationalism and “language of Anglo-Saxon heritage and bloodlines [that] cements the connection between the Heartland movement and white supremacy.”

Formal statements and online essays authorized by church leadership have reinforced these changing perspectives. A newsroom statement in the midst of the Mitt Romney campaign for President of the United States declared, “The Church unequivocally condemns racism, including any and all past racism by individuals both inside and outside the Church” (Walker 2012).

“Gospel Topics” essays on race and DNA released in the following couple of years illustrate these shifts (Church 2013, 2014). The first reiterated, “Church leaders today unequivocally condemn all racism, past and present, in any form.” The second stated, “the primary purpose of the Book of Mormon is more spiritual than historical.” For those who might wonder about historical issues, the DNA essay points to a limited geographical setting in no specific location, accompanied by gene flow, genetic drift, and founder effect, as possible explanations for the lack of genetic evidence for Book of Mormon migrations in Native American ancestry. The essay, notably, acknowledges Asian affinities in Native American genetics and chastises those who use DNA both to critique and defend the Book of Mormon (Murphy and Baca 2020).

The Church’s implicit critique of the Heartland advocates for their claims that DNA supports historical assertions of a North American setting for the Book of Mormon is noteworthy in light of the subsequent publication of Kennewick Man’s DNA. Analysis published in Nature found that the Ancient One’s mitochondrial genome “is placed at the root of haplogroup X2a” and rejected the hypothesis that Kennewick Man is more closely related to Ainu or Polynesians than he is to Native Americans.” Instead, it showed “that Kennewick Man has ancestry proportions most similar to those of other Northern Native Americans... including the Colville” who had petitioned for his repatriation. In striking contrast to the scientists who opposed repatriation and the media who used terms “European-like” and “Caucasoid” to describe the features of the Ancient One, this team of scientists found that “Kennewick Man’s pattern of cranio-metric affinity falls well within the range of affinity evaluated for individual Native Americans.” They faulted plaintiff scientists for not “explicitly taking into account within-population variation,” concluding that “biological affinities of individual specimens [using cranio-metric data] cannot be resolved with any statistical certainty.” They contrast this uncertainty with “autosomal DNA data [that] are highly statistically significant.” More reliable genetic data show “stronger association of the Kennewick Man with Native Americans than any other continental group.” They demonstrate “that the autosomal DNA, mitochondrial DNA and Y chromosome data all consistently show that Kennewick Man is directly related to contemporary Native Americans, and thus show genetic continuity within the Americas over at least the past 8,000 years” (Rasmussen et al. 2015).

The analysis of the Ancient One’s DNA confirmed positions of claimant tribes and anthropologists who had supported initially unsuccessful attempts at repatriation. Donald Sampson (2008:40–41), former Executive Director of the Confederated Tribes of the Umatilla Indian Reservation, had long objected to racializing the Ancient One with outdated cranio-metric methodologies, noting “it is common knowledge among good anthropologists that it is impossible to determine the so-called ‘race’ of an individual. A sample group is needed so that common traits can be determined.” Umatilla, he insisted, “do not reject science.” The tribes employ “anthropologists and other scientists” and “use science every day to help protect our people and the land... However, we do reject the notion that science is the answer to everything, and therefore should take precedence over the religious rights and beliefs of U.S. citizens.” Umatilla religious leader Armand Minthorn
(2008:43) reflects, “We believe that humans and animals change over time and adapt to their environment. And our Elders have told us that Indian people did not always look the way we look today.” Minthorn emphasized “We are not trying to keep anything from anyone. All we want as Umatilla tribe is a voice in how these remains are treated” (Riffe 2000). Archaeologist Darby Stapp (2008:58) observed, “there is no evidence in the archaeological record of displacement or migration of any of the Columbia Basin peoples throughout prehistory.” In fact, “no such hiatus” was found in ethnological, oral tradition, or linguistic analysis. Anthropologist Ann Kakaliouras (2019:83) concluded that the Ancient One’s “genetic results have ended craniometry’s authority to classify ancient American skeletons.”

After publication of the DNA analysis, the U.S. Army Corps of Engineers finally ended a decades long struggle by returning the Ancient One to the tribes who claimed him as their ancestor on February 17, 2017, for a private reburial in an undisclosed location (Burke Museum 2017).

Decolonization

Decolonizing methodologies that center on the perspective of Indigenous peoples have begun making an impact in twenty-first century studies of the Book of Mormon (Baca 2008; Benally 2017; Covin and Brooks 2018; King 2019; Hafen and Rensink 2019; Hernández 2021; Simon 2022). In Laman’s Terms, a documentary film directed by Diné and Hopi anthropologist Angelo Baca (2008), featured scientists discussing new DNA research alongside Native Americans expressing concerns over cultural misrepresentations in the Book of Mormon. Tim Roderick (Wampanoag) told the audience that he thought stories of violent Lamanites helped white Latter-day Saints “let themselves at ease” over their own complicity in atrocities against American Indians. G. Peter Jemison (Seneca) objected to the Book of Mormon’s claim that his ancestors had destroyed an ancient white nation of Nephites, “We were never the kind that thought you had to wipe out every last person.” Forrest Cuch (Ute) objected, “We are not of Israelite” heritage, and “certainly are not going to turn white someday.” Māori scholar Hemopereki Simon (2022:6–7) identifies the following priorities for engagement between Critical Indigenous Studies and Mormon Studies: “the relationship of Mormonism... to settler colonialism;” “The appropriateness of assigning a religio-colonial [Lamanite] identity upon Indigenous groups or people;” “Questioning the position of whiteness within Mormon culture;” “Advocating for cultural engagement with the Church, particularly around taonga [precious treasure, Indigenous knowledge] the Church may hold or exploit;” “Moving the Church and its members to accept the spiritual nature of the Book of Mormon (i.e., that the Book of Mormon is not actually factual);” and “Preventing the further destruction of Indigenous cultural heritage sites as a worldwide archaeological project of the Church and its members to validate the Book of Mormon as historically accurate.” Scientific and cultural concerns about the Book of Mormon’s historical claims overlap (Baca 2008).

If the LDS Church seeks to achieve its laudable goal of rejecting racism then it needs to consider repatriation of human remains, cultural materials, and lands taken without consent from Indigenous peoples. “A fundamental problem,” noted by Murphy and Baca (2016:702, 706), is that the faith’s foundational events “began with the looting of Indigenous artifacts and graves and were made possible through the theft of Indigenous lands.” If there are actual gold plates inscribed with reformed Egyptian hieroglyphics, from which Joseph Smith said he translated the Book of Mormon, or if he used Indigenous artifacts in his translation activities, “then they would rightfully have belonged to the Seneca from whose graves or ruins they were taken.” The Seneca, on whose traditional lands the founding events of Mormonism took place, have strong beliefs about the sanctity of the ancestors and their burials. Seneca elder Geraldine Green explains that “the digging up of human remains... is not
our way of life.” After a person is buried and there is a funeral address, Green states, “We leave them alone, they are through.... They have done their jobs; we need not bother them anymore. That is why they go to rest; they have finished their job here, and it is very important to us that we not disturb them anymore,” the Longhouse elder concludes (Jemison 1997:59–60). Even under English common law, Pascua Yaqui law professor Rebecca Tsosie (1997:66) notes, “dead bodies cannot be owned, and the removal of funerary objects from a burial site is considered a dreadful and abhorrent crime.”

Seer stones, gold plates, and Egyptian papyri involved in the production of Mormon scripture are inescapably linked to looting. Murphy (2021a) lamented, “While we can view Joseph Smith as a product of his settler culture, he set a regrettable example with grave consequences for successive generations of Latter-day Saints who have learned that it is okay to take sacred records, artifacts, and even remains from human graves.” Baca (2018:74) observes that if the Church does have sacred artifacts of Indigenous origin “then they need to be examined by outside anthropologists and archaeologists as well as through consultation with Native American tribes.” Murphy (2018:55) reflects, “If we insist upon the truth claim that the Book of Mormon is an ancient Indigenous scripture, then an ethical decolonization effort requires that it be returned to the people from whom it was stolen.” Choctaw artist Gary White Deer (1997:39–43) calls the “finders-keepers notion of buried objects... the Buried Treasure Syndrome.” He calls “collecting Indian remains and grave objects as buried treasure” an unacceptable practice. He continues, “What is needed at this moment is a return of the sacred.” That would include “objects of cultural patrimony [such as seer stones]... used to mediate between the seen and unseen.” Since passage of NAGPRA, LDS church museums have repatriated dozens of human remains and funerary objects but still retain Egyptian papyri and Indigenous artifacts (gorgets, spindle whorl, etc.) used as seer stones by early church leaders (Murphy and Baca 2016; Murphy 2020, 2021a, 2021b). The dilemma facing Mormons is similar to the ethical quandary posed by the colonial legacy of anthropology and archaeology and the debate over the repatriation of the Ancient One it generated (Riffe 2000).

Dakota Latter-day Saint historian Elise Boxer (2019:9) notes that even after recent changes, “The Introduction to the Book of Mormon and the history therein not only ignores the diversity of Indigenous Peoples completely, but ignores their unique history that intimately connects them to the land.” The association of American Indians with Lamanites “erases the diverse creation stories and histories unique to each tribe.” In common settler colonial readings of the Book of Mormon, such as those found in both the Mesoamerican and Heartland movements, “Indigenous identity, history, sovereignty, and belief systems have not only been dismissed but replaced with a limited, racialized identity grounded in Mormon religious discourse.” In its depictions of “Indigenous Peoples as Lamanites, or the first immigrants to this continent, the Book of Mormon provides the necessary justification for Indigenous removal and dispossession by Mormon settlers” (Boxer 2019:4). Boxer (2019:5) clarifies that her “rereading of the Book of Mormon is not about its veracity, or challenging its ecclesiastical authority, but rather how [the] text operates as a definitive history of Indigenous Peoples in the Americas.”

A recent Dialogue podcast on Indigeneity and Mormonism (King et al. 2021) highlighted concerns about settler colonial interpretations of the Book of Mormon. Diné sociologist James Singer stated, “The Book of Mormon is a book of faith.... It is not a history. But, we have been taught it is a history. So, what do you do with that?” Diné historian Farina King repeated, in a paraphrase, President Nelson’s recent statement, “the Book of Mormon is not a textbook, it is not a history textbook.” Tsimshian blogger Sarah Newcomb noted, though, that despite some shifting perspectives among church leadership, missionaries continue to teach the Book of Mormon as history.
Literary scholar Jared Hickman (2020:75–76) highlights what he calls a decolonizing potential within the Book of Mormon. Hickman’s interpretation draws from common nineteenth-century definitions of “translation” to suggest that Joseph Smith may have employed more of a metaphysical than a linguistic concept of translation when he looked into his seer stone to dictate the scripture. Hickman suggests that Smith acts “as if” Native voices “had cried from the dust” (3 Nephi 3:19–20). He represents Smith’s role as more like that of an “activist; that is someone acting on behalf of Native peoples as a ‘spokesman’... rather than as an actual medium of Native peoples.” Recognizing the inherent limitation of such a settler colonial spokesperson, Hickman advocates conceding interpretive authority to Indigenous peoples, “the Book of Mormon has to be ceded to indigenous peoples and made to serve their fruition, as determined by them.” In light of the conflict over the Ancient One, one might read Hickman’s interpretation as akin to a literary repatriation of at least interpretive authority.

Indigenous Latter-day Saint scholars have offered interpretations that escape some of the historical difficulties in both the Mesoamerican and Heartland models of the Book of Mormon. Taos Pueblo literary scholar P. Jane Hafen (2018:273) notes, “For Mormons to see Indigenous peoples as ‘alike unto God’ (2 Nephi 26:33), the relationship must decolonize.” Hafen (2018:263) distinguishes between determinate and indeterminate approaches to origins. Fixed or determinate origins “may lead to racism or nationalism.” On the other hand, “If an origin is indeterminate, or perhaps simply figurative, a door is opened to multiple interpretations and understandings. These various understandings decolonize the dominant culture.” Hafen (2018:266) emphasizes, “Listening to Natives tell their own stories about their origins is a decolonizing act.” Wínak anthropologist Daniel Hernandez (2021:10) highlights “many Indigenous Mormons who use extra-canonical texts to add to an expanding world view, which include the oral, woven, tattooed, and written sacred stories of the ancestors of the Americas and Polynesia.” Indigenous Mormons often read the Book of Mormon’s references to “other scriptures” as validation of canonical status for oral traditions and other sacred texts such as the Code of Handsome Lake, Popol Wuj, and Black Elk Speaks (Murphy 2018, 2019, 2022). Indeterminate Indigenous approaches allow for the co-existence of multiple origins, while determinate settler colonial readings of the Book of Mormon displace those alternatives.

Similar perspectives to those of Hafen appear in dialogue between archaeologists and Native Americans. Archaeologist Larry Zimmerman (1997:54) regretfully acknowledged, “Past created by archaeologists have been imposed on Indian pasts without a chance for debate.” He prefers to see these narratives as “analogues, not homologues.” Indigenous and archaeological narratives, he explains, “need not be the same stories even if they are discussing the same past(s).” Anishinaabe-Ojibwe archaeologist Sonya Atalay (2006:285) noted settler colonial complicity in the discipline, “Through the process of colonization, Westerners gained the power to study not only those distant from themselves by time but also the pasts of others who were distant from themselves culturally, and often geographically—those who had been subjected to colonial rule around the globe.” Pawnee archaeologist Roger Echo Hawk (1997:89) observed, “A religious approach accepts oral texts as the source of holistic truths rather than as documents that require evaluation for historicity.” Harvey Moses, Jr. (2008:102), former member of the Colville Business Council, advises those who “want answers about our (American Indians’) past, present, or future... need to come and talk to us.” In this decolonizing dialogue, there is space for multiple approaches to and interpretations of the past.

Dakota anthropologist Kim Tallbear (2013:116) highlights a significant difference between Native American and Mormon approaches to the use of genetics in the interpretation of the settlement of the Americas. She describes
a discussion on a genealogical listserv, “One lister posted favorable comments of Mormon scholars who attempt to use genetics to support church views of creation and the settlement of the Americas.” Even there, the poster was met with an unfavorable response, “He was roundly criticized and his views were declared irrelevant to the list.” This incident inspired Tallbear to lament that “Native American and Christian perspectives that are critical of genome knowledge are seen to fall on the same side of a religion-versus-science divide.” She identified mistaken assumptions, “Unlike Christian traditions, Native American origin narratives are generally missing the will to convert and so are without intolerance of other ontologies.” Native Americans, she notes, are much more concerned about “who has the power to research whom and how, and who has the power to make policy that affects Native American lives.” She objects to a “false comparison between Christian creationists and tribal creation narratives.” Indigenous concerns about the Ancient One, in this respect, are better understood as protecting particular “notions of the sacred, and [as] political resistance to being objects of research.”

Diné scholar Moroni Benally (2017:72) highlights a decolonizing approach to the Book of Mormon through his family’s negotiation of spirituality and place in a colonizing Latter-day Saint faith tradition. His family “respectfully negotiated the doctrines of the Church with their Navajo practices, always viewing the Church structure and organization within the broader context of colonization.” The experience, he explains, is more aptly described as “conversation” than “conversion.” The Book of Mormon, Benally (2017:73) clarifies, operates dually as an instrument of evangelism and as “a tool of erasure for Indigenous people’s rightful claim to land, politics, economies, and power.” In this context, “the struggles of native peoples in the United States—and in the Church—becomes a struggle against elimination, against their erasure.” “The Book of Mormon,” Benally (2017:74–77) observes, “functions as both a tool of invasion and replacement, but also, strangely, as an instrument of resistance against the Church itself.” His grandfather’s “negotiation of membership into the LDS church” was not governed by “historical inconsistencies” or a “belief in being an Israelite.” His family, like many other Indigenous Mormons “continue to participate in their own ceremonies because these ceremonies expand the meaning of Church doctrine and reify the core purposes of the Book of Mormon.” In this “mode of non-compliant resistance,” Benally (2017:77–78) concludes, “Indigenous faith blossoms.”

Conclusion

Injudicious use of ethnic terminology, craniometrics, and facial reconstructions by some anthropologists and, even more carelessly by the media, have fed Latter-day Saint misrepresentations of Kennewick Man as a white Jaredite or Nephite from the Book of Mormon. These Latter-day Saint depictions, especially those associated with the Heartland movement, share much in common with the “virulently racialized representations of Kennewick Man at white nationalist and white supremacists sites” analyzed by Kakaliouras (2008:89). Even a popular science fiction author and biologists and anthropologists at BYU and ISU, who would likely bristle at any association with white nationalism, have racialized the skeleton, mischaracterized Native American perspectives about science, and portrayed ancient American populations as white. In these respects they undermine recent efforts of their own church leadership to reject racism in any form.

Long-standing challenges posed by archaeology and more recent ones coming from genetics have led the two largest Mormon denominations to distance themselves from racist; hemispheric; and even, to a limited extent, literal historical readings of the Book of Mormon. The Heartland movement appears to resist changing perspectives by hearkening back to teachings of earlier church leaders, res-
recting archaeological frauds, and repeating creationist objections to radiocarbon dating in service of settler colonial readings of the Book of Mormon. The recent publication of *Face of a Nephite* (Read 2020) inappropriately racializes the Ancient One and his mitochondrial lineage and deliberately misrepresents radiometric dating in support of a white nationalist reading of the Book of Mormon.

Indigenous Mormons have objected to racist and historical readings of the Book of Mormon, insisted that the Book of Mormon is not a history, called for repatriation of human remains and sacred items taken from Indigenous graves, and read scripture in ways that validate Indigenous sacred traditions. In the inclusive, indeterminate, and analogic approaches to the past advocated by Indigenous Mormons, there is space for dialogue, oral tradition, science, and sacred narrative—even for allegory, pseudepigrapha, and inspired fiction.

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**Angelo Baca** (Diné/Hopi) is a cultural activist and filmmaker with a Ph.D. in anthropology from New York University. He is the cultural resources coordinator for Utah Diné Bikéyah, a non-profit organization dedicated to the defense and protection of culturally significant ancestral lands, and Assistant Professor, Liberal Arts, at Rhode Island School of Design. The National Parks Conservation Association designated him as one of their top “10 under 40” cultural activists. His films, *In Laman’s Terms: Looking at Lamanite Identity* and *Shash Jaa: Bears Ears*, reflect a long-standing dedication to both Western and Indigenous knowledge.
Columbia Plateau Culture Area Rock Art Bibliography

Leigh Marymor, David A. Kaiser, and James D. Keyser with Foreword by William D. Layman

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Abstract  Columbia Plateau rock art has been the subject of intensive study for more than a century. Some of the earliest research was done as part of a large-scale scientific archaeological expedition from the University of California, but other recordings were done by avocationalists who were intrigued with the many carvings and paintings lining the cliff faces along the Columbia River. Of course, some early avocationalists’ studies are little more than flights of fancy, trying to attribute the rock art to marauding Viking warriors or Indian sun-worshippers, but several avocationalists left records that remain the basis for twenty-first century research projects. Here, we summarize the history of research into Columbia Plateau rock art and present it as a matrix organizing the hundreds of references provided herein.

Keywords
Columbia Plateau, Columbia River, rock art, rock imagery, history of research, bibliography.

Foreword
William D. Layman

Contemporary rock art researchers build their respective contributions on the shoulders of early informants, previous scholars, and, stretching back in time, the individual makers who brought their work to life on stone. This regionally-specific article offers a vast array of citations that are scattered throughout the Columbia Basin and Plateau in a multitude of holdings—tribal cultural resource repositories, state archaeological records, federal agencies, museum and educational institutions, and personal libraries. Though many books are accessible to the public, and an increasing amount of information is available on the Internet, much of the relevant research is tucked away in reports, historical and archaeological journals, conference proceedings, newsletters, magazines, and newspaper archives. Adding to the trove of publications, numerous dissertations, theses, and unpublished manuscripts sit on shelves or are packed away in files, awaiting discovery by new generations of researchers.

Here three distinguished leaders in American rock art studies illuminate the history of rock art traditions within the Columbia Plateau Culture Area. Notably, each author is a recipient of the American Rock Art Research Association’s highest award for lifetime achievement. Their cumulative impact in the arenas of scholarly contributions to the field, documenting sites, engaging in conservation work, and promoting education has been long appreciated by their peers.
The article’s primary author, Leigh Marymor, is like a modern-day medieval scribe spending early mornings and late evenings patiently adding citations and links to the database he has created, now hosted online by the Museum of Northern Arizona as the Rock Art Studies Bibliographic Database. David A. Kaiser’s finely honed research and writing skills over the last twenty years give all his work an enduring place in the rock art literature of the Columbia Plateau and the Plains. The article’s third author James D. Keyser’s lifelong devotion to the field is recognized by professional and lay audiences throughout the world through his numerous contributions including his authoring and co-authoring in excess of 100 articles and books within the realm of rock art and biographic imagery.

Marymor’s strong pull to gain a full sense of the world’s rock art literature opened the doors to what has become an enduring commitment to offer his work freely to others. Beginning in the early 1990s, he ditched the use of hand or type-written lists in favor of using rudimentary database software then available for use on early versions of home computers. Once having mastered the right software, Leigh was able to make magic happen. With a few instructions and a tap of a key, rock art professionals, students and amateurs alike, would forevermore save enormous amounts of time and effort by more easily accessing citations and relevant resources. This work of generosity, persistence, and creativity has resulted in strengthening the level of scholarship across the board by virtue of its completeness; no longer would it be excusable to ignore what others had already contributed to the field.

Marymor is known to assist fellow researchers in accessing relevant source materials for their projects. After a time, this inspired him to collaborate on the publication of several regional and thematic rock art bibliographies. In this article readers can see at once the sum total of present references of rock art found within the Columbia Plateau cultural area. Keyser and Kaiser’s discussion of the region’s rock art history provides a narrative that is refreshingly new to the field. In particular, it underscores the Columbia Plateau area’s importance in documenting the intentions and motivations of those who have used this form of expression, especially with early ethnographic contributions from individuals such as Canadian anthropologist James A. Teit.

The variety of subjects and headings covered within the article is impressive—readers will not only find ethnographic references and classic studies, they will see a host of various citations showing advances in dating technologies, rock art conservation efforts, and numerous topics that shed additional light on the field. If one were to wish going beyond the bibliography published here to find more specific groupings of themes and places, the online database is only a step away.

So strong is the appeal of this age-old form of Indigenous expression, that thousands of amateurs and professionals alike regularly log on to the Museum of Northern Arizona’s Rock Art Studies Bibliographic Database. Growing validation of the work happens every time an individual utilizes the site.

The field of rock art studies is simply like none other, combining stunning works of beauty with unending streams of images and panels that have been painted, scratched, etched, abraded, or pecked on a multitude of rock surfaces. The imagery gives voice to humankind’s intimate relationship to place and cultural life. The incredible number of aboriginal sites throughout the world raise fundamental questions about the origins of symbolic thought and expression. We are deeply drawn to the histories revealed by various sites—their relationship to past and present Indigenous cultures, the themes and styles which are expressed within them, and the stories people have gathered about them. To witness rock formations upon which the images are displayed—cliffs, caves, shelters, fallen rock, and even the boulders that stand alone in the landscape—is good for one’s eyes and spirit, opening pathways of further inquiry.
Recent trends in the field indicate signs of health and advancement. Ethics matter more than ever, professional research grows sharper, and Indigenous tribal people are making their voices known (e.g., see *Talking with the Past: The Ethnography of Rock Art*, Keyser, Poetschat, and Taylor 2006). Increasing numbers of North American Tribes are training their own rock art specialists who operate within traditional and ethical guidelines generated by culture-bearers of their respective communities. To the disappointment of some, significant contributions may never find their way into bibliographies such as this. Nor will they be necessarily accessible to the public writ large, though researchers, upon being vetted, may be given restricted permissions to carry out specified work. Such sovereign tribal positions can be understood both within the context of Indigenous historical trauma as well as within the context of the fragility of the sites themselves. The combination of unintentional wear and tear, modern day unregulated cultural tourism, thoughtless postings of site locations on social media, and willful acts of vandalism create a mix of increased vulnerabilities facing cultural resource sites throughout the continent. It is worth hearing the sentiments of contemporary Native people. Mid-Columbia elder Arlene Buck spoke to the importance of rock images in her introduction to a 1994 exhibit created by the Wanapum Priest Rapids band entitled *Sacred Stones*: “These images have been locked inside our lives for protection and safety... they are reminders of what is holy.”

A bibliography such as this is a story within its own right, one that carries hundreds of smaller narratives written by observers and researchers who, like the initial makers who took paint and tools to stone, have possessed a passionate interest to express their findings for others to see, using paper and ink rather than rock.

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2. Also known as pictograms, rock paintings.
3. Also known as rock engraving; often involving abrasion, percussion, incising, etc.
Many Native American culture-keepers within the Columbia Plateau and beyond are rightfully sensitive to the use and mis-use of the term “rock art,” and some have suggested that the term “rock image” is more suited to the imagery found in their traditional lands.

The term “rock art” used to describe this field of study emerged in the first quarter of the twentieth century in English language literature. At the same time, “art rupestre” and “arte rupestre” were in use in French and Spanish literature. Prior to this, terms like “hieroglyph” and “picture-writing” were (mis-)used to describe cultural markings on natural rock supports by early explorers and prehistorians. The term “rock art” gained currency in reaction to the earlier terms that fell short of encompassing the many cultural motivations expressed by peoples from around the world over the passage of the millennia.

“Rock art” has become a convenient and familiar term, but it is also loaded with uncomfortable post-colonial connotations. Rock art researchers are aware of this and have proposed, struggled with, and argued about alternatives for a long time. Of the many alternative terms that have been proposed, none have gained a foothold that might dislodge the familiar term “rock art” as the accepted nomenclature to describe the field of study. Some of the alternate terms proposed include: rock-art, rock writing, rock images, cultural markings, rock representations, graphic rock manifestations, and picture-writing.

A singular exception to the use of the term “rock art” is the term “quilca” whose regional adoption has been vigorously advanced by Peruvian archaeologist, Gori Tumi Echarvarría López. Echarvarría Lopez makes the case for use of the term as follows.

The category “quilca” should be used to universally refer to the graphic phenomenon without considering the exclusivity of any material. Quilca is any graphic manifestation in Peruvian archeology and the term categorizes the phenomenon itself, allowing its study and research without conceptual restrictions. Pictograms, petroglyphs, geoglyphs and mobile art with rock tradition, the four classic objects of “Peruvian rock art” arequilcas, regardless of their intrinsic material properties or artifactual nature, since they are cultural objects that carry plastic and graphic manifestations. This definition also covers any “artistic” form sanctioned for its quality or aesthetic quality, manufacturing or cultural correspondence, whether assigned or self-defined, such as the so-called “Chavín art,” “Tiwanaku art,” “Shipibo art” or any other “art” whatever the case, which can and should be considered phenomenologically similar to the manifestations referred to as “rock art,” from which they have been historically separated, forced by the tacit conditioning of Eurocentric ideology.

The successful normalization of the term to describe Peruvian graphic rock manifestations can be appreciated by the numbers of Peruvian publications using the term in their titles—the Rock Art Studies Bibliographic Database (RASBdb) lists 76 books, manuscripts, and articles published beginning in 1990. The term “quilca” can be found in the titles of approximately 7% of all Peruvian literature cited in the RASBdb. In comparison,

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5 German = felsbilder, felskunst. Norwegian = bergkunst. Russian = настальное искусство, etc.

6 “One of the oldest debates in rock art studies is over the term ‘rock art’ itself,” Breen Murray (2005), La Pintura 32(2):7.

one of the more preferred alternative terms to “rock art” that has gained some currency over the same time period, “rock image,” appears in the titles of 13% of all of the world’s titles listed in the RASBdb. The future of the wide adoption of the term “rock image” in publication appears to be in its early days locally on the Columbia Plateau with seven occurrences appearing in the RASBdb, these authored by four researchers.

In their discussion of “What is Art,” David and McNiven (2018) accept that the definition of art in its diverse manifestations implies the “expression or application of human creative skill and imagination...,” but they underscore that aesthetic value, however culturally defined, does not imply that rock images were primarily created for their beauty and emotional power. Recognizing that the intent of rock art expressions is frequently unknown to the modern day viewer, they recognize a host of motivations found across a wide range of cultural groups (e.g., marks of ancestral or spiritual power, increase and maintenance of rituals, presence of ancestral beings, passing of ancestral knowledge to initiates, etc.). Summarizing the shortcomings with the term “rock art,” they observed that “By reducing image-making to ‘art,’ we normalize the West’s notion of imagery and distance those of others, exoticizing the latter in the process.”

An important ethnographic contribution to discussions about rock art (rock images) in which Indigenous worldviews are held front and center resulted from a conference convened in 2002 hosted by the Oregon Archaeological Society. The conference brought together rock art scholars from around the world with tribal traditionalists from the lower Columbia River region to discuss rock art, both locally and further afield. The resulting publication, Talking with the Past: The Ethnography of Rock Art (Keyser, Poetschat, and Taylor, editors, 2006) engendered spirited discussions among scholars, authors, and elders and provides a fresh look at the role of rock art from around the world.

Professional values in academic study and land management have been evolving in the United States commencing with the Antiquities Act of 1906, which was succeeded and greatly broadened by the Archaeological Resources Protection Act (ARPA) of 1979 which criminalizes the theft or destruction of archaeological resources, including rock art, on public lands. Subsequent laws, especially the American Indian Religious Freedom Act of 1978 and the Native American Graves Protection and Repatriation Act (NAGPRA), have enshrined Native American rights of protection for sacred heritage and sacred landscapes on federal lands, as well as rights of return of human remains and sacred objects held within institutional collections. These federal laws coupled with the ground swell of grassroots cultural empowerment movements on the rise in the United States beginning in the 1960s and 1970s (e.g., “Red Power,” the American Indian Movement, the occupation of Alcatraz Island, Native American Studies curriculum in university courses, etc.) have led to the normalization of Native American consultation in management decisions related to Native American intellectual and property rights on state and federal lands. Increasingly, archaeological research has moved away from purely academic agendas. Today, archaeological research (including rock art research) is carried out in service to Heritage Management, where ever more frequently Native American voices and concerns set the agenda.

The centrality of concern for “right relationship” between Indigenous peoples’ worldviews, intellectual and real property rights, and rock art research is evidenced by the large and ever-growing body of literature on this topic. A subject keyword search of the Rock Art Studies Bibliographic Database using the search term “conservation” recently returned 4,110 citations culled from more than 47,250 citations that populated the database at that moment in time. Within this broad topical search, many terms were found

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8 “What is Art?” In The Oxford Handbook of the Archaeology and Anthropology of Rock Art, p. 3. Oxford University Press.
representing Heritage Management issues and Native American concerns. The list below is helpful in directing a focused search of the rock art literature concerned with these issues:

**Advocacy**
- Bureaucracy
- Conservation District
- Conservation easement
- Fundraising
- Grassroots
- Community organizing
- Land Trust
- Land acquisition
- Trustee
- Law enforcement
- Prosecution
- Laws
- Litigation
- Valuation
- Legislation
- Networking
- Private
- Public
- Partnership
- Alliances
- Collaboration
- Government/Sovereign Nation
- Public/Private
- Political and public awareness
- Political action
- Politics.

**Ethics**
- Academic integrity
- Code of ethics
- Colonialism
- Decolonialization
- Post colonialism
- Conflicts of interest
- Control and power
- Cultural appropriation
- Exploitation
- Professional vandalism.

**Community Engagement**
- Community involvement
- Aboriginal Ranger Program
- Citizen participation
- Citizen scientist
- Descendant communities
- Indigenous intellectual property
- Appropriation
- Commoditization
- Indigenous property rights
- Cultural property
- Native Title
- Indigenous values
- Custodianship
- Stewardship
- Economic benefits
- Community development
- Consumer benefits
- Marketing
- Landscape values
- Oral history, interview, narrative, story
- Outreach
- Public relations
- Repatriation
- Traditional knowledge
- Well-being.

**Cultural Landscape**
- Historic landscape
- Social landscape.

**Cultural Resource Management (CRM)**
- Archival records, storage
- Area of Cultural and Environmental Concern (ACEC)
- Best practices
- Harm, do no
- Reversibility
- Condition Assessment
- Geological risk assessment
- Geomorphic stability assessment
- Risk, Risk map
- Rock Art Stability Index (RASI)
- Conservation, techniques
- Consultation
- Disaster planning
- Documentation
- Recording form
- Environmental Impact Statement (EIS)
- Evaluation
• Interagency cooperation
• Interpretation
• Etic/Emic
• Multivocality
• Intervention
• Mitigation
• Inventory
• Database
• Geographical Information System (GIS)
• Management plan
• Monitoring
• Color monitoring
• Multiple use
• Significance
• Site record
• Special Protection Area
• Stakeholder
• Strategies
• Survey
• Visitor study.

For a deep dive into the most current thinking about Heritage Management issues offered by a wide spectrum of prominent rock art researchers from around the world, we recommend *Networking for Rock Art. Global Challenges, Local Solutions*, edited by Neville Agnew, Janette Deacon, Nicholas Hall, Terry Little, Tom McClintock, Peter Robinson, Sharon Sullivan, and Paul Taçon (2022).

**Rock Art Studies Bibliographic Database**

The Rock Art Studies Bibliographic Database (RASBdb) is an open access, online resource that fulfills the need for a searchable portal into the world’s rock art literature. Geared to the broadest interests of rock art researchers, archaeologists, students, cultural resource managers, and the general public, the RASBdb makes rock art literature accessible through a simple search interface that facilitates inquiries into multiple data fields, including authors’ names, title and publication, place-name keyword, subject keyword, ISBN/ISSN, and abstract. The results of a data search can further be sorted by any of the data fields, including authors’ names, date, title, and so forth. An ever-increasing number of citations within the database include web links to online versions of the reference cited, and many citations include full authors’ abstracts.

The data compilation has been undertaken by Leigh Marymor with the year 2022 marking the 29th year of continuous revision and expansion of the data. Over 47,400 citations are currently contained in the database. Materials cited in the RASBdb have been culled from hundreds of sources. These include: books, periodicals, conference proceedings, gray literature (unpublished documents), bibliographies, public and academic library catalogs, institutional repositories and archives, private libraries, academic search engines, internet search engines, and social media. A few words about materials that are de-emphasized in the RASBdb follow.

Newspaper accounts have not been a primary focus of the literature included in the Rock Art Studies Bibliographic Database primarily due to the copious numbers of such accounts and the limited resources of time and energy available for the compilation of the RASBdb project as a whole. This is not to say that newspaper articles are not of great interest to the historiography of rock art research and to specific research interests pertaining to regional or thematic concerns. Researchers will discover a fair number of newspaper citations in the “Columbia Plateau Culture Area Rock Art Bibliography,” but our list is certainly not complete.

For researchers who would like to dig deeper into newspaper accounts, the most efficient access is found through use of internet-based search engines, such as Newspapers.com. The primary drawback involved in using archival

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10 The Rock Art Studies Bibliographic Database can be searched at: <https://musnaz.org/search_rock_art_studies_db/>.
search engines is that they are often protected by paywalls. As such, unless the researcher has institutional access, one will need to find a library that offers access to the search engine, or as a last recourse, pay for access. As of this writing, Newspapers.com offers a seven-day free trial subscription.

Two publications that contain excellent references to early newspaper accounts pertaining to the Columbia Plateau Culture Area are cited in our bibliography; for these see Keo Boreson (1976) and Roderick Sprague (1967).

There are often many magazine references to primary scientific research. Every attempt is made to include the primary research, if not all of the dissemination of news about that research through magazine accounts.

Unpublished conference presentations are frequently unavailable to researchers, except when directly available from the presenter. As such, unpublished conference presentations are of limited usefulness to rock art researchers and for the most part are not cited in the RASBdb. An exception is made for draft manuscripts of unpublished presentations that have been placed on file at public repositories such as State Historic Preservation Offices (SHPOs).

Published conference abstracts in the absence of publication of the complete paper are the next best thing. At a minimum, a researcher can learn something about who in the field has been working with particular rock art sites or research issues, and gain a sense of what held currency as of the date of the conference. Although there are far too many published abstracts to include in the RASBdb based on the compiler’s limited time and energy, exceptions have been made for some conferences.

Book reviews when well-conceived and written not only describe a publication’s content, but contribute to the discussion by amplifying issues or providing constructive criticism. Constraints on the RASBdb compiler’s time and energy have precluded citations to most book reviews, but every attempt has been made to include a citation to the reviewed publication. A Google search of a publication’s title will often include citations to a publication’s reviews, as well as to the publication itself.

Digital media including videos, photographs, PowerPoint presentations, and the like are not cited in the RASBdb.

The RASBdb first launched online as a joint project of the Bay Area Rock Art Research Association and the University of California’s Bancroft Library. After thirteen years of collaboration, the project found a new home and collaborator at the Anthropology Department at the Museum of Northern Arizona. The “Columbia Plateau Culture Area Rock Art Bibliography” results from an export of data from the RASBdb and captures a freeze-frame of rock art research as compiled here in the year 2022.

The online version of the RASBdb at the Museum of Northern Arizona is updated continually, and we refer the reader to that resource for up-to-date bibliographic data revisions and additions.

The History of Columbia Plateau Rock Art Research—The Area and its People

James D. Keyser and David A. Kaiser

The Columbia Plateau (Figure 1) is one of the lesser-known culture areas of western North America, especially when compared to such famous regions as the Plains, Northwest Coast, and American Southwest. The area encompasses the watershed of the Columbia River and its major tributaries including the lower Snake River from the Hells Canyon downstream, the Salmon River of central Idaho, and the Clarks Fork of the Columbia River and Flathead River of western Montana. In addition, it also includes the Fraser River drainage in south-central British Columbia. The area is bounded on the west by the Cascade Range, on the north by the Mackenzie/Fraser river drainage divide, on the south by the Snake River Plain in southern Idaho and the northern Great Basin in Oregon, and on the east by the Rocky Mountains. Along the
Cascade Range in Oregon, the region extends southward to encompass the Klamath Basin in far southern Oregon and extreme northeastern California.

The area is defined by a mild, dry continental climate with hot summers and cold winters. The northern Columbia Plateau is heavily forested with dense stands of fir and pine and characterized by major streams and rivers flowing through narrow valleys. Numerous long, deep glacial lakes occupy glacially scoured portions of narrow, north-south trending valleys. The central and southern portions of the region are an ancient basalt plateau formed by successive lava flows extruded from Miocene volcanoes between 10 and 30 million years ago. In some places these successive basalt flows are more than ten thousand feet thick. The Columbia River and its major tributaries have cut deep canyons in these basalt flows forming dramatic basalt-rimmed gorges extending for miles. In the central part of the region, miles of dry channels are the remnants of Pleistocene floods caused by the periodic emptying of Glacial Lake Missoula. The southern margin of the region is rimmed by a series of low mountain ranges that separate the area from the northern Great Basin.

Tribal groups living in the Columbia Plateau in historic times included representatives of six distinct language groups, including the Salishan, Athapaskan, Sahaptian, and Chinookan language families, and the Kutenai and Klamath-Modoc language isolates. Keeping in mind that each of the Tribes in the area had specific beliefs, customs, ceremonies, and socioeconomic systems that differed slightly from their neighbors, in general all of the Tribes in the region shared more in common with one another than they did with Tribes from other regions. These groups lived in autonomous villages (or bands in areas like western Montana and central Idaho) to whom members gave their allegiance and from which they received their identity. Villages or bands were led by councils who “governed” through charisma and group consensus rather than true political power. Hunting, fishing, and gathering were key elements of Columbia Plateau economy, but trade served to spread items from distant areas throughout the region. Large-scale trade fairs took place at major fishing villages found throughout the region such as those at Celilo Falls, Kettle Falls, and on the lower Fraser River, where products arrived from the Northwest Coast, northern California, the Northern Plains, and the Great Basin. Key villages were occupied year-round, and large pit houses or plank houses were typical habitations at such sites for at least the last five thousand years. Columbia Plateau religion centered on the vision quest and various shamanic rituals and ceremonies, with rock art occupying a central role in many of these religious activities.

The Rock Art

Columbia Plateau rock art has been the subject of intensive study for more than a century. Some of the earliest research was done as part of a large-scale scientific archaeological expedition from the University of California, but other recordings were done by avocationalists who were intrigued with the many carvings and paintings lining the cliff faces along the Columbia River. Of course, some early avocationalists’ studies are little more than flights of fancy, trying to attribute the rock art to marauding Viking warriors or Indian sun-worshippers, but several avocationalists left records that remain the basis for twenty-first century research projects. Here, we summarize the history of research into Columbia Plateau rock art and present it as a matrix organizing the hundreds of references provided herein.

Early Scientific Study

Rock art was sporadically mentioned by early explorers and settlers describing their new landscapes. Most descriptions were brief and vague, telling of “rude pictures of men and animals scratched on the rocks” (Abbot 1857:94). Some reports, however, contain the
earliest illustrations of rock art in the region (e.g., Pickering 1848:42; McClellan 1853:Image 23). The earliest detailed study of rock art in the Columbia Plateau was conducted by the ethnologist Albert Gatschet (1878) who sketched and made detailed notes about Oregon’s Patton Valley petroglyphs. Unfortunately, he never published these records, but they are now filed at the Smithsonian Institution.

For the first third of the twentieth century, rock art research of lasting import was conducted primarily by university-trained or supported scholars. The earliest detailed research pertaining directly to rock art in the region was the work of James A. Teit (1896, 1900, 1906, 1909, 1918). Although he was a self-educated ethnographer, under the sponsorship of Franz Boas of Columbia University, between 1896 and 1918, Teit wrote at least four detailed studies concerning pictographs in the territories of individual interior Columbia Plateau Salishan Tribes. He then summarized this work (and added additional data) in a 1930 publication concerning all interior Salishan Tribes. But Teit was not the only scholar interested in these images. Contemporaneously, Morton Elrod, a biology professor at the University of Montana, conducted a detailed study of the Painted Rocks site (later designated 24LA1026) on Flathead Lake (Elrod 1908). Bringing formal scientific method and a professional photographer’s “eye” to his study, Elrod published photographs and a drawing of more than 200 hundred images at the site that rival any recordings done before the late 1970s. Between 1932 and 1935, Luther Cressman, an anthropology professor from the University of Oregon, recorded several rock art sites in the southern Columbia Plateau (Cressman 1937). These included both Cascadia Cave and Picture Gorge, both of which have been the subject of major studies more than 80 years later (Poetschat et al. 2010; Hann 2013a). Finally, one major scientific expedition was undertaken by the University of California, and it recorded rock art at several major sites around the confluence of the Deschutes and Columbia Rivers (Strong and Schenck 1925).

These early scholarly studies range from detailed descriptions of images, sometimes with accompanying ethnographic information, to more basic descriptions of sites and images that were obviously thought to be of secondary import to data collected from controlled excavations. These first recorders primarily used freehand black and white drawings to document their subject, although Elrod’s article has ten excellent black and white photographs of the imagery at Painted Rocks. Unfortunately, many of the early drawings are isolated images without panel context (e.g., Strong and Schenck 1925:78), greatly reducing their value to later scholars.

Fanciful Interpretations

Sharing this early period of investigation were self-styled experts who believed the pictographs and petroglyphs of the region were either not the work of the Native inhabitants or represented a long-lost religious cult that no longer survived in Indian cultures. One of the most vocal of these was the self-proclaimed “Professor” Olaf Opsjon, who lived near Spokane. In more than two dozen articles published in local newspapers (but also appearing as far away as the New York Times (NYT)) (NYT 1926; Finley 2005), Opsjon claimed that the rock art of the region was runic writing done by Viking raiders commemorating their epic battles with local Indian Tribes (Clark 1971:191). He even claimed to have discovered a burial mound containing fallen Viking warriors, though he never produced any artifacts or excavation reports. Even when confronted with the testimony of Herbert J. Spinden, an anthropologist at Yale University’s Peabody Museum who was knowledgeable about rock art, that indicated these images were made by local Tribesmen, newspapers continued to print Opsjon’s flights of fancy. The one contribution Opsjon did make to regional rock art study was an amazing set of early photographs (1919) of the rock art at
Vantage, Washington, on the mid-Columbia River, as well as smaller suites of imagery from a few other sites.

A similar interpretation of Indigenous art through one’s own cultural lens was promoted by Yasin Raja, a Pakistani student at the University of Oregon, who claimed the art was carved by early Buddhist monks (Hauser 1957). This interpretation was further supported by K. V. Krishnamurthy, a visiting engineer from India working with the Army Corps of Engineers (Anonymous 1957). Other than reflecting the racial and cultural biases of the proponents and the times, the idea that Vikings or Buddhist monks contributed to Columbia Plateau rock art is simply nonsense.

Finally, closer to home, noted Oregon historian John Horner published numerous newspaper articles and book chapters on regional rock art in the 1920s. These included many drawings of the art. His interpretations were also, unfortunately, quite fanciful, touching on Mexican calendars and again on early European explorers. However, his primary interpretation, given weight by his scholarly credentials, was an overarching cult of sun-worshippers. He often promoted this idea, even visiting pictograph sites in the Columbia Gorge with Native people to inform them, rather than ask them, what the art meant (Horner 1925). This cultural ignorance and arrogance was the cornerstone of many early misinterpretations of the Indigenous art in the region.

**Avocationalists Become Involved**

The amount of rock art in the Columbia Plateau, especially near sizeable cities and towns along the Columbia River, was simply a subject too large not to attract attention. Thus, beginning just before World War II, and increasing in popularity following the war, avocational rock art recorders began documenting rock art sites along the Columbia River and in the interior of British Columbia. This period began in the late 1920s and continued until the late 1970s. The first of these people to leave records worthy of professional consideration was Harold Cundy (1938), a businessman and member of the Columbia River Archaeological Society, who made both black and white and watercolor sketches of imagery in the mid-reach of the Columbia River and surrounding areas. Cundy also took photographs of sites and produced a manuscript that was donated to the Washington State Historical Society but unfortunately was never published (Layman 1998). Cundy also produced a second unpublished volume that was more focused on his ethnographic explorations and work with Indian myths. Cundy’s work was state of the art for its time, and his drawings are still used today for some of the imagery that no longer survives.

For two decades spanning the period from the late 1940s to the early 1960s, to the north in British Columbia, John Corner (1968), the provincial apiarist, was amassing a record equal to Cundy’s. In that period, Corner recorded more than 100 sites in the interior of the province and published the results of his work in 1968. Corner’s book still remains a key source for British Columbia pictographs.

During this “avocational” period, rock art recording grew in popularity because of a combination of factors including a growing population involved in leisure-time activities (including various archaeological projects), increasingly popularized photographic technology, and the realization that industrialization of the Columbia River region was rapidly destroying much of the rock art resource. In the three decades between 1950 and 1980, there were more people doing more rock art recording in the Columbia Plateau than at any time before or since. Photography was often the preferred method of recording, though drawings of various sorts were still frequently produced, and many of the more deeply pecked petroglyphs were recorded with rubbings. The practice of “chalking” petroglyphs became popular to help images stand out and show up
better in photographs, but doing such chalking often resulted in incomplete recordings and sometimes damaged the images. One horribly misguided effort in the Hells Canyon painted over the actual native designs with whitewash for this purpose (Keyser 1992:104). The result usually obscures (and sometimes even completely masks) the actual prehistoric image and is often disastrous for the art itself. Many Hells Canyon sites remain badly damaged today, with pictographs only incompletely visible beneath this historic whitewash overlay.

In addition to Cundy and Corner, there were several equally important avocational recorders during this period. Susan Barrow did a major project prior to the filling of the Wanapum Reservoir which included a large set of tracings of the several sites at Vantage, Washington, while Arlie Ostling did another large set of tracings of the Whale Island petroglyphs. Others included Jeanne Hillis, Malcolm and Louise Loring, Greg Bettis and Faye Speciale, and Howard F. Hughes who worked along the lower Columbia River from Kennewick to The Dalles. Publications written by or about these people, and various online compilations, document their avocational fervor, and their work still forms the basis for much current professional research in the region (Cundy 1938; Corner 1968; Loring and Loring 1982; Woodward and Speciale 1982; Bettis 1986b, 1987; Keyser 1994; Hughes 2020).

More recently, several “albums” have been compiled to document photographic records of sites that were inundated by the dams built on the Columbia River. Probably the most complete of these are major compilations of the rock art at Whale Island and the Vantage sites (Layman 2013, 2015), which lay out the history of recording at those sites and pull together all the known imagery from them. Until the completion of these albums, neither of these two key site complexes had been well-documented in the published record.

An even more recent such album, with a slightly greater geographic coverage, and a more singular focus, is a two-volume compilation by Steven Hughes (2020), who chronicles the “lost” rock art of the lower Columbia River. His fascinating compilation includes more than 470 photographs taken by his father in the late 1950s to document at least 20 rock art sites that were being inundated by Columbia River dams at that time. Among his photographs are images that we have never seen before, including what appears to be a sculpture of a turtle—the largest Columbia River sculpture so far known.

Professional Rock Art Scholarship

Throughout the period of avocational interest, a few professional anthropologists—often conducting thesis research as graduate students—maintained professional involvement in Columbia Plateau rock art research. Some of these students were cultural anthropologists who interviewed members of several Tribes and obtained information about why rock art was made and used. These included, Walter Cline, who recorded and published pages of data about rock art from his interviews with Southern Okanagan people in 1938 (Cline et al. 1938) and Norman Lerman, whose interviews with other Okanagan people for his M.A. thesis published in 1952 recorded significant ethnographic information about the making and use of rock art (Lerman 1954). About this same time, Carling Malouf, a University of Montana anthropology professor, partnered with Thain White, a Montana avocationalist, to record pictograph sites in western Montana, but Malouf’s even more important contribution was the effort to document the beliefs and traditional knowledge of both Salish and Kootenai elders about the pictographs in the Flathead Lake region (Malouf and White 1952, 1953).

One major government-sponsored project was undertaken in the early 1950s to record rock art in The Dalles area of the lower Columbia River. That effort was to sketch and photograph as many of the petroglyphs and pictographs as possible in the area to be flooded by The Dalles Dam. The project was initiated by David Cole and Jack Hegrenes in 1953 as part of the River
Basin Survey sponsored by the National Park Service. Their publication, “Report on Petroglyphs of The Dalles Reservoir,” used freehand drawings and photography to record panels and to rank significant rock art for removal before the site was inundated (Cole and Hegrenes 1953). Shortly thereafter, Mark Hedden, an anthropology graduate student, made relatively detailed records of additional sites using freehand sketches, rubbings, and a few black and white photographs (Hedden 1956a). Unfortunately, the two monographs produced by these scholars have never been published, and their work is therefore neither widely known nor often cited.

However, other archaeology graduate students began to study particular sites or site complexes from the 1950s through the 1970s. These included H. Thomas Cain (1950), Paul Nesbitt (1968a, 1968b), Doris Lundy (1974, 1979), Rick McClure (1978, 1979a, 1979b, 1981, 1984), Keo Boreson (1976b, 1984; Boreson and Peterson 1985), and Larry Coburn (1975), who all wrote theses or dissertations focusing on complexes of rock art sites in various areas of the Columbia Plateau that provide a wealth of site information and imagery for current scholars. Of these students, only Boreson and McClure maintained an ongoing professional interest in the region's rock art by continuing to publish additional articles and summaries of recording projects. Additionally, Dan Leen, an independent professional rock art recorder working on various archaeological projects for the USDA-Forest Service, documented groups of sites from the Chief Joseph Reservoir on the upper Columbia River, the Hells Canyon area of the Snake River, and the Harney Basin, and assisted McClure on his work throughout the region (Leen 1984, 1988, 1991; Hann and Leen 2017).

Finally, two British Columbia studies deserve special mention. Baravalle did a rock art inventory of Kootenay Lake and published the results in 1981. This work added key new sites to the interior of the province. Then in the early 1990s, two anthropologists and a Native woman, Annie York, published a stunning study documenting Annie's traditional knowledge of pictographs in the Stein River valley of southwestern British Columbia (York et al. 1993).

Showing the continuing value of present-day ethnographic information, the work with Annie York laid a foundation for the 2004 symposium sponsored by the U.S. Forest Service and Oregon Archaeological Society (OAS) in which top world rock art researchers met and talked with tribal elders from the lower Columbia River region about the pictographs and petroglyphs of that area (Keyser et al. 2006). Both of these studies show that a wealth of information about rock art still exists in traditional Native communities.

Concurrent with the fluorescence of research in the late 1970s, James Keyser began studying the rock art of western Montana and published several articles on sites in that area before authoring an overview of Columbia Plateau rock art in 1992. Since then, he has been actively working with a research team from the Oregon Archaeological Society to record rock art in the lower Columbia River region. This research has produced a series of eight monographs published by the OAS (Keyser et al. 1998a, 2004, 2008, 2018; Keyser and Poetschat 1998; Keyser and Taylor 2002; Keyser, Poetschat, and Taylor 2006; Keyser 2010; Keyser, Kaiser, and Minick 2018) and a number of site-specific research articles (Keyser 1989, 1992a, 2018; Keyser and Whitley 2000a, 2000b; Keyser and Poetschat 2004; Poetschat and Keyser 2007; Minick and Keyser 2018). In addition, several members of the OAS research team have co-authored articles with Keyser (Poetschat et al. 2003; Taylor and Keyser 2003; Taylor et al. 2008) and David Kaiser, another team member, has published his own research regarding the region’s imagery (Kaiser 2010, 2016, 2017; Kaiser and Keyser 2010, 2018; Kaiser and Cleary 2020).

It was McClure and Leen, Boreson, and Keyser who began the direct tracing as the preferred method of recording rock art in the region in the late 1970s. These tracings on clear plastic sheets (and illustrations based on these) relatively quickly came to replace hand drawn or sketched images for most professional pub-
lications. Direct tracing continues to be used in more recent studies done by Keyser and his OAS research team and several other researchers. This is because the method is easily used to produce a copy of the image with maximum fidelity to the original. Likewise, it has the greatest flexibility for use in recording all types of rock art, from the most lightly scratched and abraded petroglyphs to deeply pecked images, bas-reliefs, and polychrome pictographs (Keyser et al. 2004, 2008; Keyser 2005:23).

More recently, however, with the advent of digital photography and use of the DStretch enhancement program, photographs have returned to prominence in Columbia Plateau rock art recording projects and publications (Figures 1–6). In fact, for sites containing primarily pictographs, recent projects have relied primarily on digital photography and enhancements (Minick and Keyser 2018; Keyser et al. 2019). Digital technology combined with DStretch enhancement capability promises to both speed up the recording of Columbia Plateau pictographs and improve the capability of scholars to capture many images that have been difficult to record until now.

Current Research Trends and Accomplishments

In addition to leading the national effort to integrate ethnographic and rock art research (e.g., York et al. 1993; Keyser and Whitley 2000a, 2000b; Cash Cash 2004; Hann and Bettles 2004; Keyser et al. 2004; David and Keyser 2008; Hann et al. 2010; David 2012a), Columbia Plateau scholars have made initial forays into other areas of research that currently occupy mainstream rock art scholarship in North America. Just previously mentioned is the use of DStretch enhancement for finding and recording many of the difficult-to-document pictographs that characterize much of the region. Dating efforts and studies of pigment composition have not been common on the Columbia Plateau. Possibly, the stylistic homogeneity across the area has rendered dating efforts less important than in other regions, especially when archaeological finds show that the basic Columbia Plateau imagery has existed for several thousand years (Copp 1980; Keyser 1992:18, 59–60). Conversely, determining what the prehistoric artists used for pigment and where they obtained it has a long history of research. Long before such practices would have been discouraged, Elrod (1908:6) reports that his party broke off a “few portions of the rock with the ‘writings’” at 24LA1026 and returned them to the University of Montana where a chemistry professor determined the pigment to be iron oxide. Much more recently, MacDonald et al. (2019) have shown that artists in the Babine Lake area of the far northern Columbia Plateau harvested “aquatic microbial iron mats” that were then homogenized and heat-treated to enhance their color to a vivid red hue.

Possibly also because of the basic homogeneity of most Columbia Plateau rock art, analysis of style tends to focus on documenting how intrusive stylistic entities have interacted with the basic Columbia Plateau tradition. On the southeastern margin of the region, Don Hann (Hann and Leen 2017) has spent considerable effort investigating how Great Basin and Columbia Plateau Styles interact in the Blue Mountains region. Along the lower Columbia River, there has been intensive effort to identify how the Columbia River Conventionalized Style interacts with both the Yakima Polychrome and Central Columbia Plateau Styles (Keyser et al. 2008, 2019), and as part of this, to better identify some of the key characters in the Columbia River Conventionalized Style (McClure 1979b; Kaiser 2017; Keyser et al. 2019:77–84). Likewise, work on the eastern margin of the region has begun to explicate how connections to the northern Plains introduced the Biographic art tradition into the region where it was integrated into several cultures and modified in various ways (Keyser et al. 1998a; Cash Cash 2004; Loendorf et al. 2015).

Landscape analysis of rock art has recently become fashionable in the Columbia Plateau
and has ranged from looking at the site or even the panel itself as an expression of landscape (Keyser and Poetschat 2004; Loubser 2006; Keyser 2016) to understanding the placement of an entire style within the landscape as viewed by the artists who created the imagery (Whitley et al. 2004; David 2005). Trying to understand why sites occur where they do on the landscape and how sites differ from one another in the same landscape has become a recent focus of interest (Hann 2013a, 2013b; Kaiser and Keyser 2018; Delgado-Morris 2019; Keyser et al. 2019). Finally, some of the most in-depth landscape-oriented rock art research is currently being undertaken by Robert David, a member of the Klamath-Modoc Tribe and recent graduate of the University of California at Berkeley, who is exploring Klamath Basin rock art through an emic view of the Klamath-Modoc landscape (David 2005, 2010, 2012b; David and Conkey 2021).

Finally, the conservation and preservation of the numerous rock art sites in the region has been a focal point of research by a few scholars for the last two decades. Early efforts by Barbara Kennedy (1979) reported graffiti removal at one British Columbia site and the reattachment of a nearly detached painted slab at another, but we know of no follow-up study to determine the success of these efforts. Similar restoration efforts were conducted on a Columbia River site near Hermiston, Oregon, in 2019 (Loubser and Damp 2020). In the late 1990s two major condition assessments—with accompanying management plans—one for an individual site and the other for a group of sites have been conducted by Dean (1996) and Loubser (1997a, 1997b). Finally, in 1999, Loubser (2011; Loubser et al. 2000) established a long-term monitoring plan to evaluate the effects of changing air quality conditions on a group of pictograph sites in the Columbia River Gorge National Scenic Area. That study is still ongoing.

Lastly, although not research per se, the removal and protection of rock art resources threatened with inundation by the many reservoirs on the Columbia River and its tributaries has a long history on the Columbia Plateau. Efforts at removal and eventual repatriation in consultation with appropriate Indian groups, in some cases, range from the Wallula Stone, which was removed from ceded tribal lands to the Portland City Hall in 1897 and returned to the Umatilla Indian Reservation a century later, to the Vantage Petroglyphs, and the Temani Pesh-wa petroglyphs interpretive exhibit at the Horsethief Lake unit of Columbia Hills State Park, both of which have rescued dozens of images from inundation by federal reservoirs. Another, less well-known example is the Crooked River petroglyph boulder, which was moved from the bank of the Crooked River to Cove Palisades State Park above Lake Billy Chinook Reservoir in northwestern Oregon.

Summary

Given this long and complex history of interest in the pictographs and petroglyphs of the Columbia Plateau region and a vibrant history of research that continues to this day, this bibliography, which updates and expands a previous list of resources compiled almost fifty years ago (Boreson 1976a), is an essential tool for both the professional scholar and the avocationalist. We have built our own research libraries over decades and yet we still use Leigh Marymor’s bibliography to find “out-of-the-mainstream” sources or to answer specific questions about particular citations. This work will find a place in the library of anyone interested in rock art of the Pacific Northwest.
IMAGES OF COLUMBIA PLATEAU ROCK ART.

Figure 1. Painted geometric image in the Central Columbia Plateau Style.

Figure 2. Yakima polychrome paintings consist primarily of red and white geometric images.

Figure 3. Cupules and simple geometric shapes are carved in pit and groove style petroglyphs.
IMAGES OF COLUMBIA PLATEAU ROCK ART. (cont.)

Figure 4 (top left). Incised starbursts in the Columbia Plateau Scratched Style.

Figure 5 (top right). Columbia Plateau Tradition art reaches as far as western Montana, as seen at the Kila site.

Figure 6 (bottom). Typical vision quest composition in the Central Columbia Plateau Style showing stick figure human under a rayed arc, paired with an animal. Colors enhanced with DStretch yre.
Columbia Plateau Culture Area
Rock Art Bibliography

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Aaron, Louise


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Keywords: Columbia Plateau, northwest United States. North America. Early description of regional rock art, “rude pictures of men and animals scratched on the rocks.” MNA.

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Aguilar, George W., Sr.

Ahl, W.W.
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Anonymous
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Anonymous

Anonymous

Anonymous

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Keywords: Columbia River, northwest United States. North America. Vikings.

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Keywords: Columbia River, northwest United States. North America. Early European carvings. Sun worship.

Anonymous
Keywords: Rock Creek, Oregon, Columbia River, Washington, northwest United States. North America. Works Progress Administration (WPA) Writers Pproject. Rose Leibbrand [Washington State University Library Digital Archive Resource Identifier sh143-97].
Abstract: “Indian pictographs found in Gorge. The above pictographs were found recently in Rock creek gorge and have been interpreted and reported by Rose Leibbrand, field worker for the historical records survey, a WPA writer’s project. The pictographs may possibly provide another link in the race migration story revealed in other Columbia valley pictographs and petroglyphs.” MNA.

Anonymous


Anonymous

Keywords: Columbia River, Portland, Oregon. Northwest United States. North America. Petroglyph boulder on display at city hall. Buddhist interpretations of symbols suggested. LMRAA (photo copy).

Anonymous

Keywords: Vantage, Washington. Columbia River. Northwest United States. North America. KBORE.

Anonymous

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Anonymous
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Keywords: Columbia River. Portland, Oregon. Niix-Ya-Wii-Veterans Memorial Park, Umatilla Indian Reservation, Oregon. Northwest United States. North America. Cultural resource management. Conservation and preservation. Repatriation. The “Wallula Stone,” a ten-ton petroglyph boulder, is returned by the City of Portland, where it has been on display behind City Hall since 1910, to the Confederated Tribes of the Umatilla. Removed from in situ. LMRAA.

Anonymous


Anonymous

Arment, Horace L.

Keywords: Roosevelt (45KL14), Arlington, Columbia River, Oregon, Washington, northwest United States. North America. MNA.
Keywords: Northwest of Brogan, Oregon, Columbia Plateau, northwest United States. North America. WELLM.

Arnett, Christopher Anderson
Keywords: TseTseQU/(EbRk-2), Stein River, British Columbia, Canada. North America. Nlaka’pamux rock painting site. RASNWV.

Keywords: Stein River, Lytton, British Columbia. North America. Rock art along the Columbia River, Washington, northwest United States, see pp. 372–376. Internet, OATD.

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Associated Press


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Keywords: Kootenay Lake, British Columbia, Canada. North America. CRARA.


Keywords: Kootenay Lake, British Columbia, Canada. North America. Biblio.


Keywords: Kootenay Lake, British Columbia Plateau. Canada. North America. Dating. CRARA.


Barbeau, Marius

Keywords: British Columbia, Canada. North America. “...[F]our 1926 interviews pertaining to pictographs, two with an old Kootenai man named Tartley, or Qalsahluhlat, one with (Daniel) Wildman, and one with George McLean or Tatangameme, a Stony,” per Mike Klassen, Rock Art Newsgroup Electronic Posting, 23 May 1996. Ethnography. Kutenai Indian. Vision quest. Consult spirits about the future. Red paint was a medicine with supernatural power. Painted pictures to make things happen (per David Whitley in Chapter 7: Art and Belief. *Seeing and Knowing* [Blundell et al. 2010]. Whitley cites publication date as 1960). *Biblio*.

Barker, James H.


Barrow, Susan


Beauchamp, Douglas

Keywords: Wallula Stone, on the Umatilla Indian Reservation; the Crooked River petroglyph, at Cove Palisades State Park; and the Agness boulders near the Rogue River, Oregon. Northwest. Columbia River Plateau. United States. North America. Petroglyph boulders removed from *in situ*. *LMRAA, ALL*.


Abstract: “In the early 1920s an Oregon newspaper announced discovery of ‘Picture Writings’ near Roosevelt, Washington, on the Columbia River. A popular 1921 volume, Oregon, provided drawings of petroglyphs from the site. In 1928–1929 The Oregon State Motor Association promoted it as destination for vacationers, via ferry from Arlington, Oregon. Thus began ‘Glyphland’ and nine decades speculation, promotion, displacement, and documentation. The John Day Dam project in the 1950s and 1960s sparked relocation of 27 of the riverside basalt boulders to a civic park near Roosevelt. After forty years and visits by thousands, neglect motivated a 2003 move under the auspices of the Army Corps of Engineers, in consultation with tribal and park representatives, to Horsethief State Park. In 2012 these 27 boulders, cleaned then moved again, joined other petroglyphs displaced by The Dalles Dam in the 1950s to become part of the Temani Pesh-wa Trail. Today this display, along with the nearby Tsagaglalal petroglyph, is a popular heritage attraction.” Academia.edu.

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Keywords: Horsethief Lake State Park (45KL58), Columbia River, Washington, northwest United States. North America. Yakama (Yakima) legend. The Window Rock. Tsagaglalal. MNA.

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Bell, J.F.


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1986 *The Place of the Teetering on a Pole: An Ajumawi Narrative Involving the Sun, Moon, the North Star and South Star.* Paper presented to Society for California Archaeology Rock Art Symposium. 15+ pp.

Keywords: Din-Hin-Na-Oose, The Place Of The Teetering Pole, Fall River Valley, Medicine Lake Highlands, Modoc County, United States. North America. This manuscript is accompanied by a letter from Arlene Benson to Evelyn Newman and Bob Mark. Achumawi ethnography. Archaeoastronomy. Charmstones. Cupule. Cairns. Jumping rocks. *RCSL (correspondence and photo copy).*

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Keywords: Willamette Falls, Sherar’s Bridge, Gentry’s Landing, Horsethief Lake, Columbia River, Washington, northwest United States. North America.


Keywords: Mid-Columbia River, Horsethief Lake State Park (45KL58), Wishram, Jones Canyon, Macks Canyon, Guano Creek, Thunderbird Lake, Jack Lake Rim, Long Lake, Oregon. Cape Horn, Petroglyph Canyon, Roosevelt (45KL14), Washington. United States. North America. Catalog of drawings of rock art elements. *RCSL, NADB #1298404.*

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Keywords: Columbia River, Washington, Northwest, United States, North America. Tsagaglalal. General public introduction to rock art. *LMRAA.*  

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1975a  *Rock Art of the Pacific Northwest.* Master's thesis, October, pp. 1–61, University of Idaho, Moscow, ID.  

Keywords: Coeur d'Alene, Idaho, Columbia Plateau, northwest United States. North America.  

Abstract: “This work is a study of rock art and its behavioral significance for anthropological study. Observations are made regarding the distribution of rock art in the Pacific Northwest, both generally and by type. Native American rock art interpretations, obtained from historic and ethnographic literature, are then compared and placed into the spatial and temporal framework of the Salishan expansion hypothesis. The paper originally appeared as a Master's thesis [Boreson 1975b] completed in September of 1975 at the University of Idaho. For additional information on rock art consult the thesis, which also has an appendix containing quotations from which the interpretive information was obtained.”  


COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY


Keywords: San Poil Indian Picture Trees (45FE8), Swawilla Pictographs (45FE300), Hell Gate Pictographs (45FE301), Omak Lake Pictographs (45OK384), Disautel Pictographs (45OK396), Piekin Pictographs (45OK411), Belvedere Pictograph (45OK707), No Name Pictographs (45OK708), Smith-Condon Pictographs (45OK709), Coyote Creek Pictograph (45OK710), Kartar #2 Pictographs (45OK711), Kartar #1 Pictographs (45OK712), Crusoe Spring Pictographs (45OK713), Hopkins Canyon Pictographs (45OK715), Parmenter Creek Pictographs (45OK779), Omak Mountain, McBeth, Coyote Creek, Omak Lake Road, Omak Lake. Okanogan and Ferry Counties, Washington. Columbia River. Northwest. United States. North America. *Biblio.*


Keywords: Columbia Plateau. United States. Rock feature incorporation: serrated edges. *Biblio.*


Keywords: Columbia Plateau, Washington, northwest United States. North America. Biblio.


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Keywords: Lake Pend Orielle, Bonner County, Northern Idaho, Columbia Plateau, northwest United States. North America. Bear paws. Biblio.

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Keywords: Columbia River, Vancouver, Washington, northwest United States. North America. Petroglyph damage.


Keywords: Columbia River, Vancouver, Washington, northwest United States. North America. Petroglyph damage.

**Brink, Jack W.**


Keywords: Zephyr Creek Site, Alberta, Canada. North America. Columbia Plateau cultural sphere. LMRAA, MNA.


Keywords: Writing-on-Stone, Stevens Rock, Crownsnest Cave, Table Butte, Pine Coulee, 25 Ranch, Zephyr Creek, Mystic Cave, Okotos Erratic, Grotto Mountain, Spray Canyon, Airdrie Erratic, King Buffalo Jump, Carstairs Coulee, Cline River, and Snake Indian (Devona) Cave, Alberta. Canada. North America. Columbia Plateau cultural sphere (at Zephyr Creek). CRARA, LMRAA, MNA.
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<th>Year</th>
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<td></td>
<td>Keywords: Zephyr Creek, Alberta, Canada. Columbia Plateau cultural sphere. <em>Refidoc.fr, RASNWV, MNA.</em></td>
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<td><strong>Caldwell, Warren W.</strong></td>
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<td>Keywords: Okanogan and Similkameen Valleys, British Columbia, Canada. North America. <em>WELLM.</em></td>
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<td><strong>Butler, B. Robert</strong></td>
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<td><strong>Camp, Al</strong></td>
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<td><strong>Carlisle, Kendra</strong></td>
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|      | Abstract: “Hunter-gatherers depend on naturally occurring resources and, in order to survive, must overcome resource procurement challenges inherent in their environment. One challenge relates to the temporal and spatial availability of resources, which hunter-gatherers address, in part, through the strategic use of space to position themselves for optimal access to necessary resources. This can be seen on the Columbia River Plateau in northwest North America where late Holocene hunter-
gatherers solved problems of resource acquisition associated with seasonality and geographic variability by utilizing a subsistence-settlement strategy known as the ‘winter village pattern.’ There is minimal archaeological research addressing local and sub-regional variations in the winter village pattern. This thesis explores how winter economic activities could have factored into the selection of late Holocene winter village locations in the lower Salmon River Canyon, Idaho. It provides a GIS modeling methodology applicable to further research and contributes to a greater understanding of the archaeological record of both the canyon and the Plateau. The winter village is viewed as a central location from which foraging activities could take place to supplement winter food stores. Models are developed in GIS, based on an analysis of game habitat in the environments surrounding winter village sites, showing various levels of hunting payoff expected under a central place foraging strategy. These models are used to evaluate the degree to which ancillary economic concerns played a role in positioning winter villages, assuming that locations were chosen to potentially minimize travel time to areas in the landscape with expected high densities of game. The models are also used to examine how the payoff-related movement of economically motivated hunters could be expected to differ according to variation in the structure and distribution of game habitat. Results of the analysis show that in portions of the canyon where the environmental structure creates spatial inconsistency in the type and distribution of game habitat, villages may have been positioned to facilitate easy access to areas in the landscape providing a relatively greater chance of hunting success. General predictions for hunter mobility strategies and the spatial distribution of hunting-related archaeological sites are made based on the models. The predictions generated by this GIS method are well suited for evaluation by future archaeological survey. The methodology employed in the analysis can be applied throughout the Columbia River Plateau to sites of varying ages in an examination of the economic aspects of the relationship between hunter-gatherer subsistence and settlement, and thus enhance archaeologists’ ability to reconstruct past lifeways.”

**Cash Cash, Phillip Minthorn**


Keywords: Columbia Plateau, northwest United States. North America. Ethnography


**Cassidy, Stephen C.**

Keywords: Cranbrook Petroglyph Site, Kootenay River, British Columbia, Canada. North America. AL@RLG.

Cassidy, Steve, and Jackie Cornford
Keywords: Site DiPw1, Columbia Plateau, Interior British Columbia, Canada. North America. Petroglyphs. MNA.

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1964a  Indian Rock Writing will be Moved. Chelan Valley Mirror, 20 April 72(25):9. Chelan, WA.

1964b  Petroglyphs at Wells are Largely Salvaged. Chelan Valley Mirror, 24 September, 73(46):8. Chelan, WA.

1964c  Indian Rock Writing will be Moved. Chelan Valley Mirror, 8 October, 72(48):1. Chelan, WA.

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Keywords: East Kootenay, British Columbia, Canada. North America. Incised figures and paintings found in two rock shelters. CRARA.

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Keywords: Washington. Oregon. Columbia River. Pacific Northwest. United States. North America. A collection of more than 100 tribal tales (myths, legends), including at least two which explain the origin of particular rock art sites. LMRAA.

Keywords: The Dalles, near the village of Wishram, Columbia River, Washington. Oregon. Pacific Northwest. United States. North America. Wishram Indian. A legend is given to explain the origin of an “eye” motif petroglyph. LMRAA.

Keywords: Naches River, Columbia Plateau, Washington. Oregon. Pacific Northwest. United States. North America. Yakama (Yakima) Indian. A legend is given that explains that pictographs were painted by Wahteetas, ancient little people. Guardian spirit. LMRAA.

Clark, Gerald J.

Keywords: Spokane, Washington, Pacific Northwest, Columbia Plateau, northwest United States. North America. History of research, Olaf Opsjon, Nordic runes, Norse (see p. 19). MNA.

Clark, L.


Claasen, Cheryl, editor


Cleghorn, John C.

Keywords: Petroglyph Point, Tule Lake, Klamath County, Modoc County, California, Oregon. United States. North America. Including plates, figures, and map. Modoc rock art. WELLM, LMRAA.

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Keywords: Okanagan, Washington, Columbia River, northwest United States. North America. Interior Salish ethnography. See pages 138, 143–145, per Loendorf 1994. Winter dance. Trance. Cure (medicine). “Only people with strong power painted pictures on rock. One did not do this until he had sung his power song at his first winter dance. When he painted these pictures, he had with him a friend who knew their meaning and who could later call upon him for aid from the pictures. The painter said to his friend, ‘I’m painting these here so that if you ever have any illness or get hurt you can call on me to help you.’ The painter’s companion told other members of the tribe that so-and-so had painted the pictures, which thus served as a kind of advertisement. Often both men made rock paintings at the same time. There was no formal obligation in such friendship, though the two shaman usually remained friends for life and told their trouble to one another. These pictures, in some vague way, assisted the painter to employ his power, especially to cure sickness, but the cure itself did not have to take place near the paintings.”
Coburn, Larry Winthrop  

Cole, David L.  


Cole, David, and Jack R. Hegrenes, Jr.  

Colley, A.G.  


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and removal of petroglyph boulders. Also commission of a salvage photo expedition prior to inundation. Moved from in situ. Bibliography.

**Confederated Umatilla Journal**


**Cornford, Jackie**


**Conway, Thor**


Keywords: The Dalles, Ozette, Washington, Columbia River, northwest United States, Tsagaglalal (She-Who-Watches).

**Copp, S.**


Keywords: Mccall Site (Dhqv-48), Okanagan Valley, British Columbia, Canada. North America. Interior Salish territory. A dated pictograph. Portable rock art. LMRAA. Bibliography.

**Corner, John**


Keywords: Interior of British Columbia (includes sites on Kootenay Lake, Upper Arrow Lake, Lower Arrow Lake, and Columbia Lake constituting the headwaters of the Columbia River), Western Canada. North America. Pictographs site inventory. LMRAA.

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Keywords: Balloon Site, Columbia River, Northwest, United States, North America.

**Crotty, Helen K.**


Keywords: Tule Lake, (Petroglyph Point, CA-MOD-1), Modoc County, Northeastern California. Lava Beds National Monument, United States, North America. Klamath. Modoc Style rock art. Regional overview. LMRAA (photo copy).
COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY


**Crouch, J. Carlisle**


Keywords: Fern Cave, Lava Beds National Monument, Modoc County, California. United States. North America. *DBNPS.*

**Cundy, Harold J.**


Keywords: North central Washington. Columbia River. Northwest United States. North America. Columbia Plateau culture area. “Bound manuscript volume documenting the painted and carved rock art located in north central Washington State; 209 pages and 49 plates, illustrated with original water color sketches and photographic prints (plates), based upon investigations made by Harold J. Cundy, during the period from autumn 1927 to the spring of 1938.” Indians Ms Box 3 ART 4B. *KBORE, Internet.*


**Curtin, Jeremiah**


Keywords: Klamath Lake, northeastern California. Southern Oregon. United States. North America. See pages 1–16 for Modoc cultural mythology. *LMRAA (photo copy), Internet.*

**Curtis, Edward S.**


**David, Robert James**


Keywords: Holding Hands Petroglyph Site, Modoc Plateau, Goodlow Mountains, Langell Valley, Lost River, Klamath County, Oregon. United States. North America. Modoc rock art. Shamanism. LMRAA.


Keywords: Klamath Basin, California, Oregon, northwest United States. North America. Landscape context. Internet, LMRAA.


Keywords: Sprague River Valley, Klamath Basin, Oregon, United States. North America. Modoc mythology. Owl myth. Internet, LMRAA.
COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY

Dawson, E.J.  
1929  *Petroglyphs on Tule Lake, Modoc County (File #273).* Berkeley: Archaeological Research Facility, University of California.  
Keywords: CA-MOD-1, Tule Lake, Modoc County, California. United States. North America. Sketches. *UCBARF, BSABSR.*

Dean, J. Claire  


Delgado-Morris, Jessica  

DeLeon, Mark  
Abstract: “On a small, lichen encrusted boulder in the middle reach of the Chewuch River is a pictograph panel displaying several motifs common to the Columbia Plateau. The angled boulder face, on which the pictographs occur, forms a meager shelter, at the base of which a test excavation recovered artifacts. These artifacts represent the only collection to date, albeit sparse, from a controlled excavation in the Chewuch drainage. The presence of the lichens (cryptograms, or what a Forest Service botanist winsomely calls the lower life forms) prompts questions about the utility of lichenometry to archaeology. Observations on the cultural material and lichenology are presented.” *MNA, Internet.*

Denison, James S.  
Keywords: United States. North America. Klamath informant related that pictographs were made by Indian doctors and inspired fear of the doctors’ supernatural powers. Shamanism (per David Whitley, quoting Dennison in Chapter 7: Art and Belief, *Seeing and Knowing,* Blundell et al. 2010). Ethnography. *Biblio.*

Keywords: Standing Rock, Klamath, Lake County, Oregon, United States. North America. Columbia Plateau cultural sphere.

Dewdney, Selwyn

Keywords: Alberta. Saskatchewan. Canada. North America. *BCSRA*.


Keywords: Alberta and Southern Saskatchewan, Canada. North America. 45 24 in. x 30 in. sheets of full size and scale reproductions, in water color, line drawing, and conté chalk. *BCSRA*.

Donner, Shirley

Keywords: Vernita, near Hanford Reach, Columbia River, central Washington, northwest United States. North America. Lines, dots, and “x” motif(s). Map interpretation. *Internet*.

Donovan, John


Dorn, Ronald L., and Carolynne Merrell


Downing, Alfred


Dreyfuss, Simeon


Duncan, Mary Ann
Keywords: Horsethief Lake (45K158 and 45K159), Columbia River, Washington. Northwest United States. North America. NADB #1330323.


**Dutton, Helen**


**Eidsness, J.P., Louise Johnson, and Ken Hay**


**Eidson, Rex**


Keywords: Petroglyph Canyon, just upstream from Wakemape Mound, The Dalles, Washington. Columbia River. Northwest United States. North America. Site description, petroglyphs now destroyed (inundation) by the construction of The Dalles dam. LMRAA, RANMAB.

**Eller, T., Robert Mierendorf, and S. Gough**


Elrod, Morton John

Keywords: Flathead Lake, Montana. Northwest United States. North America. Site description with map showing location. Columbia Plateau culture. *LMRAA (photo copy).*

Eng, Jordan

Keywords: Petroglyph Site DjRi-31 near Yale, Lower Fraser River Region, British Columbia, Canada. North America. Groove motif(s). *Internet.*

Erickson, R.


Evers, Dietrich
1993 Indian Petroglyphs of the Northwest. *Adoranten Arsskrift For*, pp. 36–44. Tanumshede; Scandinavian Society for Prehistoric Art. ISSN: 0349-8808.


Erwin, Richard P.

Keywords: Idaho (includes Columbia Plateau), northwest United States. North America. Broad discussion includes site map and numbered site inventory with photographs and descriptions. Interpretations draw heavily on “Indian sign language.” Photos frequently show chalking. *LMRAA.*

Featherson, Debra

Keywords: Chewack River (45 Ok 392), No Snake Creek (45 Ok 603), Black Canyon (45 Ok 34), Weeman Bridge (45 Ok 82), Okanogan County, Methow Valley, Washington. Columbia Plateau. Northwest United States. North America. Personal journal resulting from author’s participation in the Passport in Time, Field Survey by USDA Forest Service. Keo Boreson. Harold Cundy. Thomas Cain. Includes notes, newspaper clippings, and site report forms. *LMRAA.*

Fentress, Jeff

Keywords: Boles Creek, CA-MOD-74, Modoc National Forest, Northeastern California. United States. North America.
Site description. Arlene Benson's recording project. Lightning strikes. Magnetic anomalies. LMRAA.


Feyhl, Kenneth J.


Finley, James


Freeman, Paul

Keywords:
b. 06/1994 WA-YK 86: Cowiche Creek Pictographs, Naches River (Yakima Style), Washington.
e. 06/1994 WA-OK-418: Buckhorn Bend Pictograph Site (Black Canyon Creek and Methow River), Washington.
h. 09/1998 MT-Flathead Canyon: Kilo Pictographs, Ashley Creek Valley near Kalispell, Montana.

The Columbia River Basin, United States. North America. UCB.
CA-SIS-0002 (Gillem’s Bluff), CA-SIS-nkn (Hospital Rock), CA-MOD-0001 (Petroglyph Point), CA-MOD-0158 (Horse Mountain), CA-MOD-0075 (Boles Creek).

b. 7/1997 Ahjumawi Lava Springs State Park, including: CA-SHA-0661 (Big Bend Petroglyphs).
Siskiyou, Modoc, Shasta Counties, California. United States. North America. UCB.

Garrison, Philip

Gates, G.R.
Keywords: Modoc National Forest, California. United States. North America. Biblio.

Gatschet, Albert S.

Gavin, Mabel M.
Keywords: Okanogan, Washington, Columbia Plateau, northwest United States. North America. MNA.

Glinert, Jill Elaine

Goodfellow, G.G.
Keywords: Similkameen Valley, British Columbia, Canada. North America. Biblio.

Grant, Campbell


**Hainstock, R.L.**


Keywords: Nicola Lake, British Columbia, Canada. North America. Pictographs. Interior Salish. *LMRAA*.

**Hair, Calley**


**Hall, Inez**


Keywords: Gaston, Patton Valley, Oregon, Columbia Plateau, northwest United States.

**Hann, Don**


Hann, Don, and Gordon Bettles  

Keywords: Klamath Basin, Oregon. Ufie Hill, Tule Lake, House of the Rising Sun, northeastern California. United States. Ethnography. Sacred geography. Klamath/Modoc rock art. Concentric circle motif(s). A particular cave with scratched and incised petroglyphs is related to a mythic story collected by ethnographers in the late 1800s from Ko-a-lak’-a, a Modoc woman. LMRAA.

Hann, Don, James D. Keyser, and Phillip Minthorn Cash Cash  


Hann, Don, and Daniel Leen  

Harman, Jon  
Keywords: Big Painted Cave, Symbol Ridge, Juniper Cave, Gillem’s Bluff, Petroglyph Point (CA-MOD-1), Lava Beds National Monument. Horse Mountain. Boles Creek. Modoc County, California. United States. North America. Modoc rock art. Heart of the creator motif(s). LMRAA.

Harris, J.  
Keywords: South Central British Columbia, Canada. North America. Biblio.

Hauge, Muriel Jean  
Keywords: Washington, Columbia River, northwest United States. North America. Yakama (Yakima) rock art. See Prehistoric Art, pp. 24–30. MNA.
Hauser, Paul  
1957  Petroglyph at City Hall Suggests Buddhist Rites. *The Oregonian*, 22 March, LIII(1). Portland, OR.  

Hedden, Mark  
1956a  Descriptive Catalogue of Petroglyph Prints for the University of Washington from The Dalles Dam Reservoir. Unpublished manuscript, Burke Memorial Museum, University of Washington, Seattle.  


Keywords: The Dalles, Columbia River, Washington, northwest United States. North America. *Biblio*.


Keywords: The Dalles, Columbia River, Washington. Pacific Northwest. United States. North America. The Oregon Archaeological Society plans a publication of Hedden’s photographs and archival material relating to the pre-dam inundation of these petroglyph sites. The archival materials are on file at the Burke Museum, Seattle, Washington. *LMRAA*.

Heizer, Robert F.  
Keywords: California. Including Files: #15 CA-MOD-1 (Petroglyph Point, Modoc County); #27 California; #45 CA-SLO-79 Painted Rock (P-40-000079); #51 CA-MNT-86; #58 Modoc and Lassen Counties; #59 Naval Ordinance Station, Inyokern, Inyo County; #61 California; #114 CA-SBA-508; #132 California; #146 Northern California; #157 California;
#242 CA-PLA-26; #244 Central California and Western Nevada; #247 Rocky Hill, Tulare County; #250 Lagomarsino, Storey County, Nevada; #252 Fresno And Tulare Counties; #273 Tule Lake, Modoc County; #292 Fresno And Tulare Counties; #300 Brooks Island, Contra Costa County; #312 Mouse Tank Nv-Cl-145, Picnic Nv-Cl-146, and Atlatl Rock Nv-Cl-1, Nevada; #319 California; #345 Arizona and Nevada; #386 Kern County; #408 Modoc Lava Beds National Monument; #409 Inyo and Mono Counties; #411 California; #415 Chalfant, Swansea, Inyo County; #432 Colorado River. United States. North America. Catalog of research files containing notes, photographs, drawings, and manuscripts. Bibliography. Petroglyphs. Pictographs. Incised pebbles, portable rock art. Rain rocks. Modern Petrography (Western Message Petroglyphs). Rock feature. Intaglio (geoglyph), ground figure. LMRAA (photo copy).


Hinds, Norman E. A.
1952 Evolution of the California Landscape. 
State of California Division of Mines Bulletin, 
December, No. 158. San Francisco: State of 
California Division of Mines. 240 pp. 
Keywords: California. Sierra Nevada. 
Basin-Ranges. Mojave Desert. Colorado 
Klamath Mountain. Great Valley. Coast 
Ranges. Transverse Ranges. Peninsular 
Ranges. Sea floor. United States. North 
America. Geologic history. LMRAA, BSL.

Hines, Donald M.
1992 Ghost Voices: Yakima Indian Myths, Legends, 
Humor and Hunting Songs. Issaquah, 
WA: Great Eagle Publishing. ISBN-10: 
435 pp. 
Keywords: Columbia River, Washington. 
Yakama (Yakima) Indian. Medicine men 

1993 Magic in the Mountains: The Yakima 
Shaman: Power and Practice. Issaquah, 
WA: Great Eagle Publishing. ISBN-10: 
252 pp. 
Keywords: Columbia River, Washington. 
Yakama (Yakima) Indian. An Indian 
doctor [shaman] whose spirits painted the pictures on the rock, painted one of the rock art designs on the face of a woman who he was curing (see p.103, per David Whitley, INORA, 2000). Ethnology. Biblio.
Hinze, Hans-Peter


Hittell, Mrs. Theodore H.

Keywords: Donner Summit, fourteen miles south of Donner Lake, Headwaters of the North Fork of the American River, Sierra Nevada mountains, California. Walker River, Revielle, Nevada. The Dalles, Columbia River, Oregon (Washington), Zuni, New Mexico, Oakly Springs (Willow Springs, Tuba City), Arizona, United States. North America. [Internet].

Hollenbeck, Jan L., and Susan L. Carter

Keywords: Domke Falls pictograph site, Tumwater Petroglyph site, and Tumwater Canyon Pictographs (45CH224), Wenatchee National Forest, Washington, Columbia Plateau, northwest United States. North America. Inventory. Brief descriptions. *MNA*.

Hopson, E.G.
1920 High Writings on Lake Shore. *The Oregonian*, 20 November. Portland, OR.


Horner, John B.


1920 Ancient Races in Oregon had Many Styles of Worship. *The Oregonian*, 15 February. Portland, OR.

Keywords: Columbia River, Oregon, Washington, northwest United States. North America. Interpretation. Sun worship. *MNA*.

1923 Remarkable Inscriptions by Ancient Oregonians are among Attractions of Mighty Columbia River. *The Oregonian*, 1 April. Portland, OR.

Keywords: Columbia River, Cascadia Cave, Oregon, Roosevelt (45KL14), Washington, northwest United States. North America. Interpretation. Sun worship. Calendar stone. Lizard motif(s). *MNA*.


COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY


Howard, J.D., and C.A. Higgins

Keywords: CA-MOD-1 (Petroglyph Point), Tule Lake, Modoc County, California. United States. North America. Collection of various photographs, drawings and articles. *UCBARF, BSABSR*.

Hughes, Steven H.

Keywords: MP123 (between Cliffs and Towal), below John Day River 2 mi., John Day River confluence, John Day River 1 mi. upstream, MP133 - Isle 1 mi. below Rock Creek, Fountain Bar, Mp135.5 below Sundale, MP139, Roosevelt Site 45KL14, MP148, MP158 McCredie, The Dalles, Columbia River, Washington, John Day River, Oregon, northwest United States. North America. 477 photographs taken by amateur photographer, Howard F. Hughes (1903–1967) at 19 petroglyph and pictograph sites circa 1957. Digital photo archive from original 35mm Kodachrome film processed as slide transparencies. These sites are now largely inundated with some of the petroglyph boulders having been salvaged and moved from *in situ*. Accompanying maps with GPS coordinates of approximate locations are included.

Hyder, William D., and Georgia Lee

Istvanffy, Denes G.

Keywords: Painted Rock Sites (24LA5), west shore of Flathead Lake, Lake County, Montana. United States. North America. Ethnography: Baptiste Mathias, signatures of the spirits. Straight lines are signifiers of time. Malouf Style I. Columbia Plateau culture. LMRAA.

Jacobs, Jim


Johnson, Robyn L.

Keywords: Hells Canyon, Idaho, Oregon, and Washington, defined as the upper reach of the Lower Snake River between the confluence of the Power and the Salmon Rivers, northwest United States. Columbia Plateau. North America Style analysis. Internet, OATD.

Johnson, Tony A., and Adam McIssac

Keywords: Lower Columbia River, Washington, Oregon, northwest United States. North America. Chinookan art styles. Tsagaglalal (She-Who-Watches). MNA.

Jones, Tate, and Martin E. McAllister


Abstract: “This chapter addresses the use of 3D laser scanning to document unauthorized archaeological damage in lieu of conventional archaeological documentation methods. The first use of 3D laser scanning in archaeological damage assessment occurred in the Red Elk Rock Shelter case investigation. Due to the complexity of the site involved and the damage to it, conventional archaeological documentation methods would have been extremely time-consuming and expensive. As a result of this case, the basic benefits of 3D laser scanning to document archaeological damage became immediately apparent to the archaeologists involved. These benefits will be fully described in the following discussion of 3D laser scanning and in case studies of its use.” Google Scholar.
**Kaiser, David A.**


Keywords: Willamette Falls, Columbia Plateau, Oregon. North West United States. North America.


Keywords: Crawford Point, Miller Island, John Day Bar, Four O’clock Rapids, Blalock Rapids, and Vantage, Columbia River, Washington, northwest United States. North America. Cannibal Woman motif(s). Myth. Indian doctor. Shaman. **LMRAA.**

**Kaiser, David A., and Julia Cleary**

Keaveny, Shannon


Kelly, John W.

Keywords: Petroglyph Point, Klamath Basin. Southeast Oregon, northwest United States. North America. Columbia Plateau cultural sphere. MNA.

Kennedy, Barbara

Keywords: Monsell Site, Yellow Point Road (DgRx8). Petroglyph Park (DgRx6). Sproat Lake (DhSf1). Cyclops (DiRb23). Trees (DiRb2). Deer Corral (D9Ra7). British Columbia, Canada. North America. Cultural resource management. Conservation and preservation. LMRAA, RABNPV, Biblio.


**Kennedy, B., and S. Cassidy**


Keywords: Cranbrook, southeast British Columbia. North America. *Biblio*.

**Kennedy, B., and Doris Lundy**


Keywords: Sproat Lake, British Columbia, Canada. North America. Cultural resource management. Conservation and preservation. CRARA.

**Kennedy, Dorothy, and Randall Bouchard**


**Keyser, James D.**


Keywords: DesRosier Rockshelter, Montana. United States. North America. *Biblio, MNA*.


Keywords: Western Montana, United States. North America. Columbia Plateau culture. NADB #5191413. *Biblio*.


Keywords: The Dalles, Columbia River Gorge. Washington. Oregon. Northwest United States. North America. General introduction to the rock art of the region, illustrated with the photographs of Jeanne Hillis’ rubbings. The Hillis collection of rubbings is now held at Skamania Lodge. LMRAA.


Keywords: Dog Creek Cave (35D)266), Randy’s Rockshelter (35D)262), Little Bend Creek Rockshelter (35DO19), Medicine Creek Rock Shelter (35DO9), Cascade Mountains, western Oregon. Northwest. United States. North America. Study of four painted rock shelters. Ethnographic accounts. Biblio, LMRAA.


2007b A Newly Recognized Tsagaglalalal Figure from the Columbia River. *Screenings*, 56:34–35. Portland: Oregon Archaeological Society.

Keywords: Columbia River, Washington, North West United States. North America. Tsagaglalalal motif(s). Biblio.


Keywords: Columbia River, Washington, Northwest. United States. North America. Tsagaglalalal motif(s). *Biblio.*


Keywords: Pittsburg Landing, Hells Canyon, Snake River, Columbia River, Washington, northwest United States. North America. Petroglyphs on flood deposited basalt boulders. LMRAA.


Keywords: Vissotzky petroglyph site, western Montana. United States. North America. Columbia Plateau cultural sphere. MNA.

**Keyser, James D., and Phillip Minthorn Cash Cash**


**Keyser, James D., David A. Kaiser, and David L. Minick**


Keywords: Lower Columbia River, Harris Canyon, Spedis Creek (45KL81), Washington, northwest United States. North America. Survey. Documentation. Iconography. Interpretation. Regional styles comparison. LMRAA.

**Keyser, James D., and George C. Knight**


Keyser, James D., Carol Pedersen, Greg M. Bettis, George Poetschat, and Helen Hiczun

Keywords: Owl Cave, Washington, Columbia Plateau. Northwest. United States. North America. Human, handprint, animal, spirit figure, rayed circle, dot groups, tally mark, abstract, lines and line group, and blob motif(s). Scratched petroglyphs. Scalloped (faceted) edge petroglyphs. LMRAA.

Keyser, James D., and George Poetschat

Keywords: Butte Creek (35wh37 and 35wh38), Oregon, Columbia Plateau. Northwest. United States. North America. Columbia Plateau Tradition, North Oregon Rectilinear, Yakima Polychrome, Long Narrows (or Columbia River Conventionalized) and Biographic Art traditions (an influence from the Northern Plains) styles. Guardian spirit quest. Shaman's rituals. Curing or mortuary activities. LMRAA.


Keyser, James D., George Poetschat, Phillip Minthorn Cash Cash, Don Hann, Helen Hiczun, Roz Malin, Carol Pederson, Carol Poetschat, and Betty Tandberg


Keyser, James D., George R. Poetschat, Phillip Minthorn Cash Cash, Don Hann, Helen Hiczun, Roz Malin, Carol Pedersen, Cathy Poetschat, Betty Tandberg, with contributions by Frank Crosser, Paul Lawson, Pat Lyttle, Carolynne Merrell, Richard Reay, and Larry Summers
Keywords: Steiwer Ranch and Rattlesnake Shelter, Butte Creek, Oregon. Columbia Plateau. Northwest United States. North America. Human, handprint, animal, spirit figure, rayed arc, arc, rayed circle, circle, rake, ladder cross, tally mark, grid, abstract, thin red line, blob, stick figure human, shield bearing warrior, thin line stick figure, horsemen, projectile point, zigzag, barbell, curvilinear maze, dot and line figure, and dot motif(s). Setting: spatial arrangement. Vision quest. Shamanism. Mortuary art. Biographic Tradition. LMRAA.

Keyser, James D., George Poetschat, Helen Hiczun, Pat McCoy, and Betty Tandberg

Keywords: Fisher’s Landing (45CL6), Clark County, Washington, Lower Columbia River, Portland Basin, northwest United States. North America.

Keyser, James D., George Poetschat, and Michael W. Taylor, editors


Keyser, James D., George Poetschat, and Michael W. Taylor


Keyser, James D., and Michael W. Taylor

Keywords: Washington, Oregon, Columbia Plateau, northwest United States. North America. MNA.


Keyser, James D., Michael W. Taylor, and George R. Poetschat, editors


Keyser, James D., Michael W. Taylor, George Poetschat, and David A. Kaiser

Keywords: Celilo Falls, The Dalles (Wishram Road 45KL60, 45KL65, 45KL1194, 45KL1195, 45KL1196, 45KL1198, 45KL60, Celilo Bridge 45KL77, Shadow Cave 45KL77a, Eightmile Butte 45KL1197), Columbia River, Oregon, Washington. Columbia River Gorge. Northwest. United States. North America. Ten sites were recorded and reported here. Face, mask, handprint, mountain sheep, spirit figure, bird, lizard, spider, tally mark, Yakama (Yakima) star, geometric figure, circle, arc, line, dot, abstract, blob, smear, modified edge, wall painting (i.e., red wash) motif(s). Columbia Plateau Tradition. Yakima Polychrome Style. Central Columbia Plateau Style. Columbia Plateau Scratched Style. Northwest Coast Tradition. Columbia River Conventionalized Style. Vision quest. *LMRAA*.

Keyser, James D., and David S. Whitley


Keywords: Miller’s Island, Columbia River, Washington. Northwest. United States. North America. See "A New Ethnographic Reference..." by J.D. Keyser and D.S. Whitley, *International Newsletter on Rock Art*, 25:14-20. “In a recent summary of ethnographic references to Columbia Plateau rock art, the authors inadvertently used information from an Indian informant that was confidential. The informant would rather not have been quoted on this subject and he would rather not have had this information made public. Prior to publication the authors were unaware of his desires.
We apologize for any breach of trust.” Intellectual cultural property. Ethics. LMRRA.

Kiefer, Kathy


King, Larry


Abstract: “In 1992–1993, rock climbers in Central Oregon installed approximately 290 bolted climbing anchors in five lava tube cave entrances. Three of these caves are known archaeological sites containing prehistoric pictographs. In some cases climbing routes have been placed directly over Native American rock art panels. Efforts to preserve these pictographs have met with limited success due to sign vandalism, climber non-compliance, and an intensive lobbying effort to keep these caves open for climbing. The Bend/Fort Rock Ranger District is in the process of developing an environmental assessment and management plan for these sites.” LMRRA.

Kitsap Sun


Klug, Linda


Krieger, Herbert W.


Keywords: Roosevelt (45KL14), Columbia River Valley, Washington. Northwest United States. North America. Archaeological context. MNA.


Keywords: Columbia River Valley, Washington. Northwest United States. North America. RANMAB.


Keywords: Spearfish Indian Village, lower Columbia River, Washington. Northwest United States. North America. Elk motif pictograph. RANMAB.

Kruger, Darius


Abstract: "My name is Darius Dean Thunder Elk Kruger. I am a member of the Penticton Indian Band. My father is Richard Dean Kruger, also a member of the Penticton Indian Band. My grandmother is Anne Allison and is also a Penticton Indian Band Member; originally, however, she was from the Lower Similkameen. I am 11 years old and in grade 6 at Skaha Lake Middle School in Penticton. I have been volunteering and attending programs of the Upper Similkameen Indian Band Archaeology Department since I was three years old. If you think that is young, my friend Willy has been doing this since he was one."

MNA.

Large, Dr. R. Geddes

1952 Coastal Wanderings. Historical and Scientific Association Museum and Art Notes, April, 2(2):1–33. Vancouver, B.C.

Keywords: Spiller Channel, British Columbia, Canada. Also, Kitkiata or “Old Hartley Bay,” on Douglas Channel. North America. Petroglyphs typically found at the mouth of salmon streams. To mark fishing rights. LMRAA.

LaSarge, Diana R.


COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY


Layman, William D.


Keywords: Rock Island Rapids (45DO301), Mid-Columbia River, Washington. Northwest United States. North America.

Keywords: Central Washington. Columbia River. Northwest United States. North America. Pre-dam history. LMRAA.


Keywords: Priest Rapids (Chalwash Chilni), Sentinel Gap, Vantage, Picture Rocks Bay, Skookumchuck Canyon (Crescent Bar), Spanish Castle, Buffalo Cave (45KT63), Cabinet Rapids, Rock Island (45DO301), Azwell (45OK62), Columbia River, Washington. Northwest United States. North America. A historical account of the pre-dam history of the mid-Columbia River. Illustrated with historic photographs, many published for the first time here. Emphasis is on the river’s topography, Indigenous inhabitants—their sacred places, stories, and habitations—early explorers, and early navigation—especially steam boats. Innundated rock art sites are featured. Wanapum Indian. Colville Federation. Interior Salish. Sahaptin. LMRAA.

Keywords: Rock Island (45DO301), Priest Rapids, Columbia River, Central Washington. Northwest United States. North America. Pre-dam history. Wanapum Indian. LMRAA.

2013 The Petroglyphs of Chalwash Chilni: Sacred Island of the Columbia. Ephrata, WA: Grant County Public Utility District, No. 2.

Keywords: Chalwash Chilni (Whale Island), Priest Rapids, Mid-Columbia River, Washington, northwest United States. North America. Inundated petroglyphs. MNA.

Inundated Pictographs and Petroglyphs of Wanapum Reservoir, Columbia River: The Vantage Sites, 45KT38, 45KT39, 45KT40, 45KT41. Ephrata, WA: Grant County Public Utility District, No. 2.

Keywords: 45KT38, 45KT39, 45KT40, 45KT41, Vantage, Wanapum Reservoir, Mid-Columbia River, Washington, northwest United States. North America. Inundated petroglyphs. MNA.


Keywords: Priest Rapids Lake, Lake Wanapum, Columbia River, Washington, northwest United States. North America. Preinundation aerial photographs, Grant PUD. “Completed under contract with Grant County PUD. This supplement work to document, known data of 31 inundated rock image sites of Priest Rapids and Wanapum reservoirs. The supplement follows a series of aerial surveys done by the Department of Army in 1945 and 1946 from rivermile 401 to rivermile 431. The supplement includes site numbers, rivermile markers and distribution of types of rock images of each site. Oblique photographs taken by Grant County PUD and a series of color photographs taken by T.A. Weaver show river features prior to the creation of the two reservoirs. For permission to access this report, contract Wanapum Heritage Center Repository.” MNA.

Layton, Robert


Keywords: Keep River, Australia, Australasia. Stein River, British Columbia, Canada. Kanab Creek, Utah. United States. North America. Oceania. Ethnography. Culture is not monolithic. Each individual internalizes what he understands to be the values and meanings organized in their community, and expresses that understanding through their own actions, i.e., Habitus. LMRAA.


Leatherman, Kenneth E.


Keywords: Petroglyph Point (CA-MOD-1), Lava Beds National Monument, Modoc County, California, United States. North America. Archaeological context. Excavation. NADB #2000374.

Lee, Georgia


Keywords: Lava Beds National Monument, Klamath County, Modoc County, Northeastern California. Fern Cave. Petroglyph Point. United States. North America. Modoc. Northern Painted Style and petroglyph site described. LMRAA, RCSL.


Keywords: Lava Beds National Monument (Petroglyph Point, CA-MOD-1), Modoc County, northeast California. United States. North America. Research methodology. Drawing. LMRAA.
Lee, Georgia, and William D. Hyder

Keywords: Petroglyph Point (CA-MOD-1) and Fern Cave (CA-MOD-17), Tule Lake, Lava Beds National Monument, Modoc County, California. Klamath Basin. United States. North America. Modoc rock art. Relative chronology derived from study of climatic conditions which would have affected lake levels and cave wall saturations. *LMRAA, AATA*.

Lee, Georgia, Bill Hyder, and Arlene Benson

Keywords: Petroglyph Point (CA-MOD-1) and Fern Cave, Lava Beds National Monument, Modoc County, California. United States. North America. *Biblio, NADB #2000810*.

Leechman, Douglas

Keywords: Southeastern British Columbia, Canada. North America. *RANMAB*.

Leechman, Douglas, Margaret Hess, and Roy L. Fowler

Keywords: For Columbia Plateau cultural sphere, see Zephyr Creek. Also includes: Pine Coulee, Okotoks, Cayley, 25 Ranch, Oldman River, White Man Pass, Grotto Mountain, Calgary, Cochrane, Writing on Stone, Pendant d’Oreille, southwestern Alberta, Canada. *WELLM, CRARA, LMRAA, MNA*.

Leen, Daniel G.

Keywords: Site 45-D0-208, Site 45-D0-325, Site 45-D0-441 (Heffernan), Site 45-00-442 (Brandt Homestead), Site 45-OK-14 (south of Condon’s Ferry), Site 45-OK-17 (Rufus Woods Lake), Site 45-OK-170 (aka Deadman’s Eddy, 45-OK-74 and 45-OK-170), Site 45-OK-181 (vicinity of Condon’s Ferry), Site 45-OK-234 (northeast of the Rufus Woods Lake shoreline and just north of the Nespelem River), Site 45-OK-240 (Armstrong Canyon near Nespelem Bar), Site 45-CK-504 (Peter Dan Creek), Site 45-OK-505 (above Rufus Woods Lake), Chief Joseph Dam, Columbia River, Douglas, and Okanogan counties, Washington, northwest United States. North America. Archaeological survey. *MNA*.


**Leiberg, John B.**


Keywords: Pend d’Oreille, Idaho, United States. North America. Columbia Plateau Culture Area. WELLM, LMRAA (*photo copy of typescript*).

**Lennartz, Florence**


Keywords: The Dalles Reservoir, Columbia River, Oregon, Washington, northwest United States. North America. Documentation. Petroglyph rubbings. MNA.

**Leo, Maria Domenica**


**Lerman, Norman H.**

1954  *Okanagan (Salish) Ethnology.* Seattle: Melville Jacobs Collection, University of Washington Library Archive.

Keywords: British Columbia Plateau, British Columbia, Canada. North America. Okanagan. Ethnography. “[W]hen a person has a power he paints a picture (pictograph) of it.” “[P]ictographs were done by kids on their spirit quest, a painting represents a kid’s power” (per David Whitley, quoting Lerman, INORA, 2000, see pp. 99, 142, 191), and “A child who painted these [pictographs] could be depended upon to [become a] doctor [shaman]” (see p. 191). Biblio.

**Le Roy, Bruce**


Keywords: Central Washington. Columbia River. Northwest United States. North America. Call for support from Washington State Historical Society to finance the publication of Harold Cundy’s work located in the Washington State Archives. LMRAA, RCSL.

**Lewis, Randy (K’ayaxan), and William D. Layman**


Lloyd, Francis E.  
Keywords: Gaston, Oregon, Columbia Plateau, northwest United States. Tualatin (Atfalati) Indians. *KBORE*.

Loendorf, Lawrence L.  
Keywords: Finnegan Cave (24MA1146) along Cherry Creek on the Flying D Ranch, Montana, compared to Hell's Canyon, Snake River, Oregon, Idaho, Columbia Plateau, northwest United States. North America. Rock art elements here are similar to the Hell's Canyon Painted Style (Leen 1988). Vision quest. Interior Salish. Columbia Plateau culture. *LMRAA, Biblio*.

Loendorf, Lawrence, Mark Willis, Greg White, Laurie White, and Claire J. Dean  

Loring, J. Malcolm  

Loring, J. Malcolm, and Louise Loring  


Lothson, Gordon A.  
Lothson, Gordon A., and Bruce L. Lothson

Loubser, Johannes H.N.


Keywords: Lava Beds National Monument, Modoc County, California. United States. North America. Biblio, Bancroft.


Keywords: Watson Petroglyph Complex, southeast Oregon, Columbia Plateau, Great Basin, United States. North America.

ScienceDirect, TIB.

Loubser, Johannes H. N., and J. Damp


Loubser, Johannes H.N., James D. Keyser, and B. Yazzolina


Lucas, Georgean

Keywords: Columbia River, Washington and Oregon. Northwest United States. North America. Recording methodology. Author describes technique for making rubbings. LMRAA (photo copy), JHL.

Lundy, Doris Marion


Keywords: Gibbs Creek, Lillooet, Stein River, British Columbia, Canada. North America. Biblio.


Keywords: Fraser River, British Columbia, Canada. North America. Biblio.


Keywords: Atlin Lake, Charlie Lake, Carnbrook Area, Spahats Creek, Soda Creek, Chilcotin River, Lone Cabin Creek, Big Bar Creek, Yale Area, Stein River, Spuzzum Area, Moran Area, Gibbs Creek Area, Fraser River, Interior British Columbia, Canada. North America. Sixteen sites described. LMRAA.

Keywords: Columbia River, Washington and Oregon, northwest United States. North America. Northwest Coast art. Columbia River Conventionalized Style. *MNA*.

Lyman, William

Keywords: Lake Chelan (45CH66), Columbia River, Cascade Mountains, Washington, northwest United States. North America. Pictographs. *MNA*.

Lynch, Mike

Keywords: Rock Island Rapids (45DO301), Columbia River, Washington. Northwest United States. North America. Cultural resource management. Conservation and preservation. Author recounts the story of the inundation of the Columbia River at Rock Island Rapids, and the role played by the members of the Columbia River Archaeology Society in removing petroglyph boulders and photographing others soon to be drowned. Current locations of the salvaged petroglyph boulders and photographs are given, where known. Moved from *in situ*. *LMRAA (photo copy)*.

MacDonald, Bruce A.

Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. (Not) Ogam. *LMRAA*.

MacDonald, Brandi Lee, David Stalla, Xiaqing He, Farid Rahemtulla, David Emerson, Paul A. Dube, Matthew R. Maschmann, Catherine E. Klesner, and Tommi A. White


Mack, Cheryl, and Larry King

Keywords: Goose Lake, Gifford Pinchot Forest, Washington, Columbia Plateau. United States, North America. *LMRAA*.

Mader, Erna, and Don Rose


Malouf, Carling I.

Keywords: 24LA3 and 24LA4, Near Dayton, Flathead Lake Region, Montana.

Abstract: “Red pictographs contained animal and human type figures.”


Keywords: Montana. United States. North America. Columbia Plateau cultural sphere. Distribution, type, age, and possible uses. *NMLAB/P 2542, RANMAB, NADB #925233 and #5190437, Biblio, MNA*.

**Malouf, Carling I., and Thain White**


**Maniery, James Gary, Jerald J. Johnson, and Dorothea J. Theodoratus**


Keywords: (Petroglyph Point, CA-MOD-1), Tule Lake, Lava Beds National Monument, Modoc County, California. United States. North America. Archaeological overview written to accompany the assessment of the monument for inclusion in the National Register for Historic Places. *NADB #1045514, LMRAA (photo copy)*.

**Marantos, Jeanette**


**Mark, Robert, and Evelyn Billo**


Keywords: Weitchpec, CA-HUM-173, Humboldt County, Klamath River, California. United States. North America. Quadruped motif(s). *LMRAA*.

**Marymor, Leigh**


COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY

Masten, Ruth, Glenn Hartmann, and Jean P. Yearby

Keywords: Alberton Pictograph, Alberton, Missoula County, western Montana. United States. North America. Columbia Plateau culture. LoC.

Mattila, Walter

Keywords: The Dalles, Columbia River, Washington. Northwest. United States. North America. Describes the use of heavy equipment (crane, bulldozer, barge) to remove petroglyph boulders from The Dalles prior to inundation by the rising dam waters. Biblio.

Mattson, Dan
1988 Vandalized Rock Art Sites Visited by Members. Spilyay Tymoo [Coyote News], 23 September:3. Warm Springs, OR.

Keywords: Shearar’s Bridge, Columbia Plateau, United States. North America. Vandalism.

McAllister, Martin E.

McLary, Tom


McClellan, George Brinton

Keywords: Painted Rock, Columbia River, Washington, northwest United States. North America. See Image no. 23.

McClure, Richard H., Jr.


Keywords: Columbia Plateau. United States. North America. Anthropomorph motif(s). Biblio.


Keywords: Mid-Columbia River, Wenatchee, Washington, northwest United States. North America. Twins motif(s). LMRAA.


M’Gonigle, Michael, and Wendy Wickwire


McKelvie, B.A.
1940 Characters Found on Rock may Prove Earliest Runic. Vancouver Province, 31 August:11.

Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. Runic. Biblio.
McWhorter, L.V.


1908a  Was Not Work of Vandalism. *The Yakima Herald*, 9 October. Yakima, WA.


1908c  *Natural Sized “Pictographs” Naches Gap Tracings Done Summer 1908. Intended to be Done in Colors, as Indicated on Tracings, Now Dimmed by Age (August 5, ’37)*. L.V. McWhorter Papers, Item #306. Pullman: Washington State University Library Archives.


Keywords: Selah (45YK47), Yakima County, Columbia River. Washington, northwest United States. North America. Photographs. *KBORE*.

Merrell, Carolynne L.


Keywords: Site 10LE75, Idaho Plateau, Columbia Plateau, northwest United States. North America. Pictographs. Documentation. Digital enhancement. Abstract: “Kittle Rockshelter was registered on 9 September 1993 as Smithsonian number 10-E-75. This rockshelter contains at least seventeen previously unrecorded pictographs. The motifs display anthropomorphs and zoomorphs including buffalo. Other surfaces are too obscure to identify without detailed research other than to note pigment application. Several pictographs are located on columnar basalt projections from the ceiling. Many are loose and are expected to drop to the shelter floor as the natural deterioration of the shelter continues. In presenting these motifs, the effect of digital enhancement techniques is demonstrated and comparisons are made with pictographs from elsewhere on the Columbia Plateau.” *MNA, Internet*.


Petroglyph panels predominate, but two pictograph panels occur here. Great Basin, Interior Plateau, Great Plains, and Lower Columbia River influences are all found at this site. LMRAA.

**Meyers, Donald W.**


**Micnhimer, D. Russel, and LeeAnn Johnston**


**Miles, Don**


Keywords: Kettle Falls, Columbia River, Washington. Northwest. United States. North America. KBORE.


**Miller, Jay**


**Minick, David L., and James D. Keyser**

Keywords: Spedis Creek (45KL81), The Dalles, Columbia Hills State Park, Columbia River, Washington and Harris Canyon (35SH274), Deschutes, Oregon, northwest United States. North America. Documentation. Digital photo enhancement. DStretch. Yakima Polychrome Style. Columbia. LMRAA.

**Mitchell, Suzanne**


Keywords: Stuart Lake/Nak'al Bun, British Columbia, Canada. North America. Social landscape. *Internet, RASNW4*.


Keywords: Stuart Lake or Nak'al Bun, British Columbia, Canada. North America. Fifteen sites located on water's edge, all accessible by water craft. Contemporary ethnographic accounts. *LMRAA, ALL*.


**Mohs, Gordon**


Keywords: South Thompson River Valley, British Columbia, Canada. North America. Five brief site descriptions. *LMRAA, CRARA*.

**Moncure, Peyton**


**Montgomery, Marcia**

2012 Research Summary Regarding the Establishment of the Petroglyph Monument at Priest Rapids. Manuscript on file. Grant County Public Utilities District.


**Moore, T.A., editor**


Keywords: Writing-on-Stone, Stevens Rock, Crownsnest Cave, Table Butte, Pine Coulee,

**Morice, A.G.**
1893 *Notes, Archaeological, Industrial, and Sociological on the Western Denes. Transactions of the Canadian Institute*, 4:1–222.


**Muench, David, and Polly Schaafsma**


**Muldoon, Katy**


**Nankivell, Simon, and David Wyse**

Keywords: Columbia Plateau. British Columbia, Canada. North America. Tour guide. Cultural resource management. Conservation and preservation. This mass market trade paperback is an example of a publication which promotes public visitation to rock art sites on First Nation, public, and private lands, without regard to the existence of management strategies in place to protect the sites. Brief sections on interpretation, shamanism and an “icon dictionary” are all poorly constructed. *LMRAA.*

**National Park Service**


Keywords: Symbol Bridge (CA-SIS-1/3), Antelope Well (CA-SIS-20/21), Big and Little Painted Caves (CA-SIS-22/23/24), Bearpaw Cave (CA-SIS-29/30/H), Captain Jack's Cave (CA-SIS-146/H), Juniper Cave (CA-SIS-1479, Ship Cavern and Symbol Cave/Copper Rock Cavern), Lava Beds National Monument, Modoc County, Siskiyou County, California. United States. North America. Contract specifications issued by the National Park Service designed to seek professional services to complete the documentation of eight rock art sites within the monument (see Loubser 1998). Includes archaeological site records for the eight sites. All of these caves had been recorded previously by Eidsness (1989, 1990). *LMRAA (photo copy).*

**Nesbitt, J.K.**
Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. Biblio.

Nesbitt, Paul Edward


Newman, Sandra

Newman, Thomas M.
Keywords: Cascadia Cave, western Cascade Range, northwest Oregon, northwest United States. North America. Columbia Plateau cultural sphere. Mollala. Archaeological context. MNA, NADB.

New York Times

Nicholas, M. Leona
1927 Legends and Stories of Religion Woven by Indians Somewhat Similar to those Born in Greece and Rome. The Oregonian, p.19. Portland, OR.
Keywords: Columbia Plateau, northwest United States. North America. Stone carvings. Rock art. Vision quest. MNA.

Nissen, Karen M., and Eric W. Ritter

Nordquist, Del
Keywords: The Dalles Dam, Columbia River, Washington, northwest United States. North America. Tsagaglalal (She-Who-Watches). MNA.


Keywords: Roosevelt (45KL14), Washington. Northwest. Columbia River. Some petroglyph boulders have been removed from the encroaching waters of John Day Dam, to a park one mile east of Roosevelt on HWY 8. United States. North America. Includes illustrated petroglyph element catalog. Quadrupeds, human forms, reptiles, birds, insects, animal paws, ovals, circles, rectangles, triangles, zig-zags, wavy lines superiorly spurred arcs, lines, and dot cluster motif(s). LMRAA, KBORE, NADB #1331755.

**Okanagon County Historical Society**

1968 Cover Photograph. *Heritage*, June, 6(3):Cover. Okanagon County Historical Society, WA.


**Omak Chronicle**

1964a Near Wells Dam. Indian Paintings will be Preserved. *Omak Chronicle*, 7 May, 54(47):3.


1964b Petroglyphs at Wells are Largely Salvaged. *Omak Chronicle*, 4 June, 57(43):3.

Keywords: Azwell (45OK62), near Wells Dam, Columbia River, Washington, northwest United States. North America. Cultural resource management. Conservation

**Opsjon, Oluf**


**The Oregonian**


**Oregon Museum of Science and Industry**


**Orne, Stanley**


**Osbourne, Douglas**


**Ostling, Arlie G.**


**Pardee, Loe**


**Patterson, Carol**


**Patterson-Rudolph, Carol**


**Pearkes, Eileen Delehanty**


**Peterson, Ernest**


**Pickering, Charles**


Keywords: Columbia River, northwest. United States. North America. Wilkes Expedition. Early recorded rock art images (pp. 41–42). *MNA.*
Poetschat, George, and James D. Keyser


Abstract: “The Northwest Coast culture area has a rich tradition of mobile or mobiliary art, including stone sculpture, which has yet to be broadly compared to the equally widespread regional rock art tradition. Three case studies where we compare rock art images to mobile art show the value of this approach. These include Tsagaglalal, a Protohistoric death cult guardian spirit figure; the Woodworm and Raven images in Alaska’s Pictograph Cave; and the Beaver Bowl, a bas-relief petroglyph carved in the Portland Basin section of the lower Columbia River. Comparison of these pictographs and petroglyphs to mobile pieces opens up new understandings of these ancient images, and illustrates a new line of enquiry for rock art scholars in many other areas of the continent.” *MNA, Biblio.*

Poetschat, George, James D. Keyser, Betty Tandberg, Helen Hiczun, and Pat McCoy


Powell, Todd W.


Powers, Alfred

Keywords: The Dalles, Columbia River, Washington, Oregon, Pacific Northwest. United States. North America. Wishram. *MNA.*
Rader, Chris


Rau, Charles


Relander, Click

Keywords: Priest Rapids, Vantage, Washington, Columbia River, northwest United States. North America. Wanapum. Sacred Island. Little people made petroglyphs. MNA.

Ranck, Glenn

Keywords: Columbia Plateau, Oregon. Northwest United States. North America. Wishram Indian. Medicine man (shaman) used unseen power to paint a pictograph during the night and was found the next morning at the rock art site, deep in trance. Ethnography (per David Whitley, *INORA*, 2000). Biblio.

Rice, David G.

COLUMBIA PLATEAU CULTURE AREA ROCK ART BIBLIOGRAPHY

**Rice, Harvey S., J.A. Ross, and R. H. McClure, Jr.**


**Richards, T.H.**


**Richards, Terry**


**Richards, Leverett G.**


1953 American Indian Highway Marked by Road Signs. *The Sunday Oregonian*, 29 March. Portland, OR.


**Rubin, Rick**


**Ritter, Eric W.**

Keywords: Site 35kl1901, Keno Petroglyphs, Klamath River Canyon, South East Oregon. United States. North America. Paper explores the cultural boundaries and interaction spheres between the Klamath,

Ritter, Eric W., Jon Harman, Jennifer Rovapaera, Devin Snyder, Elisa Correa, and Sheila Harman

Keywords: CA-MOD-19, BLM site #40.14.30.01, CA-MOD-4738, CA-MOD-161, Devil's Garden, Likely Tablelands, Volcanic Tablelands, Modoc Plateau, northeastern California, United States. North America. The study documents co-occurrence of petroglyphs and pictographs. LMRAA.

Ritzville Journal Times


Abstract: “Hieroglyphics and rock carvings which indicate that there may have been life in Adams county thousands of years ago were discovered on the Harry Harder ranch near Macall last week, Harder reported this week.” *MNA, Internet.

Root, Gordon

Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. *Biblio.*

Rudolph, Carol

Keywords: Mid-Columbia River, Washington, northwest United States. North America. Partial transcript given from, “A Forum on Rock Art, Whose Property, Whose Culture?” Ethics of commercial and reproduction of rock art images. LMRAA.

Schaafsma, Polly


Schumacher, Paul J.F.

Scott, Shane J.


Seaman, N.G.

Keywords: Columbia River, Washington, Oregon, northwest United States. North America. Spearfish, water devil motif(s). Tsagaglalal (She-Who-Watches). Classification. MNA.


Silver, Constance S.


Simonsen, Bjorn

Keywords: Cranbrook Petroglyph Site, Weldwood Petroglyph Site (Gabriola Island), Petroglyph Park (Nanaimo), British Columbia, Canada. North America. Cultural resource management by the Heritage Conservation Branch, British Columbia. LMRAA.
Smith, Harlan I.


Solland, Sonja O.

Keywords: Horsethief Lake State Park (45KL58), Columbia River, Washington. Northwest. United States. North America. Tsiggalalal motif(s). Cultural resource management. Conservation and preservation. Environmental report initiated by the proposal to install a visitor trail to the petroglyphs, and projected impacts of increasing visitation. LMRAA.

Spier, Leslie

Keywords: Klamath Basin, California. United States. North America. Klamath Indians refer to rock art as shaman's paraphernalia. Sites are maintained by shamans and repainted by shamans' assistants, see p. 142 (per David Whitley, quoting Spier, in Chapter 7: Art and Belief, *Seeing and Knowing*, Blundell et al. 2010). Ethnography. Biblio.

Spilyay Tymoo


Spokane Daily Chronicle


Keywords: Columbia River, Washington, northwest United States. North America. MNA.


Keywords: Little Spokane River (45SP31), Columbia Plateau, Washington, northwest United States. North America. MNA.

1916 Northwest Indian Hieroglyphs Mean Nothing, Asserts Expert. Ethnologist Calls Signs Along Columbia and on Colville 'Idle Markings'. Spokane Daily Chronicle, 30 May, 30(241):2. Spokane, WA.

Keywords: Columbia River, Colville, Washington, northwest United States. North America. MNA.


Keywords: Spokane area, Columbia Plateau, Washington, northwest United States. North America. MNA.


Keywords: Spokane area, Columbia Plateau, Washington, northwest United States. North America. MNA.


Keywords: Spokane area (45SP34), Columbia Plateau, Washington, northwest United States. North America. German ancestors. MNA.

Keywords: A.S. White Home, near Spokane, Columbia Plateau, Washington, northwest United States. North America. Red pigment. MNA.


Keywords: Spokane area (45SP34), Columbia Plateau, Washington, northwest United States. North America. Runic carvings. Olaf Opsjon. MNA.


Keywords: Spokane (45SP34), Columbia Plateau, Washington, northwest United States. North America. Scandinavian (Viking). Runic. MNA.

Spokesman-Review


Keywords: Columbia Plateau, Washington, northwest United States. North America. MNA.


Keywords: Cowiche Creek (45YK86), Naches River area, Yakima River Basin, Columbia Plateau, Washington, northwest United States. North America. MNA.


Keywords: Cowiche Creek (45YK86), Naches River area, Yakima River Basin, Columbia Plateau, Washington, northwest United States. North America. Cultural resource management. Conservation and preservation. MNA.


Keywords: Little Spokane River (45SP31), Washington, Columbia Plateau, northwest United States. North America. MNA.


Sprague, Roderick


Abstract: “The basic criterion for inclusion in this bibliography has been largely a negative one; was there any serious objection to including it? Anything pertaining to the State of Washington in the following areas of study was included: archaeology, archeology, early man,
historical archaeology, dates and dating techniques as applied to archaeological sites and materials, identification of zoological and botanical remains from archaeological sites, osteology, craniometry, anthropometry, pictographs, petroglyphs, rock art, archaeological museums and collections, private museums and collections, amateurs and their work, pothunters and pothunting, relic collectors, vandals, reports of pending research or excavations, news of archaeological societies, formal papers presented at meetings, manuscripts, reviews of any of the above, and anything else that has become available. Reports of archaeologists residing in Washington but not working within Washington archaeology have not been included.”


Squier, R.J., and G.L. Grosscup

Spinden, H.T.
Keywords: Columbia Plateau, Washington, northwest United States. North America. Nez Perce vision quest. Ethnography. Girls made rock paintings during vision quests to portray objects seen in their dreams or connected with their ceremonies (per David Whitley in Chapter 7: Art and Belief, Seeing and Knowing, Blundell et al. 2010). RABNPV, Biblio.

Splawn, Andrew Jack

State of Washington
Keywords: Columbia River, Washington. United States. North America. Tourist pamphlet. Includes illustrations, and probably text, by Harold Cundy. LMRAA.

Steinbring, Jack

Stinsman, E. Stanley

**Straley, Wilson, and Albert S. Hotze**


Keywords: Vantage, Washington, Columbia River, northwest United States. North America. *WELLM, KBORE, LMRAA.*

**Strange, William C.**


Keywords: Cowitchie Creek (aka Cowitche Creek, 45YK86), Yakima, Columbia River, Washington, northwest United States. North America. Interpretation. Ideology. Myth. “How the Indians got their mouths.” *LMRAA.*


Keywords: Naramata and Chute Lakes Road, central British Columbia, Canada. North America. Ethnocentricity. Research methodology. *LMRAA.*

**Strong, Emory**


1959 *Stone Age on the Columbia.* Portland, OR: Binford and Mort.

Keywords: Oregon, Washington, Columbia River, northwest United States. North America. Rock art (see pp. 103–113). Stone carvings. *MNA.*

**Strong, William Duncan**


Keywords: Columbia River, Washington, northwest United States. North America. Ghost cult. *WELLM.*


Keywords: Petroglyph Canyon, The Dalles, Columbia River. Washington. Oregon. Northwest. United States. North America. First report of this site in the literature. Anthropomorphs, bighorn sheep, elk, deer, horse, wolf, coyote, water animals, geometric, motif(s). One bison pictograph. An affinity with Great Basin styles is noted and are attributed
here to the Snake (Shoshoni) Indians. 

LMRAA (photo copy).

**Strong, William Duncan, W. Egbert Schneck, and Julian H. Steward**


Keywords: Klamath Basin, Northeastern California and Southeastern Oregon. United States. North America. Regional survey with site inventory. LMRAA, RCSL.

**Supernant, Kisha**


Keywords: Lower Fraser River Region, British Columbia, Canada. North America. Rock feature: Petroforms. Internet.

**Swanson, Earl H., Jr.**


Keywords: Methow River Valley (45OK34 and 45OK47), Columbia Plateau, north central Washington, northwest United States. North America. Survey. MNA.

**Swartz, B.K., Jr.**


**Taylor, Michael W.**


Keywords: The Dalles Dam, Columbia Hills State Park, Washington, Columbia River, northwest United States. North America. Conservation and preservation. MNA.

Taylor, Michael W., and James D. Keyser


Taylor, Michael W., James D. Keyser, and Phillip Minthorn Cash Cash


Tazioli, Terry


Teit, James A.


Keywords: Thompson River, British Columbia, Canada. North America. Cupules (see p. 320), adolescent boys who “…made round holes in rocks in boulders with a jadeite adze, which was held in the hand. Every night he worked at these until the holes were two or..."
three inches deep…. This was believed to make the arm tireless and the hand dextrous in making stone implements of any kind. Ethnography. LMRAA.


Keywords: Okanagan Valley, British Columbia, Canada. North America. Rock art created on vision quests by both genders. Pictographs. Dendroglyphs. MNA.


**Thompson, Thomas Lyn**


**Travis, Helga Anderson**


Keywords: Upper Columbia River, Washington, northwest United States. North America. Petroglyphs. MNA.

**Turnbull, Elise G.**


Keywords: Similkameen River, British Columbia, Canada. Northwest. North America. CRARA.
U.S. Army Corps of Engineers, Walla Walla District


U.S. Department of Interior, Bureau of Land Management

Keywords: Yuha geoglyphs, Palo Verde petroglyphs, Corn Springs petroglyphs, Mule Canyon geoglyphs, Mule Tank petroglyphs, Blythe geoglyphs, Surprise Tanks petroglyphs, Black Canyon petroglyphs, Red Mountain petroglyphs, Steam Wells petroglyphs, Poison Canyon petroglyph boulders, Canebrake pictographs, Slippery Rock petroglyphs, Painted Rock pictographs, Fossil Falls petroglyphs, Ayers Rock pictographs, Fish Slough petroglyphs, Chidago Petroglyphs, Red Canyon petroglyphs, Chalfant petroglyphs (north of Bishop, Owens Valley), Belfast petroglyphs, Upper Smoke Creek petroglyphs, Rock Creek petroglyphs, Petroglyph Point (Lava Beds National Monument, Modoc County), California. United States. North America. Epigraphy. (Not) Ogam (Ogham). Biblio.

Vancouver Columbian
1956 Ancient Indian Drawings to be Salvaged at The Dalles. Vancouver Columbian, 19 July. 47(197):2. Vancouver, B.C.


Vancouver Province
1946 Rock Markings above Spuzzum are not Ogham. Vancouver Province, 6 November:2.

Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. (Not) Ogam (Ogham). Biblio.

Victoria Times

Keywords: DKRi6, Fraser River, Spuzzum, British Columbia, Canada. North America. Epigraphy. Runic. Biblio.

von Werlhof, J.C.

Keywords: Petroglyph Point (CA-MOD-1), Modoc Lava Beds National Monument, Modoc County, California. United States. North America. Scale drawings. UCBARF, BSABSR.
Vuncannon, Delcie H.


Walker, Merle F.

Keywords: Juniper Cave, Lava Beds National Monument, Modoc County, California. United States. North America. Archaeoastronomy. Solstice. *ALOD, Biblio*.

Wellmann, Klaus F.


Werner, Roger H., Jay Flaherty, John W. Dougherty, and Mark A. Byars


Whitley, David S.


Keywords: Coso Range, Ridgecrest, California. Great Basin. Columbia Plateau. United States. North America. Setting: landscape contexts. Rock art sites as sacred places in the landscape, as portals into the sacred realm, rock art placed in relation to rock surface features. Gender symbolism of the landscape (mountaintops are masculine, low places feminine. Mountaintops tend to be devoid of rock art because the art was generally placed by males in “female” gendered landscapes). Rain making. Shamanism. Ethnography. Puberty ritual. Bighorn sheep motif(s). Indigenous logic of symbolic inversions. Coso rock art. *LMRAA*.


Keywords: Southern Sierra Mountains, western California and Coso Range, Mojave Desert, eastern California. Columbia Plateau, Washington, Oregon (Far West). United States. North America. Cultural continuity. Shamanism. Ethnography from especially the Columbia River Plateau and the Southern Sierra Mountains. Argues that bighorn sheep and entoptic (abstract) designs indicate a long period of cultural stasis, while hunters with bows and pattern body anthropomorphs point to cultural change in the last 2,000 years. Argues that unique patterns in “pattern bodied anthropomorph motifs” were the result of individual identifiers—each motif authored by, or indicating, an individual shaman. Coso rock art. *LMRAA, Biblio*.


**Whitley, David S., and Jean Clottes**


Whitley, David S., Johannes H.N. Loubser, and Don Hann


Widrig, Charlotte D.


Wilde, James, Rinita Dalan, Steve Wilke, Ralph Keuler, and John Foss


Wilt, Julia J.


Wood, Ralph V.

Keywords: Washington, Columbia Plateau. Northwest. United States. North America. MNA.

Woods, Wilfred R.

Woodward, John A., and Faye Speciale
Keywords: Columbia River Gorge, Oregon and Washington. Northwest United States. North America. Pictographs. LMRAA. HLH.

Wormington, H. Marie, and Richard Forbis
Keywords: Zephyr Creek Site, Alberta, Canada. North America. Columbia Plateau cultural sphere. Biblio.

Yakima Herald
Keywords: Columbia Plateau, Washington, northwest United States. North America. Sun worship. Clarence Bunnel. MNA.

York, Annie, Richard Daly, and Chris Arnett

Zawadzka, Dagmara
Keywords: Canadian Shield, southern British Columbia, Canada. North America. Ontology. Anishinaabeg and Cree. Coast and Interior Salish. Rock art studies. Images, landscapes, and rock art. Amazon.com, LMRAA.
GLOSSARY. ROCK ART STUDIES BIBLIOGRAPHIC DATABASE:
KEY TO SOURCES FOR CITATIONS.

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<td>Academia.edu</td>
<td><a href="https://www.academia.edu/">https://www.academia.edu/</a>. Social network site for sharing academic research (World).</td>
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<td>BARAA</td>
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<td>BKB</td>
<td>“Rock Carvings and Inscriptions in the Northern Areas of Pakistan, Selected Bibliography,” Martin Bemmann and Ditte Koenig, April 14, 1997. Internet posting to the Rock Art Newsgroup (<a href="mailto:Rock-Art@ASU.edu">Rock-Art@ASU.edu</a>).</td>
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<td>BSABSR</td>
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<td>BSARRM</td>
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<td>BSL</td>
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<td>CCIC</td>
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<td>Citeulike</td>
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<td>CRARA</td>
<td>Canadian Rock Art Research Association.</td>
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<td>CREAT</td>
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<td>DBNPS</td>
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<td>eLibrary.ru</td>
<td><a href="https://www.elibrary.ru/keyword_items.asp?id=399395&amp;show_option=0">https://www.elibrary.ru/keyword_items.asp?id=399395&amp;show_option=0</a>. Academic literature search engine (Russia).</td>
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<td>GetInfo</td>
<td><a href="https://www.tlb.eu/en/new">https://www.tlb.eu/en/new</a>. Website for: German National Library of Science and Technology. GetInfo is the portal for science and technology and provides access to more than 160 million data sets from specialised databases, publishers, and library catalogs (Germany).</td>
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<td>HLH</td>
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<td>IAAL</td>
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GLOSSARY. ROCK ART STUDIES BIBLIOGRAPHIC DATABASE:  
KEY TO SOURCES FOR CITATIONS. (cont.)

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<td><a href="http://search.informit.com.au/">http://search.informit.com.au/</a>. RMIT Publishing’s Informit service is the leading source of online full text, multimedia, and index databases that deliver the most authoritative research from Australia, New Zealand, and the Asia Pacific region (Australia, New Zealand, Asia Pacific).</td>
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<td>JHL</td>
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<td>JSTOR</td>
<td>&quot;Used by millions for research, teaching, and learning. With more than a thousand academic journals and over 1 million images, letters, and other primary sources, JSTOR is one of the world's most trusted sources for academic content.&quot; <a href="http://www.jstor.org">http://www.jstor.org</a>.</td>
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<td>KLCB</td>
<td>Bibliography, Kevin L. Callahan, November 1996. Unpublished manuscript.</td>
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<td>LJMM</td>
<td>References, mainly Namibia Rock Art, L. Jacobson, McGregor, 30 January 1998, Museum, Kimberley, South Africa (personal e-mail).</td>
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<td>LoC</td>
<td>Library of Congress online catalog.</td>
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<td>LMRAA</td>
<td>Leigh Marymor Rock Art Archive. Point Richmond, CA.</td>
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<td>MELVYL</td>
<td>University of California, 9 Campus computer catalog.</td>
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<td>MIP</td>
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<td>References submitted via the Museum of Northern Arizona Rock Art Studies Bibliographic Database website.</td>
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<td>NADB</td>
<td>“National Archaeological Database.” The Archaeology and Ethnography Program, hosted online by the Center for Advanced Spatial Technologies under cooperative agreement with the National Park Service. Last queried on 8 February 1998. (Useful note: when searching this database on the Internet, use the “expanded” search feature which indicates where many of these manuscripts are stored.)</td>
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<td>NMLAB</td>
<td>New Mexico Laboratory of Anthropology Library, Sante Fe.</td>
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### GLOSSARY. ROCK ART STUDIES BIBLIOGRAPHIC DATABASE:

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<td>Questia</td>
<td><a href="http://www.questia.com/">http://www.questia.com/</a> Online library (discontinued service).</td>
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<td>RCSL</td>
<td>Rupestrian Cyberservices Library. Flagstaff, AZ (Robert Mark and Evelyn Newman).</td>
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GLOSSARY. ROCK ART STUDIES BIBLIOGRAPHIC DATABASE:
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<td>Rock Paintings and Petroglyphs in South and Central Africa, 1947, B.J. Craig.</td>
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<td>RUA</td>
<td><a href="http://rua.ua.es/dspace/">http://rua.ua.es/dspace/</a>. Repository of the University of Alicant (Spain).</td>
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<td>RWVB</td>
<td>“Vermont Rock Art Bibliography,” posted to the Rock Art Newsgroup (<a href="mailto:Rock-Art@Asu.edu">Rock-Art@Asu.edu</a>), Rex Weeks, 28 February 2000.</td>
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<td>SCI</td>
<td>Science Citation Index: Web of Science. Scientific journal database.</td>
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<td>SHB</td>
<td>Stan Hendrickx Bibliogrpahy on the Rock Art of Egypt and Sudan. Excel spreadsheet.</td>
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<td>SIARB</td>
<td>Sociedad de Investigacion del Arte Rupestre de Bolivia.</td>
</tr>
<tr>
<td>SWMBRL</td>
<td>Southwest Museum Braun Research Library. Los Angeles, CA.</td>
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<td>Tesis Doctorals en Xarxa. Database.</td>
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<tr>
<td>UCB ANTHRO</td>
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<td>UCB-BANCROFT</td>
<td>University of California, Berkeley, Bancroft Library.</td>
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<td>UCB MAIN</td>
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<td>UCLARAAC</td>
<td>University of California Rock Art Archive.</td>
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<tr>
<td>UNCOVER</td>
<td>Online computer database of academic journals and periodicals.</td>
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ACKNOWLEDGMENTS

The “Columbia Plateau Cultural Area Rock Art Bibliography” is the result of collaboration among a great number of contributors, and builds on the earlier efforts of bibliographers such as Roderick Sprague (1967) and Keo Boreson (1976). The foundation of the current bibliography was compiled over many years by the primary author through his efforts in compiling the Rock Art Studies Bibliographic Database (RASBdb).

The RASBdb and the current thematic bibliography have benefited from contributions by scores of database users, too numerous to name individually here. Be it known that each are remembered and appreciated. Immense assistance has been provided by co-authors Jim Keyser and David Kaiser in providing additional citations to the literature and introductory remarks that contextualize the literature, providing a framework to better understand the time, place, and peoples to whom these cultural expressions belong. In this latter regard, Bill Layman, Columbia River historian, has been especially helpful in holding the centrality of these cultural expressions, the sacred spaces in which they are found, their ancestral creators and their present day descendants in full frontal heart and mind.

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Valuable critique and additional citations were received from our anonymous peer reviewer, whom we greatly appreciate. The State Historic Preservation Offices (SHPO) in Washington, Oregon, and Idaho granted access to their respective archaeological databases allowing the discovery of valuable, but narrowly disseminated, rock art reports. Retired Malheur National Forest Archaeologist, Don Hann, was especially generous with his time in reviewing and compiling the citations held at the Oregon SHPO.

Finally, appreciations are owed to my wife, Amy Marymor, who provides edits where needed, support and enthusiasm always, and doesn’t complain when I disappear into the library to fire up the computer and lose myself in the literature of the world’s rock art heritage.

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**ABBREVIATION**

<table>
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<td>UPL</td>
<td>University of Pennsylvania Library Catalog.</td>
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<td>WELLM</td>
<td>Klaus Wellmann, <em>The Artifact</em>, 16(1) and 17(4).</td>
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<tr>
<td>Worldcat.org</td>
<td>Literature search engine.</td>
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ABOUT THE AUTHORS

Leigh Marymor is a Past President of the American Rock Art Research Association (ARARA) where he has been a member for 40 years and also served several terms during that time as Chairperson of the ARARA’s Conservation Committee. He co-founded the Bay Area Rock Art Research Association, along with Dr. Paul Freeman in 1983, and continues in a leadership role in that organization today. Leigh is a Research Affiliate at the Museum of Northern Arizona where he is responsible for the compilation of the Rock Art Studies: A Bibliographic Database. He holds a B.S. degree in Community Education, University of Wisconsin—Milwaukee, and is a trained textile artist.

James D. Keyser earned his B.A. and M.A. from the University of Montana and his Ph.D. from the University of Oregon. He is the author of more than 200 articles and monographs and six books on rock art. He currently splits his time between homes in Portland, Oregon, and San Giorgio Scarampi, Italy.

David A. Kaiser is an independent researcher who has documented and analyzed rock art in western North America for more than twenty years, specializing in the pictographs and petroglyphs of the Pacific Northwest and the northern Plains. He is a former president of the Oregon Archaeological Society and current board member of the American Rock Art Research Association.

William D. Layman has created historically-themed books and exhibits on the Columbia River, place-based community sculpture, and various theatrical regional memory activism projects. An independent researcher, he has written extensively on the history of rock art recording in the Mid-Columbia region, with a particular interest in inundated rock art sites of the river. He is author, along with P’Squosa/Wenatchi Randy Lewis, of Rock Island of the Columbia River: The Foundation of Our Lives, a book featuring the first rock art salvage archaeology project in the Pacific Northwest, done before the creation of Rock Island Dam in 1931.

To view color photographs of the figures included in this article, please visit the Current Issues page on our website (www.northwestanthropology.com/current-issues) (password: JONA2022).
Fruit Trees and Orchards on Historic Sites: Documentation and Treatment Recommendations

René F. Burk

Affiliation
Master of Arts and Interdisciplinary studies in Botany, Anthropology, Geography, Oregon State University

Correspondence
Rene.burk9825@gmail.com

Abstract
Grafted fruit trees were brought westward with the settlers for subsistence and commercial purposes in the 1800s. Many of these grafted fruit trees are still alive on historic sites that are reaching the end of their natural life (Figures 1a and 1b). These historic trees may have rare or unknown cultivars of fruit. After reading nearly a thousand site records spanning from 1946 to 2019, fewer than ten had a notation of “fruit trees” with no further information. Domesticated plants and trees on historic sites have not been properly documented or identified during the recording and assessment of archaeological sites because a convenient means for accomplishing this task has not been available to archaeologists. The Olmsted Center for Landscape Preservation and the International Society of Arboriculture have created forms for this purpose. These forms are presented in this article for use in the field to document historic fruit trees. The literature states that fruit trees and orchards are living biotic cultural resources (Firth 1985), features (Dolan 2009:149; NPS n.d.), non-renewable resources, and/or biological features (NPS 1998) that contribute to the integrity and significance of historic sites. Documenting historic fruit trees is the first step in the effort to preserve, rehabilitate, restore, or reconstruct, in the same way that mitigation is done for traditional cultural materials and sites which is consistent with the Secretary of Interior Standards (NPS 1998; Grimmer and NPS 2017:3; 36 CFR 68), and as a due diligence effort of the National Historic Preservation Act (36 CFR 800), avoidance is not enough. Fruit trees containing rare varieties of fruit must be sent for germplasm storage, in the same way that a rare artifact is accessioned at a museum.

Keywords
Fruit trees, cultural resource management, National Register for Historic Places, biotic cultural resources, tree evaluation forms.

Introduction
This article discusses historic fruit trees using a botanical-archaeological perspective and provides information on the documentation of trees in the field setting, an introduction to forms for this purpose, how trees contribute to site eligibility, and treatment recommendations.

Fruit trees were introduced to America in the form of seed, with the arrival of the Europeans in the 1600s (Dolan 2009:4). By the 1800s, grafted fruit trees with improved fruit cultivars were brought westward with the nurserymen and settlers for commercial and subsistence purposes (Routson and Nabhan 2007:6). Fruit orchards were planted...
on homesteads to mark land claims (Dolan 2022, pers. comm.).

After reading over 1,000 Oregon site records, less than 10 records with the notation of “fruit trees” with no further information were found. This finding was the inspiration for this article. The lifespan of a domesticated apple (*Malus*) is known to be 150 years old (Dolan et al. 2012:40). Therefore, trees planted in the 1850s by settlers would now be 173 years old in the year 2023. The oldest known (seedling) apple tree in the Pacific Northwest at Fort Vancouver died in the year 2020 at an estimated age of 194 years old (Figures 1a and 1b) (Giuliani-Hoffman 2020). This tree was maintained and propagated before it died. Migicovsky et al. (2021) discuss the genetic bottleneck that is occurring due to commercialization and market demands of fruit. Routson et al.’s 2009 study found that the number of historic fruit trees and the varieties they contain on historic sites is currently unknown in the Midwest. Research shows the same is true in the Pacific Northwest. Therefore, this article provides information to aid archaeologists, contractors, land managers, students, and volunteers in documenting historic trees. Documenting historic fruit trees is the first step in the effort to preserve, rehabilitate, restore, or reconstruct, in the same way that mitigation is done for traditional cultural materials and historic sites, which is consistent with the Secretary of Interior Standards (NPS 1998; Grimmer and NPS 2017:3; 36 CFR 68), and as a due diligence effort of the National Historic Preservation Act (36 CFR 800).

**Literature Review**

Over a thousand Oregon site records from 1946 to 2019 were read by the author. The notation of “fruit trees” was seen on fewer than ten records, with no further documentation of the trees. This research demonstrates that documentation is lacking concerning fruit trees on historic sites.

The Olmsted Center for Landscape Preservation 2017 tree assessment form covers all aspects needed to document a tree’s condition. This form was created specifically for recording
historic fruit trees. It is simple enough to be filled out by those without training in plant sciences. Page 2 of the Olmsted form divides the tree into 5 zones—beginning at the ground and working up to the branches and crown (Figure 3b). After quick observations, appropriate boxes can be checked. Page 1 is the assessment with mitigation recommendations that should be completed after the page 2 examination of the tree (Figure 3a).

The International Society of Arboriculture (ISA) (2017) form is intended for hazard trees and is more suitable for use by ISA certified arborists and forestry staff. However, the ISA form is appropriate for assessing historic fruit trees but is more comprehensive. Page 1 of the ISA form (Figure 2a) divides the tree into zones and asks about aspects of the tree within those zones. The ISA form also asks questions about the landform and environment that could potentially impact the tree(s). Page 2 of the ISA form (Figure 2b) is the assessment and mitigation recommendations on the likelihood of failure of the tree. The form also provides a simple tree diagram for sketching in aspects of the tree.

Dolan’s 2009 publication, *Fruitful Legacy: A Historic Context of Orchards in the United States, with Technical Information for Registering Orchards in the National Register of Historic Places*, provides in-depth examples of how fruit trees qualify for the National Register of Historic Places in Chapter 5, beginning on page 149. Examples for Criterion A events can include orchards associated with settlement, prohibition, or the Gold Rush. Settlers planted orchards to mark their land claims and for subsistence purposes (Dolan 2022, pers. comm.). Also under Criterion A is the association with horticultural innovation (155), i.e., the development of new and improved fruit varieties, grafting, pruning techniques, and commercialization, which contributed to Oregon’s early economy.

Under Criterion B, orchards can be found significant when associated with persons who played an important role in early horticulture innovation, such as Luelling, Stark, and the Hudson Bay Company (Dolan 2009).

Criteria C of the National Register includes orchards or individual fruit trees that are a part of a larger garden design or demonstrate horticulture innovation with rare or one-of-a-kind fruit varieties.

Under National Register Criterion D, fruit trees can be eligible for yielding information about the period of historic occupation. Fruit trees are sometimes the only remaining evidence of a heritage or an ethnic group’s occupation. The trees themselves, the variety of fruit they produce, and the agricultural practices of historic groups (Dolan 2009:177) may make them eligible for nomination. The author recommends that the identification of the variety should be attempted during the initial site assessment and included in the management/mitigation recommendations (ISA 2017:2).

Landscape Lines 12: Treatment of Plant Features is an undated National Park Service publication (NPS n.d.). The purpose of the publication is to provide guidance for creating a Cultural Landscape Report (CLR), and how to perform a vegetation survey of the landscape. It discusses strategies for evaluating vegetation as features, and how the plants can contribute to the eligibility of a historic landscape. This paper also addresses historical research in regards to vegetation, the documentation of existing conditions, inventorying and mapping of vegetation. The paper recommends collaborating with botanists and/or horticulturalists to identify plants.

The Historic Orchard and Fruit Tree Stabilization Handbook, by Dolan et al. (2012), was compiled by the National Park Service in collaboration with California State Parks. This book is a contextual study of orchards within the California State Parks system in cultural landscapes. The study determined that between the years 1880–1945, the apple was the most important fruit from an economic standpoint. The handbook’s intended audience is land managers and grounds maintenance staff.
**Figure 2a.** Provided courtesy of International Society of Arboriculture (ISA). The ISA's Basic Tree Risk Assessment Form, page 1.
Figure 2b. Provided courtesy of International Society of Arboriculture (ISA). The ISA’s Basic Tree Risk Assessment Form, page 2.
The book provides guidance on assessing the condition of trees, maintenance, stabilization, repair techniques, germplasm identification, and storage. The book provides a field form (43), similar to the Olmsted form (Figures 3a and 3b). The authors state the book was guided by the National Historic Preservation Act of 1966, and the treatment guidance is based on the Secretary of Interior Standards for preservation, restoration, rehabilitation, and reconstruction. The book tells us that historic fruit trees are significant within the context of land settlement and agricultural history of California and are, therefore, living biotic cultural resources.

Routson and Nabhan’s (2007) Orchard Management Plan is a template that can be used to create an orchard management plan for an agency or client. Routson and Nabhan (2007) suggest integrating the orchard plan into the entire district’s vegetation treatment plan. The report was created for Fruita Rural Historic District within Capitol Reef National Park. This 103-page report begins with the historic overview of orchards in the United States. The authors write about the history of fruit in the region of study and discuss the condition of the trees using the Olmsted condition rating system. They summarize the report with management recommendations for the orchards. The authors provide a list of nurseries where fruit trees can be purchased for in-kind replacement (Dolan et al. 2012; NPS n.d.). The report cites a Cultural Landscape Report previously authored by Gilbert and McKoy (1997) for the Fruita Rural Historic District. The appendix has good examples of photographs of fruit from the historic orchards in the Fruita Rural Historic District.

Discussion

The documentation of historic fruit trees is a form of knowledge preservation that becomes part of the archaeological record that has historic value and makes contributions to National Register nomination, regardless of their condition at the time of initial recording (Dolan 2022, pers. comm.). Fruit trees on National Register eligible sites are considered living biotic cultural resources (Firth 1985; Savage and Pope 1995; Lee et al. 1999; NPS n.d.) and/or “historic genetic material” (NPS 1998). Domesticated fruit trees require human intervention to survive. Mitigation recommendations that are not followed through can have an adverse effect on the integrity of the historic site. The extent of rare varieties on historic sites is still currently unknown (Routson et al. 2009) throughout the Pacific Northwest. It is also unknown how many have perished due to climate change, drought, wildfire, wildlife pressure, insects, and diseases (Routson and Nabhan 2007; Routson et al. 2009; Stimpson 2022). Due to
Figure 3a. The Olmsted Center National Park Service Tree Assessment Form, page 1.
Figure 3b. The Olmsted Center National Park Service Tree Assessment Form, page 2.
FRUIT TREES AND ORCHARDS ON HISTORIC SITES

commercialization and market demand, there is a bottleneck of genetic diversity occurring (Migicovsky et al. 2021). Rare varieties and strains should be preserved (germplasm) for future fruit and plant biodiversity, as some have natural resistance to pests and diseases. Rare varieties qualify under Criterion C for horticulture innovation and may yield information to scientific study under Criterion D.

Therefore, this article is a call to archaeologists, cultural resource land managers, archaeological field technicians, contractors, students, and volunteers to document and preserve historic fruit trees as biotic cultural resources (Firth 1985; Dolan et al. 2012; NPS n.d.) and contributing features (Dolan 2009; NPS n.d.) as a due diligence effort of the National Historic Preservation Act (36 CFR 800).

The forms presented in this article are provided courtesy of International Society of Arboriculture (Figures 2a and 2b) and the Olmsted Center for Landscape Preservation (Figures 3a and 3b). Archaeologists, without specialized training in the plant sciences, can complete an initial assessment of fruit trees with the Olmsted form. The ISA form is more suitable for use by those trained in the plant sciences (Figures 2a and 2b), and it is intended for hazard trees. Both forms begin by asking for the identification of the tree. To properly identify a tree, we must begin with a short introduction of the Linnaean taxonomic hierarchical naming system, developed in the 1700s by the Swedish botanist Carl Linnaeus (L.), who initially named many of the plants. This is the standardized naming system for all living (biotic) life forms, because common names are not precise enough for scientific study, especially given the number of species across the world. The Linnaean hierarchical naming system is shown for apple (Table 1).

<table>
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<tr>
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<td>Order</td>
<td>Rosales</td>
</tr>
<tr>
<td>Family</td>
<td>Rosaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Malus</td>
</tr>
<tr>
<td>Species</td>
<td>domestica</td>
</tr>
<tr>
<td>Citation of Botanist</td>
<td>(Borkh) (Linnaeus)(L.)</td>
</tr>
<tr>
<td>Variety/Cultivar</td>
<td>Red Delicious</td>
</tr>
</tbody>
</table>

To write the botanical name of the tree properly on the assessment form, it must be underlined if handwritten, i.e., *Malus*. When typed, botanical names should be italicized and enclosed in parenthesis (*Genus* *species*). The genus is always capitalized, and the species’ name is always lower case and abbreviated, i.e., (sp. or spp.). Writing only the genus on the form and noting the type of fruit (i.e., apple, pear, cherry) is acceptable for the initial documentation and Oregon SHPO reporting. Below are examples of the Linnaean taxonomic naming system also known as the “botanical name” for apple and commonly occurring trees on historic sites:

- **Common Name (*Genus species* botanist variety name)
  - Apple (*Malus domestica* Borkh var. “Red Delicious”)
  - Apricot (*Prunus armeniaca*. L.)
  - Black Locust (*Robinia pseudoacacia*)
  - Cherry, Sour (*Prunus cerasus* L.)
  - Cherry, Sweet (*Prunus avium* L.)
  - Hazelnut (*Corylus* L.) (Figure 4)
  - Oaktree (*Quercus* spp.)
  - Peach (*Prunus persica* L., Batsch)
  - Pear (*Pyrus* spp. L.)
  - Plum/Prune (*Prunus domestica* L.)
  - Quince (*Cydonia* oblonga Miller)
  - Walnut and Pecan (*Juglans* L.).

Identification to the species and cultivar level requires the specialization of a botanist, horticulturist, or arborist. Identification of the fruit variety should be done early in the site
evaluation process to determine if the tree contains a rare variety of fruit (Dolan et al. 2012:45; Dolan 2022, pers. comm.; NPS n.d.:15). One can enclose a sample in a clipboard to have a plant or tree expert at the office identify it later (NPS n.d.). For identification purposes the sample should include a small branch with flowers, leaves, catkins, fruit, seeds, and a close-up photograph of the specimen (Figures 6a and 10a). Identification of the cultivar or variety (i.e., “Red Delicious”) requires further specialization with samples of the fruit buds, leaves, and/or ripened fruit depending on the method of identification (i.e., DNA analysis or based on the morphology of the fruit) (Figure 6b). Figure 5 is a list of places that can perform this service. Rare varieties add integrity and contribute to site eligibility (Dolan 2009; Dolan et al. 2012; NPS n.d.). If the laboratory or conservator concludes that it is a rare cultivar, they will likely want a germplasm sample for preservation, re-propagation, or future scientific studies, especially if the environment is no longer conducive to the fruit tree or orchard’s survival.

Tree Documentation and Treatment Recommendations

The forms provided in this article were courtesy of the Olmsted Center for Landscape Preservation 2017 (Olmsted) and the International Society of Arboriculture. Both the Olmsted and the ISA forms divide the tree into zones (Figures 2a–3b); both forms begin with the root zone and work toward the crown. Install a tree identifier using a small aluminum tag around a branch for future identification purposes (Figure 10b). Without training in the plant or tree sciences, one can approach the assessment of a historic tree with a concept of the ideal tree: A textured woody bark, branches extending out from the trunk, bearing fruit, with shiny green leaves.

The root zone extends from the trunk to beyond the canopy, and most of the roots are within the first foot of sediment. Aspects of the tree’s health can be seen in the root zone. Examine the ground for mushrooms (fungi), encroaching vegetation, saturated soil, stand-
ing water, areas of raised soil, holes, irrigation systems, grade differences, and dropped fruit (Dolan et al. 2012:48).

Mushrooms can be a sign of decay, especially if they are on the tree itself (Figure 4). Encroaching vegetation should be mowed and re-spread as mulch around the base of the tree (Dolan et al. 2012). Saturated soil can indicate water leaks that can lead to instability of the tree roots in saturated soil, causing the tree to topple. In the mitigation section on the form, one should recommend that water leaks should be diverted or repaired. Historical irrigation systems are associated with the orchard as a contributing feature. Raised soil may be an indicator that the tree is in the process of toppling, as the roots press against the soil surface. For this situation, the recommendation might be to support the tree by propping it up, to prevent it from falling over (Dolan et al. 2012).

Dropped fruit are useful for identifying the tree genus and variety from early summer through winter. Dried fruit can sometimes be seen hanging from a branch or caught in a tree trunk. Fruit trees naturally drop immature, un-pollinated fruit in late May to June. The most advantageous time to perform the initial assessment is when the tree is bearing fruit from early summer through fall, as the physical fruit can aid in the identification of the tree, i.e., apple (Malus), pear (Pyrus), or cherry (Prunus). To document and describe the fruit, measure a good representative specimen and photograph a cross-section with a scale (Figures 6a and 6b) (Routson and Nabhan 2007:64). Blemishes on the fruit can indicate insect infestation and/or diseases. Samples of the fruit with blemishes can be taken to the botanist or arborist for identification and to determine the appropriate treatment (Figure 6a). Trees left untreated can spread to nearby commercial orchards. Some pathogens have two hosts, such as Apple Cedar Rust (Gymnosporangium juniperi-virginianae) that can infect conifers as well.

The next zone on the forms is called the Root Crown (ISA 2017) (Figures 2a, 3a, and 4). This is the transition area between where the tree meets the ground surface and where the trunk begins. On an ideal tree, this area is tapered and is larger than the trunk. If this trunk flare (Dolan et al. 2012; Olmsted 2017) is not apparent, it may be buried, or is a trait of

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**Figure 5.** List of places that can assist in identification of fruit varieties and provide germplasm storage.

- **Pear Cultivar Identification and Germplasm Storage USDA-ARS National Clonal Germplasm**
  - Repository 33447 Peoria Rd.
  - Corvallis, OR 97333-2521 Tel: (541) 738-4214
  - https://www.ars.usda.gov/pacific-west-area/corvallis-or/national-clonal-germplasm-repository/

- **Apple/Cherry Cultivar DNA Identification and Germplasm Storage**
  - USDA-ARS Apple Collection
  - 21 Crabapple Drive, Geneva, NY 14456
  - Tel: (315) 787-2244

- **Apple cultivar identification and orchard conservancy**
  - Temperate Orchard Conservancy P. O. Box 529, Molalla, OR 97038
  - http://www.temperateorchardconservancy.org/about/almaty-farm/
the tree species. A lack of taper is considered a defect on the ISA (2017) form (Figures 2a and 2b). The recommendation in this case is to expose the buried trunk flare and re-cover the root zone with a thin layer of mulch to allow oxygen to the roots. Another defect is a root growing overtop of the other roots—this is called a “girdling root’’ by arborists (Dolan et al. 2012:50). Girdling roots must be cut away from the trunk flare. Small woody stems growing from the base of the grafted trunk need to be pruned off. If left to grow, the suckers or epicormic shoots will out-compete the graft (Dolan et al. 2012:49, 74). Seedling trees were used before rootstock was invented and will outlive the graft. The presence of mushrooms (fungi) indicate that the tree has internal rot, such as the Barcelona Hazelnuts at Dorris Ranch in Springfield, Oregon, and are being replaced with a disease resistant variety of hazelnut (Corylus) (Figure 4). If the tree is leaning or looks unbalanced, document the angle and aspect of the lean. In the mitigation section on the Olmsted form (Figure 3a), a leaning tree will need stabilization with propping until it can be re-propagated. The tree can continue to live in a compromised state for many years but would be considered in poor condition (Dolan et al. 2012:41, 82) (Figure 3a).

A tree that has toppled, but is still alive, presents a good opportunity for vegetative re-propagation by burying the limb with soil; it may grow new roots from the branch within a five-year period, experienced personally by the author. An assessment of a toppled/live tree is fair to poor if it has new growth in its compromised condition (Dolan et al. 2012).

The trunk of the tree is the next zone. The trunk of a perfect tree should have a roughened woody or smooth bark, commonly covered with moss or lichens is not considered a defect. The first measurement of this zone is from the ground surface to where the branches begin (Dolan et al. 2012:51). This will indicate how the tree was pruned during the Historic Period. The second measurement will be the circumference, by wrapping a tape below the lowest scaffold limbs (Figure 7) (Dolan et al. 2012:46).
For taller historic trees, the diameter breadth height (DBH), a standard measurement for forestry applications, is measured at 1.35 m or 4.5 feet above the ground surface (upslope) (Dolan et al. 2012:46)(Figure 7). The circumference in inches, divided by 3.14 (pi), gives the diameter breadth height (Figure 7). Write this measurement on the assessment form; the tree can be re-measured during future reassessments and the rate of growth can become useful for dating trees without causing harm or coring. Cavities on the tree trunk can be the result of pruning wounds that the tree was unable to seal (Shigo et al. 1977; Dolan et al. 2012:79). The dimension of the opening and the new bark that is growing over (compartmentalizing) the hole is good documentation (Figure 8). This compartmentalization (CODIT) is the tree’s response to wounding and its attempt to seal out decay (Figures 9a and 9b) (Shigo et al. 1977:2). Other defects to note on the trunk of the tree include bumps, burls, mushrooms (Figure 4), insects, and/or holes (Figure 10b) (Dolan et al. 2012). Aspects of the bark that are a sign of decline include cracks; loose, missing chunks of bark; or small holes in a pattern or series are caused by a bird, common name of Sap Sucker, genus (Sphyrapicus spp.) (Figure 10b) (Shigo et al. 1977). This is considered a defect that cannot be treated and can allow decay to enter the tree. The presence of a thick sap-like fluid ooze, Gummosis, is an indicator of an insect infestation or disease, such as the bacteria Cytospora canker, which is contagious and can spread to nearby commercial orchards. Insects deliver diseases to trees including ants, aphids, bees, beetles, termites, and weevils. Another indication of an infestation is a fine sawdust-looking substance called frass on or around the tree trunk. To mitigate, the recommendation should be to re-propagate the tree and send germplasm to a facility for preservation.

Embedded objects are occasionally seen on or in historic trees. Common embedded objects include fencing wire and insulators. The tree will compartmentalize around an object.
Figure 8. Measurement of compartmentalization (CODIT) (Shigo et al. 1977).

Figure 9a (bottom left) and Figure 9b (bottom right). Trees that have compartmentalized wounds (Shigo et al. 1977). Figure 9a was photographed at Oregon State University Campus. Figure 9b was photographed at Jason Lee Mission Willamette State Park.
FRUIT TREES AND ORCHARDS ON HISTORIC SITES

leaned and left against it (Figure 8) (Shigo et al. 1977). This is another form of compartmentalization (CODIT) that can be a useful indicator of historic activity: the rate of growth around the object can be measured over time (Figures 8, 9a, 9b). Evidence of previous pruning can result in cavities or holes in the trunk that have not compartmentalized, due to low vigor or a tree that is unhealthy (Figures 9a and 9b) (Shigo et al. 1977:2). The cavities become homes for birds and insects. Mitigation for this should be to treat the tree for insects and diseases, stabilize the tree, and determine if the fruit variety is of a rare type. Removing the fruit annually helps break the insect cycles.

The next zone is the limbs or co-dominant stems on the assessment forms. Limbs help the tree obtain balance. If the branches appear to be lop-sided or over-extended, this can cause the tree to lean or fall over during inclement weather. Broken, split, dead, or hanging branches are an indicator of heavy fruit loads and wildlife attempting to access the fruit. These conditions can be corrected with pruning and fences (Dolan et al. 2012).

A measurement of the new growth on the tip of the branch (Figure 10a) is a good indicator of the tree’s health and vigor. If there is no new growth in the spring, the tree is unhealthy. On the other hand, fungi growing on the limbs and missing bark are indications of internal rot, poor vigor, and that the tree is declining (Figure 4). The condition rating would be fair to poor. If the tree is determined to be a rare variety, the recommendation should be re-propagation. Rare cultivars can yield data for scientific study (Migicovsky et al. 2021) and qualify under Criterion C of the National Historic Register (Dolan 2009). On the contrary, newly sprouted branches, new growth seen at the end of branches (Figure 10a) (Dolan Figure 10a (left). Measurement of new growth at the end of the limb. Figure 10b (right). A metal identification tag wrapped around the trunk, girdling the historic tree. The metal band was removed after the photograph was taken. The holes are created by the Sap Sucker (Sphyrapicus spp.) bird.
et al. 2012:41), and sealed wounds (Figures 9a and 9b) are a sign of good vigor. Similarly, the crown of the tree should be full of leaves. Dead or broken hanging branches with dead leaves or without leaves altogether is called dieback by arborists, and indicates root disease, a lack of nutrients and water, or something else wrong with the tree. Pruning and maintenance can assist the tree to live longer.

In an ideal tree, the leaves should be dark green and free of blemishes such as foliage spots, discoloration, distortion, blisters, holes, or laciness. Blemishes on the fruit or leaves are a sign of insect infestation and/or disease (Dolan et al. 2012:53). Large masses of webbing on branches are an infestation of tent caterpillars (*Malacosoma californicum*) that should be removed promptly, as they can infect and defoliate an entire orchard, and can spread to nearby commercial orchards. Figure 6a shows an apple infested with Codling moth (*Cydia pomonella*). Examining the underside of leaves with a hand lens can reveal small insects or insect eggs that can be treated with sprays. This would be an aspect to note in the recommendations. Encroaching vegetation on the trunk, clinging to branches, or overtopping the canopy of the tree—such as mistletoe (*Phoradendron*), Ivy (*Hedera*) or blackberries (*Rubus*)—should also be noted in the recommendation section.

Finally, document the number of historic fruit trees, measure the spacing between the trees, count the number of species (apple, pear) present, and draw a sketch map of the trees in relation to other features (Dolan 2009:149; NPS n.d.) such as foundations, structures, irrigation ditches (Bae et al. 2016), agricultural machinery (Dolan et al. 2012:53; NPS n.d.:4). This documentation helps interpret our understanding of past peoples’ tastes, subsistence practices, and mechanization of the agricultural industry (Dolan 2009; NPS n.d.:4).

To keep track of an individual tree that has been assessed, attach a small metal datum tag around a branch, but not the trunk (Figure 10b), with the corresponding number written on the assessment form. At a minimum, photograph the tree and fruit (Figure 6a), measure tree cavities and diameter of the trunk, and treatment recommendations (Figure 8).

**Fruit Trees and the National Register of Historic Places Criterion**

Although cultural resource management (CRM) has evolved over the last 50 years, more is yet to be considered. Researching historical records for an undertaking may reveal the presence of fruit trees on General Land Office homestead contracts, agricultural records, letters, and in historic photographs (NPS n.d.). Fruit trees contribute to the integrity of historic sites and hold qualities that coincide with National Register criteria (Dolan 2009; Dolan 2022, pers. comm.). Fruit trees can be features. Orchards can be features or sites. Irrigation systems associated with orchards are features. Fruit trees define the boundaries between yards and pastures. Trees wrap around objects placed or attached to them, such as fence wire; fence insulators; electricity, telegraph, or phone lines. Fruit trees add information to the historic site record. It was common for people to plant multiple varieties that ripen throughout the year, such as an early transparent, a mid-summer for fresh eating, cider and vinegar making, and a late ripening baking apple that stores through the winter. Pruning techniques also varied depending on the use, such as for hand-picking domestic use or for picking with mechanized equipment for commercial economic purposes. An orchard creates a pattern on the landscape that is associated with the historic context of the place, setting, and/or other aspects of integrity. The historic landform must reflect the National Register criterion (Savage and Pope 1995; Lee et al. 1999):

1. Associated with historic events that contribute to broad patterns, such as settlement or development of an area or horticulture commercialization (Dolan 2009:154–155). Apple (*Malus*), pear (*Pyrus*), quince (*Cydonia*), and
most species of (*Prunus*) are not native to the Pacific Northwest and had to be intentionally transported and planted (Burk 2020) during the settlement of the West because of the Homestead Act of 1862 (Dolan 2009).

2. Associated with significant persons in history, such as persons that contributed to early development of horticulture within a local area or state (Savage and Pope 1995; Lee et al. 1999). Fruit trees or orchards that are on the grounds or in gardens of a significant person in history contribute to the integrity of the site (Dolan 2009:160).

3. Representative work of a master, horticulture innovation, rare genotypes of fruit (biological significance), pruning configuration, or as part of a landscape design (Savage and Pope 1995; Lee et al. 1999; Dolan 2009:164–175).

4. May yield information important during the Historical Period. The trees may be the only remaining evidence of a historic occupation. Settlers planted orchards to mark homestead claims; therefore, fruit trees are physical evidence of a historic occupation (Dolan 2009:176–178).

Managing orchards of historic fruit trees as living biotic cultural resources or contributing features requires an interdisciplinary, adaptive approach (Kato and Ahern 2008:543) because archaeologists lack the specialized training of arborists and botanists. Maintenance and preservation of historic orchards can be accomplished in collaboration with agency forestry and botany departments.

Undocumented orchards with rare varieties of fruit may still be alive on historic sites (Routson et al. 2009). Grafted fruit trees containing rare varieties need to be identified, documented, and preserved because they can add biodiversity to modern fruit varieties, add integrity to historic sites, and contribute to site eligibility, even if the tree is in poor condition (Dolan 2022, pers. comm.), and as a due diligence effort of the National Historic Preservation Act (36 CFR 800). Trees in poor condition need to be sent for germplasm storage in the same way that a rare artifact is accessioned at a museum. Archaeologists can approach the initial documentation of these trees as traditional features (Dolan 2009:149; NPS n.d.:6) and/or as biotic cultural resources (Kato and Ahern 2008:543; NPS n.d.:1).

The most advantageous time to perform the initial assessment is when the tree is bearing fruit in the summer and fall, as the physical fruit can aid in the identification of the tree species (i.e., apple, pear, or cherry). If the forms appear too daunting or time consuming, some suggestions are:

- Hire volunteers, seasonals, or interns to document the trees and perform the minimum stabilization measures (i.e., pruning, stabilization, and treating diseases and insects);
- Collaborate with agency hazard tree crews to perform the assessments, as it is a similar concept as identifying hazard trees;
- Prioritize measurements of the circumference, scars, defects, collection of a sample, and photographs of the tree and fruit (Figure 6a), and continue to avoid it for mitigation purposes;
- Map the location of the trees in relation to the other historic features (Dolan 2009:149; NPS n.d.);
- Document the historic orchard as if it will be destroyed by wildfire, so the orchard could be re-created from notes and sketch maps (Stimpson 2022);
- Send germplasm of rare cultivars to a repository for conservation (Figure 5) (Dolan et al. 2012; Bae et al. 2016), in the same way one would send an artifact to a museum.
Conclusion

Domesticated plants and trees on historic sites have not been properly documented or identified during the recording and assessment of archaeological sites because a convenient means for accomplishing this task has not been available to archaeologists. Fortunately, the Olmsted Center for Landscape Preservation and the International Society of Arboriculture (2017) have created forms for this purpose. These forms are presented in this article for use in the field to document historic fruit trees. Permission was granted courtesy of the Olmsted Center for Landscape Preservation (2017) and the International Society of Arboriculture (2017) for the use of these forms in this manner (Figures 2a–3b). Domesticated fruit trees require human intervention to survive. Mitigation recommendations that are not followed through can have an adverse effect on the integrity of the historic site. Fruit trees that were intentionally planted during the historic occupation are living (biotic) cultural resources (Firth 1985; NPS n.d.) and contributing features (Dolan 2009; Dolan et al. 2012; NPS n.d.). The extent of rare varieties on historic sites is still currently unknown (Routson et al. 2009) throughout the Pacific Northwest. Rare fruit cultivars can yield data for scientific study (Migicovsky et al. 2021) and qualify under Criterion C of the National Historic Register as horticulture innovation (Dolan 2009). The preservation of rare cultivar germplasm in a repository is equivalent to the curation of artifacts in a museum. Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into consideration their impacts on historic sites (Grimmer and NPS 2017; NPS n.d.:2; 36 CFR 800 of the National Historic Preservation Act); avoidance is not enough.
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Calculating Return Rates for Habitats in the Great Basin

Megan A. McGuinness

Abstract Occupants throughout the terminal Pleistocene/early Holocene (TP/EH) (~16,000–8300 cal B.P.) of the northwestern Great Basin encountered numerous habitat types as they traveled across the landscape. We currently do not know what the most suitable habitats were, or which habitat types the people chose to settle. This article addresses these questions through the preliminary lens of an ideal distribution model by calculating suitability, a proxy for caloric return rates, in four different habitats—wetlands, riparian zones, lakes, and uplands—with seven food resources found in the Great Basin. This research indicates that uplands should be the most suitable habitats for people to settle, having the highest caloric return available throughout the year.

Keywords Great Basin, Younger Dryas, Western Stemmed Tradition, behavioral ecology, ideal free distribution, Oregon, Paleoindian.

Introduction

Seas of sagebrush and windswept playas spring to mind when someone mentions the Great Basin. As barren as the Great Basin seems, it is home to several diverse habitats such as rocky tablelands, marshes, lakes, and streams that have persisted over thousands of years. The earliest people in the northwestern Great Basin during the terminal Pleistocene/early Holocene (TP/EH) (~16,000–8300 cal B.P.) encountered these vibrant habitats and settled in them, having the agency to choose habitats with resources that best fit their needs annually. The earliest human settlements seem to occur near pluvial lakes and wetlands (Willig and Aikens 1988; Beck and Jones 1997; Jenkins et al. 2016; Smith and Barker 2017), and later settlements occur in uplands settings, far from water (Layton 1970; Aikens et al. 1977; Smith 2022). Currently, we do not understand why the first people in the northwestern Great Basin chose to settle in those habitats.

Researchers have established nutritional data and return rates for important resources in the Great Basin (Simms 1987; Raymond and Sobel 1990; Kelly 2014); however, calculating these return rates within different habitats has not been directly linked to Paleoindian settlement choices. Calculating average return rates for wetland, riparian zone, lake, and upland habitats can help researchers develop predictions of which habitats were initially important to Paleoindians. In this
Article, I consider seven resources occurring in four habitats and use a suitability calculation to develop predictions of human distribution based on which habitats yield high caloric return rates. Habitats are then ranked based on return rates and can be applied to human behavioral ecology models to help predict the habitat settlement choices early groups made in the northwestern Great Basin.

Background

We know the environment throughout the TP/EH changed significantly in the Great Basin (Grayson 2011; Smith and Baker 2017). Proxy records of analyzed pollen from stratified lakes and caves show that during the Bølling Allerød (~14,700–12,900 cal B.P.) the climate was wetter than today, and the Younger Dryas was colder in the winters and warmer in the summers after ~11,000 cal B.P. (Minckley et al. 2004). By the early Holocene, the climate became consistently drier.

The earliest dated archaeological sites occur where TP/EH pluvial lakes and wetlands were located. Paisley Five Mile Point Caves 2 and 5, in the Summer Lake Basin, provide evidence for people settling in the northwestern Great Basin by ~14,200 cal B.P. (Jenkins et al. 2012; Jenkins et al. 2016; Blong et al. 2020). Other well-dated Younger Dryas sites, such as Connley Caves and Cougar Mountain Cave in the Fort Rock Basin, were near shallow lakes and wetlands prior to ~10,350 cal B.P. (Freidel 1993). By the early Holocene, people who inhabited cave and rockshelter locations near water move locations to the uplands. Little Steamboat Point-1 (LSP-1) Rockshelter in the north Warner Valley Basin (Smith 2022), Dirty Shame Rockshelter in southeastern Oregon (Aikens et al. 1977), Hanging Rock Shelter (Layton 1970), and Last Supper Cave (Smith 2008) in northern Nevada are first occupied in the early Holocene. During the early Holocene, these sites were located in sagebrush steppe and rocky upland canyon habitats. This change in location of sites during the early Holocene suggests people started expanding their range of habitats.

Excavations of these early sites have expanded our understanding of Paleoindian subsistence throughout the TP/EH. Direct evidence of Paleoindian diets comes from coprolites from Paisley Caves. Blong and colleagues (2020) used a multiproxy analysis to examine nine coprolites from Paisley Caves aged to the Younger Dryas and early Holocene. The results show Western Stemmed Tradition (WST) occupants of Paisley Caves consumed plants, such as seeds and leafy greens, small mammals, fish, and insects (Blong et al. 2020). Small game faunal assemblages, such as rabbits, marmots, waterfowl, are also found indirectly in hearths in caves and rockshelters (Smith and Barker 2017). Large mammal faunal assemblages, such as artiodactyls, occur at caves and rockshelters in the northwestern Great Basin (Pinson 2007); however, we may only be seeing part of the picture, as people hunted larger animals in open-air settings. Due to poor preservation at open-air sites, it is impossible to know the true degree of large mammal subsistence.

Ethnographic data show that Indigenous peoples from the northwestern Great Basin such as the Northern Paiute, Klamath, and Modoc relied on different habitats seasonally for subsistence (Barrett 1910; Spier 1930; Fowler 1992). The Cattail-eaters of western Nevada targeted microhabitats for subsistence resources based on seasonal availability; these included eggs and waterfowl collected in the spring and summer and cattail collected in the fall (Fowler 1992). Different habitats offered many resources to Indigenous peoples but at different times of the year, creating a need to relocate on a seasonal basis. Kelly (2014:44) states that “… hunter-gatherer diet is systematically related to environmental characteristics.” As environments change, people often adjust their diets to include what foods are in season.

To understand Paleoindian settlement patterns, researchers can apply human behavioral ecology (HBE) models to predict choices people should make under different environmental conditions. HBE applies evolutionary ecology models to the study of human behavior using a...
hypothetico-deductive research strategy based on neo-Darwinian theory (Winterhalder and Smith 2000). HBE models can create quantitative testable hypotheses that connect principles of human evolution by natural selection (Winterhalder and Smith 2000). These models allow researchers to analyze human foraging strategies; mating systems; and spatial organization, such as settlement patterns.

The ideal free distribution (IFD) model provides a framework to analyze settlement patterns by developing predictions about how people chose to distribute themselves across landscapes (Fretwell and Lucas 1969; Fretwell 1972; Sutherland 1983). First used in ecological biology, the IFD has been addressing anthropological problems for over 15 years (e.g., Kennett et al. 2006; Winterhalder et al. 2010; Codding and Jones 2013; Jazwa et al. 2013, 2016; Hildebrandt and Ruby 2016; Tremayne and Winterhalder 2016; Jazwa and Jazwa 2017; Yaworsky and Codding 2018; Harvey 2019; Codding et al. 2021). The ideas of the model are similar to other distribution models, such as the patch choice model (MacArthur and Pianka 1966) and marginal value theorem (Charnov 1976).

The IFD model use measures of habitat suitability to produce testable predictions about settlement and mobility (Jazwa and Collins-Elliot 2021). Habitat suitability refers to the “goodness” of a habitat (Fretwell and Lucas 1969). Available food resources, exposure to hazards (such as predators), and overall livability in a habitat determine suitability (Winterhalder et al. 2010). Researchers calculate habitat suitability by using spatial distribution of resources in an environment and other cultural variables (Jazwa and Collins-Elliot 2021). The predictions of the model are that the initial people in a region should settle in a habitat with the highest overall initial suitability. As more people enter into a habitat, suitability decreases due to the depletion of resources. When suitability has decreased in the original habitat, newcomers make the choice to expand to the habitat with the second highest suitability.

In this article, I do not build an IFD model, but create a habitat suitability ranking system that I can later apply to physical basins in the Great Basin. I calculate suitability by multiplying the abundance of seven food resources by their return rates. Habitats with the highest suitability will be ranked first. Habitats with the lowest suitability will be ranked last. The limitations of this ranking system are that there are no known resource abundance data from the TP/EH, so the calculations are based on modern and ethnographic data. Thus, the suitability calculation is only an estimate for return rates of habitats, but still allow for a general ranking system to be created.

Materials and Methods

The first step to ranking the habitats is to characterize them and the resources found within to evaluate the potential caloric abundance. A habitat refers to a geographically bounded natural space where certain organisms can live or visit. The major habitats I include in this study are wetlands, riparian zones, lakes, and uplands. While other habitats exist in the Great Basin, these are most commonly associated with WST sites (Layton 1970; Pinson 2007; Smith and Barker 2017; Rosencrance 2019; Bradley et al. 2020; Reaux 2020; Smith et al. 2020; Smith 2022), suggesting that early groups frequented them.

I chose resources based on ethnographic accounts of people harvesting them in the northwestern Great Basin (Coville 1897; Spier 1930; Kelly 1932; Wheat 1967; Couture et al. 1986; Fowler 1992; Kelly 2001). These include mule deer (Odocoileus hemionus), bighorn sheep (Ovis canadensis), pronghorn (Antilocapra americana), jackrabbits (Lepus californicus), waterfowl, cattail (Typha latifolia), and tui chub (Gila bicolor). These resources occur in several different habitats and at different times of the year. I base the density, return rates, and seasonal availability on prior research (Simms 1987; Raymond and Sobel 1990; Fowler 1992; Kornfeld 1994; Kelly 2001; Knell and Hill 2012;
Barnett and Martinez 2019). There are hundreds of other resources that occur in these habitats; however, focusing on a select few can help inform predictions of caloric return per basin.

Habitats

Wetlands

Wetlands make up a small percentage of area in the Great Basin but are important habitats for many organisms. There are many types of wetlands, such as marshes, swamps, and bogs, but the general term “wetland” is used to assign value and for managing lands by federal land management agencies. Wetlands are defined by the Federal Geographic Data Committee (FDGC) (2013) as, “... lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or land is covered by shallow water.” Wetlands have three attributes: (1) hydrophytic vegetation (aquatic plants); (2) undrained hydric soil; and (3) wetland hydrology (FDGC 2013). Emergent wetlands are different but important because they contain emergent plants that are rooted herbaceous hydrophytes. Hydrophytes are perennial and dominate emergent wetlands, allowing for predictable available food sources. Emergent wetlands are also known as marshes, wet meadows, fens, prairie potholes, and sloughs (FGDC 2013). Table 1 shows resources found in wetlands.

Riparian Zones

According to the U.S. Fish and Wildlife Service (USFWS) (2009), riparian zones are transitional areas between wetlands and uplands. Hydrologic features that run through these zones are perennial but can also be intermittent (USFWS 2009). Riparian zones have more vegetative species than in surrounding areas, and these species are often more robust (USFWS 2009). Different vegetative species provide safe areas for large and small species at different times of the year. Table 2 shows resources found in riparian zones.

Lakes

Lakes are important habitats for fish and waterfowl, though other animals also take advantage of them. Lakes are defined as having a surface area of more than five acres (Sanderson et al. 1973). Bodies of water smaller than five acres are considered ponds. Deepwater is also a factor in differentiating a lake from wetlands. According to the United States Geological Service (USGS) (2021), many characteristics of a lake affect the amount of water it holds, including climate, soil (groundwater flow), physiography, and morphometry. Shallower sections of lake edges sometimes foster more vegetation. Table 3 shows resources found in lakes.

Upland Zones

As the name implies, uplands are higher elevation habitats with little to no above ground water. The limited water creates perennial bunchgrasses and sagebrush communities. Soils in upland zones are “... rocky, thin, low in organic matter, and high in minerals” (The Oregon Conservation Strategy 2021). Uplands are just as important as wetlands for certain taxa including rabbits, sage grouse, and big horn sheep. Table 4 shows resources found in uplands zones.

Food Resources

Male Deer (Odocoileus hemionus)

Today, mule deer are common throughout North America and were widespread in the Great Basin during early historic times (Grayson 2011). Mule deer move seasonally but spend a lot of time in uplands. They are not wetland-dependent but visit wetlands where they graze in sedge-dominated seasonal wetlands and wet meadows (Gammonley 2004). Riparian zones are also important for thermal cover in the summer, and mule deer frequent wetlands, especially during harsh winters or summers (Lohman 2004). I suggest that mule deer visit wetlands during the summer, fall, and winter (Gammonley 2004; Broughton et al.
### Table 1. Wetland Resources.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Return rate (kcal/hr)</th>
<th>Density (Ind/ha)</th>
<th>Available seasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Deer (<em>Odocoileus hemionus</em>)</td>
<td>17,971–31,450</td>
<td>0.08</td>
<td>Summer, fall, winter</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>1,975–2,709</td>
<td>6.83</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Cattail roots (<em>Typha latifolia</em>)</td>
<td>269–3,299</td>
<td>0.3</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Tui Chub (<em>Gila bicolor</em>)*</td>
<td>750–7,514</td>
<td>1.68</td>
<td>Spring, summer, fall, winter</td>
</tr>
</tbody>
</table>

Note: Return rates for mule deer, waterfowl (Kelly 2014; Simms 1987); return rates for cattail (McGuire and Stevens 2017); return rates for tui chub (Raymond and Sobel 1990); mule deer density (Nevada Department of Wildlife [NDOW]); cattail density (Knell 2007:87); waterfowl density (Barnett and Martinez 2019); tui chub density (Raymond and Sobel 1990). *Tui chub numbers based on net catching.

### Table 2. Riparian Zone Resources.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Return rate (kcal/hr)</th>
<th>Density (Ind/ha)</th>
<th>Available seasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Deer (<em>Odocoileus hemionus</em>)</td>
<td>17,971–31,450</td>
<td>0.08</td>
<td>Summer, fall, winter</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>1,975–2,709</td>
<td>6.83</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Cattail roots (<em>Typha latifolia</em>)</td>
<td>269–3,299</td>
<td>0.3</td>
<td>Spring, summer, fall, winter</td>
</tr>
</tbody>
</table>

Note: Return rates for mule deer, waterfowl (Kelly 2014; Simms 1987); return rates for cattail (McGuire and Stevens 2017); mule deer density (NDOW); cattail density (Knell 2007:87); waterfowl density (Barnett and Martinez 2019).
Table 3. Lake Resources.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Return rate (kcal/hr)</th>
<th>Density (Ind/ha)</th>
<th>Available seasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Deer (Odocoileus hemionus)</td>
<td>17,971–31,450</td>
<td>0.08</td>
<td>Summer, fall, winter</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>1,975–2,709</td>
<td>6.83</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Cattail roots (Typha latifolia)</td>
<td>269–3,299</td>
<td>0.3</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Tui Chub (Gila bicolor)*</td>
<td>750–7,514</td>
<td>1.68</td>
<td>Spring, summer, fall, winter</td>
</tr>
</tbody>
</table>

Note: Return rates for mule deer, waterfowl (Kelly 2014; Simms 1987); return rates for cattail (McGuire and Stevens 2017); return rates for tui chub (Raymond and Sobel 1990); mule deer density (NDOW); cattail density (Knell 2007:87); waterfowl density (Barnett and Martinez 2019); tui chub density (Raymond and Sobel 1990). *Tui chub numbers based on net catching.

Table 4. Upland Resources.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Return rate (kcal/hr)</th>
<th>Density (Ind/ha)</th>
<th>Available seasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Deer (Odocoileus hemionus)</td>
<td>17,971–31,450</td>
<td>0.1</td>
<td>Spring</td>
</tr>
<tr>
<td>Pronghorn (Antilocapra americana)</td>
<td>15,725–31,450</td>
<td>0.040</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Bighorn Sheep (Ovis canadensis)</td>
<td>17,971–31,450</td>
<td>0.077</td>
<td>Spring, summer, fall, winter</td>
</tr>
<tr>
<td>Jackrabbits (Lepus californicus)</td>
<td>13,475–15,400</td>
<td>0.030</td>
<td>Spring, summer, fall, winter</td>
</tr>
</tbody>
</table>

Note: Return rates for mule deer, pronghorn, bighorn sheep, jackrabbits (Kelly 2014; Simms 1987); mule deer and bighorn sheep density (NDOW); pronghorn, jackrabbit (Knell 2007:87).
2008; Elston et al. 2014), moving to the uplands in the spring.

**Bighorn Sheep (Ovis canadensis)**

According to Broughton and colleagues (2008:1917), "Bighorn sheep in arid settings... require free water sources within close proximity to plant forage, thermal protection, and rocky escape terrain." In western Nevada, bighorn sheep vary in herd size and location over the course of a year, with most sheep living higher than 2,400 m above seal level during the summer and staying within 3–5 km of watering holes (Kelly 2001). In the winter, herds move to lower canyons. Bighorn sheep hunting would be predictable in the late fall–early winter when multiple sheep could be captured at one time (Kelly 2001). Ethnographically, bighorn sheep were not hunted frequently, though early logistical groups brought them from mountains to valley camps where their hides and horns had different uses (Fowler 1992). I suggest that bighorn sheep stay in uplands annually.

**Pronghorn (Antilocapra americana)**

Whitaker and colleagues (2019:86) write that pronghorn, "... prefer forbs, then shrubs, then grasses, and rarely feed extensively in one place." In the winter, pronghorn form large herds but separate into smaller groups during the rest of the year (Whitaker et al. 2019). They avoid soft wet ground because they lack a dew claw. Deer and elk have dew claws, which provide traction in wet environments (Whitaker et al. 2019). Collins (2016) tracked pronghorn in the northern Great Basin and showed that pronghorn follow a north-south gradient, using fall migration routes frequently and repeatedly. Typically, pronghorn use higher elevations during summer months and descend to lower elevations during the winter (Collins 2016:109). Ethnographically, pronghorn were hunted communally. Hunts were guided by a shaman who would go out a day ahead, come back with a location, and lead the hunting party to the herd. The hunters would use a brush corral or sagebrush cord and club the animals to death or shoot them with arrows (Fowler 1992:76–77). In this study, I suggest pronghorn are available in the uplands during the summer and fall, visiting wetlands and lakes during the winter and spring.

**Jackrabbits (Lepus californicus)**

Jackrabbits were important food resources in the Great Basin as they could be hunted in various ways (Kelly 2001). Jackrabbits are abundant in areas that support sagebrush, greasewood, and salt brush and occupy the same habitat year-round (Fowler 1992). Ethnographically, Jackrabbits were hunted communally, and hunts involving nets could last 10–15 days (Fowler 1992). These drives were usually conducted in the fall when meat and pelts were in the best condition (Kelly 2001). I suggest jackrabbits occupy the uplands annually.

**Waterfowl**

Fowler (1992) estimates that 12 to 18 million ducks visit the Great Basin wetlands annually, with highest use in the summer. Waterfowl seem to prefer a 1:1 ratio or 1:2 ratio of foliage cover to water, making wetlands more suitable than open water (Kelly 2001). However, in the winter, shallow wetlands can freeze so larger, deeper lakes become concentrated with waterfowl (Gammonley 2004). Waterfowl were abundant in wetland areas of Cattail-eater country, and the Cattail-eaters took advantage of the abundance (Fowler 1992). Hunters used nets or blunt-tipped arrows to take waterfowl individually, though they sometimes also used a communal drive technique (Kelly 2001). In this study, I assume that waterfowl occur throughout the year in both lakes and wetlands.

**Cattail (Typha latifolia)**

Cattails are available in marshes and offer an average return rate of 3,299 kcal/hour (McGuire and Stevens 2017). The bulbs of cattails act as energy reserves which are easily digestible and expedient for humans to procure (McGuire and Stevens 2017). Cattails were harvested year-
round, with spring roots having lower return rates than winter roots (McGuire and Stevens 2017). According to McGuire and Stevens (2017), 1 acre of cattail can produce nearly 6,650,000 calories. The Cattail-eaters of western Nevada gathered cattail roots in the spring and fall, noting that they were best in the fall (Fowler 1992:65). I suggest cattail are available annually but use two different return rates for spring/summer collection and fall/winter collection.

*Tui Chub* (*Gila bicolor*)

Tui chub are minnows that adapt to multiple environments including fresh to alkaline water. They live in large open bodies of water and streams, rivers, and marshes. They prefer to school in shallow waters (Raymond and Sobel 1990). Tui chub reproduce rapidly, averaging 23,300 eggs a year with spawning taking place between April and August depending on warm spring weather (Raymond and Sobel 1990). People used gill netting and dip netting to capture tui chub in shallow lakes (Raymond and Sobel 1990; Fowler 1992:61–62). In this study, I suggest tui chub are available annually.

### Methods

To create a suitability calculation, I used the abundance calculation initially developed by Kornfeld (1994) and adapted by Knell and Hill (2012). It is a quantitative estimate using kilocalorie per hectare (kcal/ha) of overall environmental zone productivity which provides a proxy for a caloric return-rate per habitat (Knell and Hill 2012). The caloric return-rate allows a comparison of resource availability between habitats. The calculation for kcal/abundance is as follows:

\[ A = D \times W \times K \times C \]

where \( A = \) abundance in kilocalories per hectare, \( D = \) plant or animal resource density per hectare (ind/ha), \( W = \) edible weight in kilograms (kg/ind) of an average plant or animal taxa, \( K = \) kilocalories per kilogram (kcal/kg) for each plant or animal, and \( C = \) cull rate estimates the harvest loss rate that a plant or animal can sustain (Knell and Hill 2012:43). Table 5 lists the values for the seven resources I include in my model.

### Table 5. Variables and Data Used to Calculate Resource Abundance.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Density (Ind/ha)</th>
<th>Edible Weight (kg/ind)</th>
<th>Caloric Yield (kcal/kg)</th>
<th>Cull Rate</th>
<th>Abundance (kcal/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Deer (uplands)</td>
<td>0.1</td>
<td>34</td>
<td>1258</td>
<td>0.08</td>
<td>342</td>
</tr>
<tr>
<td>Mule Deer (wetlands)</td>
<td>0.08</td>
<td>34</td>
<td>1258</td>
<td>0.08</td>
<td>274</td>
</tr>
<tr>
<td>Desert Bighorn Sheep</td>
<td>0.077</td>
<td>34</td>
<td>1258</td>
<td>0.08</td>
<td>264</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>0.04</td>
<td>24</td>
<td>1078</td>
<td>0.08</td>
<td>124</td>
</tr>
<tr>
<td>Jackrabbit</td>
<td>1.05</td>
<td>1.0</td>
<td>1078</td>
<td>0.5</td>
<td>336</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>6.83</td>
<td>0.65</td>
<td>948</td>
<td>0.25</td>
<td>1,052</td>
</tr>
<tr>
<td>Cattails, roots (spring)</td>
<td>0.3</td>
<td>0.002</td>
<td>300</td>
<td>0.25</td>
<td>0.045</td>
</tr>
<tr>
<td>Cattails, roots (winter)</td>
<td>0.3</td>
<td>0.002</td>
<td>3700</td>
<td>0.25</td>
<td>0.555</td>
</tr>
<tr>
<td>Tui Chub (nets)</td>
<td>1.68</td>
<td>0.025</td>
<td>1250</td>
<td>0.25</td>
<td>1312</td>
</tr>
</tbody>
</table>

Note: Deer and bighorn density (NDOW); pronghorn (Knell 2007); jackrabbit density (Fowler 1992:77); waterfowl density (Barnett and Martinez 2019); tui Chub density (Raymond and Sobel 1990); edible weights for animals and plants (Simms 1987:45); caloric yield (Simms 1987:45); cull rates (Knell 2007; Knell and Hill 2012); tui chub caloric yield (Fowler 1992:61).
I use modern density data as a proxy for past resource density, acknowledging the limitations associated with long-term change in how species interact with habitats. Additionally, animal densities are not distributed evenly across a landscape. Since mule deer occupy both wetland and upland habitats, two density rates are needed to show the differences between the habitats. To do this, I used mule deer population estimates in hunt units managed by Nevada Department of Wildlife (NDOW).

To understand whether there is a correlation between mule deer estimates and water sources, I used the Wetland Map of Nevada, provided by the Desert Research Institute (DRI). I imported a Nevada hunt unit shapefile, a Nevada mule deer population shapefile, and Nevada wetland shapefile into ArcGIS Pro. While my study area is in Oregon, Nevada artiodactyl density data was most accessible for this project. I chose a hunt unit (Number 213) that contained less than 1% water to represent the upland habitat. I divided the area of the hunt unit by the population estimate to find the population of mule deer in an upland area. Next, I chose another hunt unit with wetlands and divided the area of that hunt unit by the population estimate (of deer and bighorn sheep). Next, I multiplied the divided population estimates by the total habitat area in each unit. I took pronghorn densities from Knell and Hill’s (2012) study since I assume pronghorns do not visit wetlands or lakes regularly.

I collected the edible weights in kilograms and caloric yields for resources from Simms (1987) unless noted in Table 5. I used newer rates whenever possible, but Simms (1987) still provides the most uniform data for this project. I used Knell and Hill’s (2012) cull rate to estimate the loss rate plants or animals sustain over a year. Cull rates are relevant to my project because they provide the element of realism of loss (i.e., predation or old age) of a taxon in a habitat.

In the previous section, when defining the habitats, I determined when a resource was available for harvest using both ethnographic accounts and modern data about those resources. I used the resource abundance from Table 5 and multiplied them by the return rates of each resource per habitat and per season to calculate when the minimum and maximum abundance rate would occur throughout the year (Table 6). There are flaws with these methods, as loosely assigning animals and plants to habitats based on seasonality is not always going to be accurate. Variability of climate per year can change spatial distribution of migrating animals or cause some plants not to produce. However, Paleoindians certainly could have distinguished which habitats had more resources available than others (Knell and Hill 2012).

Results

Table 5 shows the abundance calculations of all the food resources. Waterfowl have the highest density at 683 (ind/ha) but have the second lowest caloric yield at 948 (kcal/kg). Tui chub also have a high density at 168 (ind/ha) with a caloric yield of 1250 (kcal/kg). Mule deer, bighorn sheep, and pronghorn have similar densities and caloric return rates. Jackrabbits have a high density of 260 (ind/ha) and a high caloric return (1078 kcal/kg), but they only occur in one habitat. Cattail roots in the winter has the highest caloric yield (3700 kcal/kg), but because the density is so low, their abundance does not contribute much to a habitat.

Table 6 shows an interesting trend. Throughout the seasons, wetlands and lakes have the same number of kilocalories per hectare. Uplands have a similar suitability as wetlands and lakes; however, upland numbers expand in the spring when mule deer are added. Riparian zones have the lowest kilocalories per hectare. Based on the results of Table 6, in terms of suitability ranking, uplands should rank number one with 131,297,358 kcal/ha, wetlands and lakes should be tied for second with 103,708,086 kcal/ha, and riparian zones rank in third with 60,338,614 kcal/ha.
Table 6. Summary of Seasonal kcal/ha Resource Abundance in Each Habitat.

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W</td>
<td>RZ</td>
<td>L</td>
<td>UP</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Sum/Total</td>
<td>29,313,270</td>
<td>18,470,902</td>
<td>29,313,270</td>
<td>28,598,844</td>
</tr>
<tr>
<td>Minimum</td>
<td>7,985,903</td>
<td>7,001,903</td>
<td>7,985,903</td>
<td>11,221,844</td>
</tr>
<tr>
<td>Maximum</td>
<td>21,327,366</td>
<td>11,468,998</td>
<td>21,327,366</td>
<td>17,377,000</td>
</tr>
<tr>
<td>W</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>RZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Sum/Total</td>
<td>15,770,096</td>
<td>4,927,728</td>
<td>15,770,096</td>
<td>45,500,826</td>
</tr>
<tr>
<td>Minimum</td>
<td>3,061,712</td>
<td>2,077,712</td>
<td>3,061,712</td>
<td>17,367,926</td>
</tr>
<tr>
<td>Maximum</td>
<td>12,708,384</td>
<td>2,850,016</td>
<td>12,708,384</td>
<td>28,132,900</td>
</tr>
<tr>
<td>W</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>RZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Sum/Total</td>
<td>29,311,450</td>
<td>18,469,082</td>
<td>29,311,450</td>
<td>28,598,844</td>
</tr>
<tr>
<td>Minimum</td>
<td>7,985,766</td>
<td>7,001,766</td>
<td>7,985,766</td>
<td>11,221,844</td>
</tr>
<tr>
<td>Maximum</td>
<td>21,325,684</td>
<td>11,467,316</td>
<td>21,325,684</td>
<td>17,377,000</td>
</tr>
<tr>
<td>Total Sum</td>
<td>103,708,086</td>
<td>60,338,614</td>
<td>103,708,086</td>
<td>131,297,358</td>
</tr>
</tbody>
</table>

Note: W=wetland, RZ=riparian zone, L=lake, UP=upland, N=number of resources per habitat per season.
Discussion

In this study, I have created a suitability calculation to rank four habitats that occur in the Great Basin to determine how people may have chosen where to settle during the TP/EH. I assume that calculated abundance provides a proxy to evaluate which habitats are most suitable for people based on caloric return. The results show that uplands have the highest suitability out of the four habitats in the study. Wetlands and lakes come in second with riparian zones being ranked third. Based on predictions of the IFD model, the first people entering a new region should choose the habitat with the highest initial suitability, and here, uplands are the highest ranked. Wetlands and lakes are comparable in suitability, only being ~27,000 kcal/ha behind uplands. These results are interesting as archaeological evidence shows that the earliest sites in the Great Basin occur around pluvial lakes and wetlands (Willig and Aikens 1988; Beck and Jones 1997; Jenkins et al. 2016; Smith and Barker 2017), and early Holocene sites are associated with uplands (Layton 1970; Aikens et al. 1977; Smith 2022). These calculations are purely estimates but other archaeological studies might shed light on these results.

In the spring, uplands had the highest suitability because of the abundance of artiodactyls. Middleton and colleagues’ (2014) research demonstrate that Paleoindian points are associated with Great Basin Carved Abstract (GBCA) petroglyphs commonly found in the uplands of the northwestern Great Basin. Their results show a strong correlation with WST points, GBCA, and sagebrush-upland environments. The authors note that low sage communities may act as a proxy for geophytes because both taxa need well-draining soil (Middleton et al. 2014). The evidence supports the notion that Paleoindians settled in the uplands during seasonal rounds to hunt and harvest root crops (Middleton et al. 2014). Larger mammals have higher return rates, especially if they are hunted communally (Hockett et al. 2013). Perhaps hunting artiodactyls in the uplands when root crops were available for harvest created suitable habitats for early people.

While the density of fish and waterfowl make the suitability higher in lakes, the fact that these resources occur in the same habitat throughout the year make them predictable. The Great Basin was an optimal habitat for migrating waterfowl on the Pacific Flyway during the late Pleistocene as lakes and marshes dominated the region (Moss and Erlandson 2013). Waterfowl would have been abundant throughout the year, as migrating waterfowl, and non-migrating waterfowl, presumably used these lakes and marshes as prime breeding grounds (Moss and Erlandson 2013). Additionally, bird meat is fattier than large game and full of micronutrients that would have been important for fetal development (Hockett 2007). If people targeted waterfowl for their high return rates in addition to their abundance, then lakes and wetlands would have contained predictable high-quality resources for people.

Zeanah (2004) and Elston and colleague’s (2014) research on male and female foraging goals are relevant here. The researchers suggest that men and women might logistically hunt in uplands for high-risk resources, such as artiodactyls. When high-risk resources are procured, females may break away and gather low-risk resources in wetlands, such as cattail and fish. Determining where to settle should be determined by the women’s foraging goals (Zeanah 2004); however, Elston and colleagues (2014) suggest that large game were available in wetlands during different seasons, making logistical hunting trips unwarranted. People may have settled in habitats with multiple predictable resources available.

There are limitations to these calculations. First, adding more food resources will undoubtedly help to develop predictions of suitability more accurately. Only using seven resources gives a rough estimate of the foods that people might encounter in certain habitats, and it does not
provide the full picture. Incorporating more plant species may increase abundance rates in riparian zones, wetlands, or uplands. We certainly know that foragers did not only eat meat (McDonough 2019), and they would have likely enjoyed a balanced diet. Adding resources such as seeds, roots, leafy greens, smaller mammals, and even insects might show different suitability ranking per habitat.

Finally, this suitability calculation can be applied to physical areas in the Great Basin. For example, if there is ten hectares of wetland in a basin, the total abundance of a wetland can be multiplied by ten to estimate the calories available to people settling in that wetland. I can then develop predictions of the IFD model to evaluate how people settled in the Great Basin during the TP/EH based on known archaeological sites. Again, an assumption of the IFD model is that people are free to settle any habitat at any time. Once the population density increases, the habitat will become less suitable and newcomers should move to the next most suitable habitat. Based on this study, I expect that the most suitable and earliest sites will be located in uplands; however, wetlands and lakes have high suitability as well and more predictable resources. Seasonality likely plays a huge role in how we see people settling on a landscape. Incorporating more details on resource migration and habits during the different seasons will likely generate more detailed predictions of the model.

Conclusion

We know people were settling in the northwestern Great Basin by ~14,200 cal B.P. (Jenkins et al. 2012, 2016; Blong et al. 2020), but our knowledge of why they chose to settle in certain habitats is limited. Here, I calculate suitability by combining return rates with estimates of resource abundance to rank four habitats: wetlands, riparian zones, lakes, and uplands. I included seven common food resources that early people may have targeted. These estimates are preliminary and can be applied to develop predictions of settlement distribution by using ideal distribution models.

My results suggest that upland habitats are highly suitable and provide high caloric returns. These returns are likely due to the return rates of large mammals that would be available at different times of the year for people to procure. Wetlands and lakes also produced high caloric returns because of high fish and waterfowl densities and that were predictable throughout the year. Future work will consist of adding more food resources, especially ones that would represent a balanced diet in different habitats. Despite some caveats with using modern and ethnographic data for food resources, my study shows it is possible to make estimates of return rates from different habitats. We currently do not know what habitats were most suitable for the first people in the northwestern Great Basin; however, using models can help researchers develop predictions of which habitats were likely more suitable for people during the TP/EH.
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Violence, Structure, and Agency in Labor Market Segmentation Among Mexican Migrant Farmworkers

Lark P. Cummings

Abstract  Medical anthropologists have long used the concept of structural violence to investigate the suffering of marginalized groups. Following Paul Farmer (1996, 2004), anthropologists such as Nancy Scheper-Hughes (1992), Philippe Bourgois (2001, as well as Bourgois and Scheper-Hughes 2004), and Seth Holmes (2013) have critically analyzed the ways that unfair political economic structures create injury and illness with comparable effects to a gunshot or a stab wound. This research has expanded beyond the concept of structural violence to include a whole spectrum, or violence continuum. As productive as this research has been, it has primarily emphasized patterns of violence that move downward from social structure, thus leading to an overly deterministic approach that conceals the role of agency. This article uses the case of the migrant farmworker experience in labor markets to advocate for a renewed analysis of the violence continuum that appreciates the role of violent practices in the production of structure, as well as vice versa, in a process of mutual causality that has not been emphasized. This concept of violence is first outlined in detail, and subsequently explored through examination of labor market segmentation among migrant farmworkers in the United States adding to the work already done by medical anthropologists using the traditional version of the violence continuum paradigm (Holmes 2013).

Keywords  Structural violence, immigration, farm work, labor market segmentation, medical anthropology.

Introduction

What role does violence play in the construction of labor markets? While historically many forms of labor market construction have involved direct coercive violence, such as slavery, the indirect violence structuring labor markets today often remains unexamined. This article attempts to utilize anthropological theories of violence, in conjunction with labor market segmentation theory, to explore how various forms of violence contribute to the construction and regulation of labor markets, specifically migrant farmworker labor markets in the United States.

In the last three decades, theoretically informed anthropological analyses of violence have grown precipitously, in both quality and quantity. In particular, the concepts of structural violence (Galtung 1969, 1975; Farmer 1996, 2004) and the violence continuum (Bourgois 2001; Bourgois and Scheper-Hughes 2004) have...
had a significant impact in the field, relating different forms of violence (political, structural, symbolic, and everyday) to one another and to political-economic structures within (neoliberal) capitalism. Other researchers have successfully drawn on this body of work in their analyses of suffering and violence in myriad field circumstances. For example, Holmes (2013) provides a powerful analysis of health disparities among Triqui migrant farmworkers in the United States, connecting their different kinds of social suffering to their position within an ethnicity- and citizenship-based hierarchy in U.S. farm work. Holmes attempts to show the different forms of violence faced by Triqui migrants, whether it be political violence coming from the Mexican military, structural violence in the form of neoliberal restructuring and “free trade” policies, the everyday violence of racism and subordination within the ethnic hierarchy of farm work, or the symbolic violence normalizing these other forms of violence. He takes care to demonstrate how no individual actor within this system wills violence, but rather it is dictated by the structural constraints of the system itself.

Holmes at once refers to the market imperatives of U.S. agriculture, the political violence of the state against the Indigenous in Southern Mexico, the decades-long process of neoliberalization in Mexico and the Global South, and the long history of racialization of migrants in the U.S. all as components of the determining structure. While all of these variables are relevant, their precise relationship is underspecified in Holmes’ work, and several things remain unclarified. For one, the fact that neoliberal policies displaced Indigenous smallholder farmers in rural Mexico does not explain how this was significant to the neoliberal project there, or the mechanisms by which profit is extracted from migrants via their displacement and economic dislocation. Stating that the structural violence of free trade policies is what drives migrant displacement still leaves us asking what structures impelled these economic reforms in Mexico, and to what ends. Whether or not this violence was ancillary to particular labor markets in the neoliberal period, or whether it was merely incidental violence, collateral damage so to speak, is an important question, and one that requires a different kind of approach. One might say that Holmes investigated the role of labor markets in the production of migrant suffering; another question entirely is the role of migrant suffering in the production of labor markets.

The case of Holmes’ widely-read study makes a broader point about the operational utility of the violence continuum as a theory with explanatory value. Does this theory have the potential to be more than a taxonomic system for naming different forms of violence, or can it tell us something about why particular kinds of violence happen, and what ends they might serve? In the interest of pursuing the latter, this article proposes the conjunctural use of labor market segmentation theory (LMST) with an augmented version of the violence continuum in order to examine the relationship between different forms of violence and labor market formation. LMST has serious potential in mapping the contours of violent practices as necessary to the formation of capitalist labor markets. Firstly, it shows violent practices to be a structuring force in their own right, not just a result of structuring processes; many unequal structures could not exist without the ongoing recurrence of violence. Second, it helps show how the precise connections between specific forms of violence and specific market, industrial, and labor configurations, such as the unique violence specific to migrant farmworkers in our industrial agricultural system, constitute a structure-violence matrix where both elements interpenetrate and produce one another in specific, historically and geographically contingent ways. Thirdly, LMST gives us insight into the kinds of political action that can seriously hope to ameliorate violence; in other words, what power relations and structures must be altered in order to really undermine extant regimes of violence?

In this article, Holmes’ widely-cited study serves as a point of departure from which to explore the relationships between violence and
labor markets. As the title of Holmes’ ethnographic text makes clear, the fresh fruits available to consumers of U.S. produce come at the cost of the broken bodies of migrant laborers. Using the theories of the violence continuum and LMST in conjunction, we can begin to ask why this deal was struck, how it is maintained, and what the conditions of its overturning might look like.

Theoretical Review

Theories of Violence

One prominent antecedent of many contemporary medical-anthropological theories of violence can be found in the work of Paul Farmer, specifically his use of the concept of structural violence (1996, 2004). While Farmer did not invent the term (that distinction belonging to Johan Galtung, 1969), he did bring it to a new audience and a fertile field of inquiry. Following Farmer, scholars such as Bourgois (2001) used this violence concept in conjunction with others to develop the idea of a “violence continuum,” in which multiple strands of violent practices interact and mutually influence each other.

Bourgois’ four forms are direct political violence, structural violence, symbolic violence, and everyday violence. Direct political violence refers to targeted, avowed, and visible violence, such as military or police repression. Structural violence, drawing largely on Farmer (1996, 2004), refers to “chronically, historically entrenched political-economic oppression and social inequality” (Bourgois 2001:8). Symbolic violence, developed from Bourdieu’s concept (Bourdieu and Wacquant 2004), refers to the misrecognition of social hierarchies as naturally existing and therefore justified, ranging from race and ethnicity to gender. Everyday violence, adapted from Scheper-Hughes’ (1992) work, describes expressions of violence on the daily, interpersonal level which mask structural inequalities.

In Farmer’s work and in the scholarly tradition that followed, including Holmes (2013), structural violence played a key role in highlighting the absence of choice for victims in the emergence of disease outbreaks such as AIDS and tuberculosis. It combatted individualized notions of responsibility for personal health and disease, demonstrating the structural barriers to health faced by vulnerable populations. While of course doing much good in drawing attention to the broad structural conditions leading to negative health and life outcomes in marginalized individuals, populations, and nations, the relationship between violent practices and structures remains underspecified, with an implication that violence is performed indifferently on victims by structures in a unidirectional, top-down flow. Structures do not have agency; however, to attribute violence to structures, as if they exist and can act without the necessary participation of agents, is both strategically self-defeating (a problem discussed further in the conclusion) and analytically spurious. A multi-dimensional understanding of the relationship between violent practices and social structures is key to understanding why violence occurs when it does, where it does, and how it does, and what consequences it has for social structure.

Violence: Between Structure and Agency

Violent practices do not simply emerge from structures as if acting out a pre-scripted inequality, but rather violent practices (emerging and existing independent of structures) enable the production and reproduction of structures that come to operate through them and depend upon them for their continued existence.

Patterns of violence are constitutive of social structure, but rather than a concrete instantiation of an abstract social reality, these concrete actions are the sites on which abstract social realities are created. They are not direct products of structure, instead emerging from complex interactions of multiple structural fields and numerous agents. Structure is incapable of “doing” anything by itself; it is the landscape in which agents act, and agents may always act outside of, or in opposition to, structures. Out-
comes of structure, if they can be called such, are always probabilistic and contingent in nature, never deterministic. Structure does provide an evolving context in which violent practices adapt and change, with violent practices in turn feeding into social structure, adapting it, and so on—but at every instance, agents have the choice to act in opposition to structure, rather than reproducing it.

One way of understanding the interdependent quality of violence and structure is in terms of existential imperatives. As social structures emerge—for example, markets—they do so under historically and geographically specific conditions (technology, capital, competition, labor, etc.). As those conditions evolve, a result of any number of factors, structures can be threatened, and their existential conditions (for example, a segmented labor supply) might disappear. The deterioration of existential conditions can produce any number of outcomes, from the withering of structures to their adaptation. Agents benefiting from certain structural conditions (for example, capitalists benefiting from easily exploitable labor markets) are prone to act in defense of these structures however they can—including violence. This too, though, is not predetermined but dependent on the agency of the actors in question, and could always be different.

**Adapting the Violence Continuum**

Whither the violence continuum? To better capture the relationship between violence and structure, the concepts of structural violence and the violence continuum must be reworked to some degree. One important observation is that political, everyday, and symbolic violence are themselves clearly structure-producing and -shaping phenomenon, often rather important ones. Given this fact, what was called structural violence in Bourgois’ model must be understood very differently. For Bourgois and others, the importance of structural violence was to emphasize the indirect consequences of inequality, which have effects tantamount to the violence of a gunshot or stab wound. The distinction between this kind of indirect violence and other, more clearly visible forms is still desirable and necessary. However, this should obscure the fact that direct, symbolic, and everyday violence, as well as indirect violence, are fundamentally structural in that they produce structures. To that end, what Bourgois called “political” and “structural” violence, shall instead be called here direct and indirect violence, terms which accurately reflect the differences between the two.

To reiterate, direct violence is visible, avowed, and acknowledged, while indirect violence is invisible; disavowed; and, if acknowledged, naturalized and politically neutralized. These two form the primary tier of violence, with everyday and symbolic violence forming a secondary, or reactive, tier, seeing as they by definition emerge in circumstances where primary tier violence has already taken place. Each of these four kinds of violence has the capacity to structure social relations, doing so to different degrees in different contexts. For this reason, structurality may be conceived as being a kind of continuous variable that all forms of violence possess to greater or lesser degrees, rather than a categorical type of violence. Calling a form of violence structural ought to be a statement about its relations to specific structures, not a quality of the practice itself. This does not mean that violence only exists in relation to a particular structure, only that we must be precise when we speak of the structural quality of violence.

While distinctions of terms such as these may seem trivial, recognizing the structuring qualities of all modes of violence is critical to the project explored here, and continuing to use a unidirectional and simplistic concept of structural violence is an impediment to those goals.

**Labor Market Segmentation Theory**

Theories of labor market segmentation date back to the 1950s, beginning with Kerr’s (1954) study of internal labor markets. Through several successive generations of theorization, a well-developed body of work has emerged which
seeks to re-evaluate theorizations of the labor market in a fashion critical of the synchronic and highly abstracted competitive models which define neoclassical approaches (Doeringer and Piore 1971; Gordon 1972; Gordon, et al. 1982; Marsden 1986; Rubery 1992). Following Reich et al. (1973:359), segmentation is "the historical process whereby political-economic forces encourage the division of the labor market into separate submarkets, or segments, distinguished by different labor market characteristics and behavioral rules."

While contemporary theories of LMS extend beyond political-economic drivers of the phenomenon, the important claim remains consistent: there does not exist one labor market, regulated by competitive pressures and through wage signals, but rather several different labor markets, constructed under historically and geographically specific circumstances, each with different rules of engagement and process. Quoting Peck (1996), "[t]he conception of the labor market as a complex, not to say contradictory institutional structure could hardly be further from the neoclassical image of a self-equilibrating labor market in which individual actors pursue rational self-interest within a framework of free competition" (46). Today, multiple causal threads which lead to segmentation are considered important, including the traditional emphasis on institutions and political-economic pressures, but also including such things as the family and the sphere of social reproduction, labor union activity, the presence of marginalized groups in the population, technological development, and much else.

As stated above, LMST embraces multiple causal threads in its understanding of the labor market. These different threads have been grouped by segmentation theorists into three main conceptual categories: supply-side factors, demand-side factors, and state-regulatory factors.

Early approaches were limited to mainly demand-side variables, emphasizing technological limitations and industrial development as key variables (Doeringer and Piore 1971). Later theorists, such as Reich et al. (1973), emphasized segmentation as a labor control strategy, and linked it to processes of monopolization within capitalism. By the late 80s and early 90s, without abandoning this earlier work, theorists were drawing on ideas of social reproduction and occupational socialization, as well as state influence. Peck (1996) emphasized the spatiality of segmentation processes as connected with processes of uneven development, highlighting local influences on labor market structures. Altogether, this literature does not form one body of theory, but rather "a cluster of models and theoretical approaches" (Rubery 1992:246). Following Peck (1996), investigation of labor market structures must be done empirically and in a manner appreciative of the historical and geographic contingencies involved. A priori theorization of labor market structures without this investigation of specific conditions is not possible.

A History of Migrant Farm Labor Segmentation in the United States

This section divides the history of migrant farm labor segmentation into two parts, before and after the passage of the Immigration Reform and Control Act (IRCA) in 1986. To some degree this is an arbitrary delineation, but the IRCA has several advantages as a turning point. IRCA created a new model of immigration policy, in response to a "crisis" of undocumented immigration—an outgrowth of consequences of the 1965 Hart-Celler Act, itself in some important ways influenced by the cultural representations of undocumented migration developed in the days of Operation Wetback (discussed below) and earlier. That said, the IRCA had significant, if unintended, consequences for the structure of migrant labor markets and ushered in a new, if unexpected, regime of migration policy, which would continue through to the present. In order to understand that regime, then, we need to look at the 40 years preceding the passage of IRCA, a period which includes both the Bracero Program and its fallout.
The Bracero Program was a two-decade foray into state-managed migrant labor contracting which had profound consequences for all subsequent migration of Mexicans to the United States. Beginning under labor shortages during WWII, the purpose of the initial Bracero Program was short-term in scope. Growers were desperate to find a cheap labor source for the harvest, and were reticent to raise wages, concerned that such wage increases would stick around after the war. At the same time, Mexico was experiencing significant economic disruption for the rural poor, increasingly displaced by modernization projects. The consequent high unemployment was a real problem for the corporatist Mexican state, and the safety valve of emigration was a tempting fix. In addition to a legal program, the Bracero period also saw the first large-scale flows of undocumented migrants from Mexico to the United States, many of whom were former or future Braceros. Growers often employed a mixed workforce, thus maximizing their flexibility, although undocumented laborers were cheaper and more easily controlled (Henderson 2011). When Bracero contracts were withheld, which happened for many reasons, growers now turned to undocumented labor to fill the gap.

The idea of undocumented migration was still very new in this period, illegal entry having only been established as a crime less than two decades prior (Ngai 2004). There were still no formal quotas on western hemisphere migration to the United States for the entire duration of the Bracero Program. That said, this period did see the first large-scale deportation spree in U.S. history, Operation Wetback (1953–1954), and the surrounding discourses of exclusion. The idea of a “wetback invasion” took hold in the population, and didn’t leave, even after the “crisis” was declared resolved. In reality, many of the deportations which took place were symbolic, a process known as “drying out the wetbacks.” Undocumented workers were taken to the border, instructed to place one foot on Mexican soil, and then welcomed back into the United States under Bracero contracts. For this and other reasons, Operation Wetback was one of the key developments in U.S. migration policy that shaped everything that came after (Mize and Swords 2011).

Employer control over Braceros was near absolute under the program. In the words of one Texas grower, “we used to buy our slaves, now we rent them from the government” (quoted in Henderson 2011:82). After a brief experiment with railroad work, Braceros were limited to agricultural work. Employer-pegged contracts meant that workers could not switch jobs, and could be dismissed by employers for any number of reasons, from rowdiness to suspected union organizing. Oftentimes, in camps predominated by undocumented workers, immigration raids were called in just before payday, and the majority of workers deported without wages. Living conditions were squalorous and pay was frequently withheld. In principle, Braceros were supposed to be able to appeal to the U.S. government for such abuses, but in reality this was beyond the abilities of most Braceros. Braceros were also attractive because of their families—still in Mexico and an anchor pulling migrants back home at the end of their contract.

Remittances grew in this period to become one of Mexico’s chief sources of U.S. dollars. The separation of the labor process from the sphere of social reproduction (the home) allowed Braceros’ families to survive on a fraction of the cost of living within the United States, lowering the effective subsistence wage (Burawoy 1976). The formation of a population which people expected to be subordinated, including members of that population themselves, was a lasting legacy of the Bracero Program. In addition to fueling xenophobic discourses (such as the “wetback invasion” narrative), people came to associate Mexican migrants with this type of work and these types of conditions. The families of Braceros became connected to parts of the United States they themselves had never been, and came to expect the lifestyle associated with having a remitting migrant sending home money from abroad. As the children of Braceros came
of age, they faced the same expectations. Instead of working traditional family plots, this was the way that work passed from generation to generation—through transnational migrant-employer networks. This development was perhaps the most lasting consequence of the Bracero Program, as it would keep the migration pipelines running well after the Bracero Program itself ended.

In sum, the Bracero Program allowed growers to establish a nearly watertight segmented market, from which migrants could rarely escape. A displaced population with little English language experience or knowledge of U.S. socioeconomic norms was invited far from their homes, to work under tightly controlled conditions, with few rights, and no accountability for their employers.

Their subordination was legally instantiated, and if they went outside the law, they did not find better working conditions but worse ones. Moreover, this fed back into the realm of social reproduction, and the children of migrants were often siphoned into the same occupations.

In 1964, the Bracero Program finally ended. This took place in the context of civil rights legislation in the same year, and the abolition of the 1924 national quota model of migration regulation in 1965. The number of Bracero contracts had at this time been declining for many years, and the undocumented population (greatly reduced under Operation Wetback a decade before) was growing again. Ending the Bracero Program, it was hoped, would moderate some of the extra-legal flows (an idea that seems somewhat silly in retrospect). The 1965 Hart-Celler Act, which overhauled U.S. migration policy, also placed a quota on Mexican migration (something that had never been done before). The result was that legal pathways for Mexican migration to the U.S. dropped to a fraction of their size practically overnight. Naturally, this coincided with the latest round of modernization in the Mexican agricultural sector, known as the Green Revolution, which brought industrial farming south of the border. This model required high capital inputs, irrigation infrastructure, high pesticide and fertilizer use, proprietary seed genetics, mechanization, and a reduction in agricultural employment. This kind of development drove rural inequality through the roof, and the only available solution to lost livelihoods for many was migration, now largely the illegal kind (Barry 1995).

Migration in the post-Bracero period was defined by the twin dynamics of economic stress in Mexico and tightening hostility in the United States. Growers, of course, were anything but hostile, and fiercely argued their right to use migrant labor (Henderson 2011). By this time, Mexican labor had been integrated into agriculture for so long that there was no domestic labor force capable of filling the gap—that is, unless wages and working conditions were improved. Rather than do this, however, growers maintained their illicit labor networks and increased them to new proportions. The precipitous growth of the undocumented population naturally met with inflammatory rhetoric from politicians and pundits, and this unease had its impact on legislation eventually.

Ultimately, the IRCA emerged from these considerations. The 1965 rollover in immigration policy left an unstable dynamic in labor migration, and once economic hardship returned to the United States in the 1970s, old cultural discourses of exclusion boiled over. In 1979, the Carter administration oversaw the beginning of an investigation into undocumented migration that carried into the 1980s, and ended up recommending three provisions to dealing with the problem: employer sanctions for those hiring undocumented workers, amnesty and legal residency for undocumented residents of the United States, and a closing of “back door” (illicit) migration coupled with a slight opening of “front door” (legal) migration. These provisions formed the bedrock of the IRCA, signed into law by President Reagan in 1986 (Bean and Khuu 2020).

The unintended consequences of this law were momentous and set a new direction for U.S. immigration policy. The employer sanctions
provision, so long fought for by organized labor, ended up losing most of its teeth in the negotiation process, and consequences were easily avoided by the adoption of new employment practices like subcontracting. These subcontracting systems took advantage of socially connected migrants, who acted as labor brokers and crew bosses.

These crew bosses were typically migrants with a long migration history, some with legal status gained through IRCA. They were slightly more secure than the routine waves of young, poor, indebted, and socially isolated male migrants that made up the bulk of migration flows, and they had connections with employers as well as migrants (Horton 2016). All wages were paid on a group contract and dispersed by the crew bosses. This intermediate layer between migrants and companies insulated the latter and made the former even more expendable—competition within and between crews was harsh, and anyone caught slacking or taking breaks (even to use the bathroom or drink water) was castigated not only by their boss, but by their crewmates as well (Holmes 2013; Horton 2016).

IRCA’s sanctions operated by mandating paperwork checks, but ones that were easily avoided. Crew bosses often worked as “identity” brokers as well as labor brokers, connecting undocumented migrants with fake or borrowed documents (Horton 2016). Working under somebody else’s name or social security number was an easy way to get around document checks—and it accrued benefits to the person whose identity was being used, making loaning one’s legal documents out a popular side hustle for migrants with legal status.

IRCA also attempted to “close the back door” of undocumented migration by increasing Border Patrol funding and beginning the militarization of the southern border. Halting undocumented migration was to some degree always a pipe dream (see Andreas 2000), but it was still effective political rhetoric, and engaged those cultural representation of the “migration threat” that had fueled IRCA in the first place. This made life more and more difficult for migrants, heightening their risk of deportation. It also began to make crossing the border more expensive, which in the short term had relatively few impacts, but within a decade had driven up the cost of border smuggling significantly (Massey et al. 2003). By adding to the debt burden of undocumented migrants, this made them intensely vulnerable to exploitation (Horton 2016). Often times it was crew bosses or other social connections who provided loans for migrants to pay smugglers, and migrants entered the country indebted to their employers.

Heightened danger and costs to border crossing also discouraged circular migration, favoring permanent residency for migrants, an ironic consequence (Massey et al. 2003). This and other consequences of the IRCA were exacerbated by subsequent legislation in the 1990s that dramatically heightened border militarization (through such programs as Operation Gatekeeper, among others), further excluded migrants from public services (see for example the 1996 Illegal Immigration Reform and Immigrant Responsibility Act), and added criminal status to many activities when they were performed by undocumented migrants. This is why it is useful to speak of the IRCA as beginning a new “regime” of migration policy—many of the tendencies first legally codified in IRCA were intensified under subsequent legislation, but the pattern was the same. As demand for migrant farm labor remained relatively constant, state restrictions grew, making the supply more and more vulnerable, precarious, and exploitable.

Concurrent to these changes in migration policy were yet another round of economic reforms in Mexico, these of a distinctly neoliberal nature. The integration of the U.S. and Mexican economies that began with the 1982 debt crisis and culminated in the North American Free Trade Agreement left millions, especially in the countryside, with no ability to support themselves aside from migration (Barry 1995). The new Mexican economy was structured in what Delgado-Wise and co-authors have called the “cheap-labor export-led model,” with economic enclave (maquiladora)
manufacturing and migration as the two primary forms of labor export (Delgado-Wise and Covarrubias 2007; Delgado-Wise and Cypher 2007). Over the course of the 1990s, the atmosphere of hostility in the U.S. grew hotter and hotter, with such movements as the “Save Our State” initiative in California propelling themselves through xenophobic rhetoric. The adoption of “Prevention Though Deterrence” policies lead to the deaths of countless migrants by blockading urban ports of entry and guiding migrants into the most dangerous parts of the border. Violence by indirect means was the toolkit of this policy set, using landscapes as weapons against migrants (Slack et al. 2016). The United States federal government in this period, following Jason de Leon (2015:84), “knowingly created a border security infrastructure that puts people in harm’s way.” After 9/11, this militarization took on the mantle of anti-terrorism, with undocumented migrants increasingly being cast as dangers to society, criminals, and potential terrorists. The creation of the Department of Homeland Security in 2002, which took responsibility for border security from the Immigration and Naturalization Service (INS), lead to a skyrocketing in budget and the development of what has been called the “Immigration Industrial Complex” (Golash-Boza 2009a, 2009b; Trujillo-Pagan 2014) This new phase in the disciplining of migrants extended the same model of segmentation to new heights, and turned it into a billion-dollar industry.

**Discussion**

In examining evidence of migrant farm labor segmentation in the United States, several important variables become visible. Each of these variables evolved throughout the period analyzed, and had a consequent effect on the changing structure of market segmentation in the period. By tracing their historical trajectories, I hope to paint a dynamic picture of migrant farm labor’s segmentation since WWII, which can then be analyzed using the violence continuum.

**Demand-side Factors**

Demand factors have been strong and long-standing. Unfree labor had long played an important role in the agricultural economy of the American South, and though the model of guaranteeing this labor had changed in different periods, the need has not gone away (Henderson 2011). As David Bacon (2008:90) has it, “U.S. Agriculture is addicted to a vast reservoir of cheap labor... African Americans made up the rural labor force of the south, first as slaves, then as sharecroppers and tenant farmers, and finally as wage laborers.” In the southwestern United States, industrial agriculture has, especially since the Bracero Program, relied on immigrant labor from south of the border. Industrial agriculture requires high volumes of short-term laborers in order to make a profit, and high control over that labor is key to success. Stalling during the harvest season can cost thousands to millions of dollars in lost crops, and thus labor agitation represents a serious threat. For this reason, growers always wanted more laborers than necessary, preferably ones that could be easily divided and did not have access to political representation.

Employment practices also play an important role in market structures, through such means as guestworker programs, employee recruitment, and contracting systems. Guestworker programs are one of the most interesting forms of labor market segmentation, because they are performed with direct state and private cooperation, and because they institutionalize otherwise informal systems of labor regulation. The transition from formal guestworker programs to informal and undocumented migration is of interest as well, and discussed below.

**Supply-side Factors**

Before migrants ever cross the border, legally or otherwise, they have already gone through many experiences which pushed them in this direction. Mexico’s tumultuous economic history during the twentieth century led to the economic displacement of millions, uprooted
VIOLENCE, STRUCTURE, AND AGENCY IN LABOR MARKET SEGMENTATION

first by Mexico’s dreams of modernization, then by the failure of that dream, and finally by the new solution of economic integration embraced in the 1980s. This cross-generational pattern of migration left a strong legacy in rural Mexico, where migration became an expectation for many.

Many former farmers, forced to abandon their farms by agribusiness competition, chose farm labor as a way to maintain their attachment to the land. The conjunction of this with a migrant habitus (Wacquant 2016; Holmes 2013), passed down from parents to children, pushed generation after generation into the same kinds of jobs. For those who moved permanently to the United States, this was sometimes escapable—barriers like a lack of education, English language skills, and familiarity with socioeconomic conventions had big impacts on the foreign-born, but little for those who were born or grew up in the United States. This dynamic implies that a rural migrant habitus is a somewhat important variable in the maintenance of labor supply.

State Policy

State policy, by regulating means of formal entry, has a huge influence on the prospects for all migrants. A whole host of legal structures mediate between laborers and employers, shaping the market. Guestworker programs are one such structure. A lack of guestworker programs, coupled with restrictive immigration policy, form another. Constructions of citizenship (and all the rights that go with it, such as unemployment insurance, education, and access to healthcare) are not written in stone, and they have evolved significantly over the course of the last century.

The flip side of noncitizenship is deportability, even for those with legal status. This deportability has long been an asset of employers of undocumented labor, allowing for harsh discipline of their workforce alongside endemic abuse and outright wage theft. While this doesn’t mean that the state can truly prevent entry, it can greatly shape the experience of migrants once they are here, legal or otherwise. The state can also exert a degree of influence over growers, though control would be a generous term. For example, growers fought tooth and nail against the inclusion of the employer sanctions provision in the 1986 IRCA, which penalized employers who used undocumented labor (Choe 2001). Nevertheless, the provision was included, albeit in a porous way that allowed for easy avoidance. Agribusiness adapted to this change in legal landscape not by hiring fewer undocumented workers, but instead it prompted a shift in employment practices to avoid accountability under the law. So, while the state may attempt to influence different actors in the market, ultimately this influence is almost always circumnavigable and produces unintended outcomes.

It is also important not to forget the existence of cultural and representational practices that shape distinctions between groups, create social norms that regulate employment expectations, and limit what is and is not possible for different groups of people. The concept of habitus was briefly mentioned above, and it also falls into this category. Racial ideologies have played a profound role in the history of Mexican migration to the United States, and the mapping of ethnic hierarchies, citizenship hierarchies, and workplace hierarchies onto one another is of profound importance to segmentation (Bourgois 1988; Holmes 2013). Cultural practices have a recursive element, in that they constitute the social fields that influence state policy, industrial structures, labor supply formation, etc. Given the relationship between anti-immigrant xenophobia and restrictive immigration practices, and between the latter and segmentation in migrant labor markets, cultural and representational practices deserve serious consideration in this analysis.

Theoretical Synthesis: Violence and Segmentation

Having reviewed the historical details of how segmentation has worked in the instance of migrant farm labor, we can now look to understanding the role of violence in this pro-
cess. There is good reason to say that violence, of various sorts, is what makes migrant farm labor’s segmentation possible. Migrants navigate a landscape of violent practices that define their choices, and guide them into particular forms of employment that are in turn structured by violence.

The first key form of violence to consider is the indirect violence of uneven development that undermined rural livelihoods in each of the periods discussed, limiting opportunities for survival in the traditional means. Rural development, through such projects as the Green Revolution, relies on the disruption of extant socio-environmental arrangements to progress. The transfer of rural populations from independent subsistence communities to wage-labor markets by economic force is the basic driver of out-migration in many cases, producing the proto-segmented labor pools necessary for segmentation to occur. This type of violence is structural in Galtung’s (1969, 1975) sense as well as the one outlined in this article.

The violence of uneven development drove migrants into the Bracero Program, seeking new sources of subsistence in a high-unemployment society. However, those programs too were laced with violent practices such as abuse, wage-withholding, racism, and requirements to work in dangerous conditions and to live in unhealthy ones. These were forms of direct violence that were perceived as justified given the racial hierarchies misrecognized by employers and laborers alike as natural-symbolic violence. This symbolic violence became embedded in a cross-generational habitus that understood and expected abuse as normal, and lead new generations into the same kinds of arrangements. While racism and abuse within farm labor was endemic, beyond farm work migrant labor was even more marginalized and not accepted for a very long time. Mexicans were associated with a particular section of the labor hierarchy, as well as a particular section of the citizenship hierarchy, and deviating from this position heightened their abuse. During the Bracero period, it was outright illegal for Mexican laborers to work outside agriculture in many instances. The growth of undocumented migration under the Bracero period and in following years redefined these hierarchies in new terms, and with new cultural representations. As new rounds of uneven development in Mexico occurred under neoliberalism, volumes of migration ballooned, and these cultural representations gained more and more power. Today, what Hagan, Levi, and Dinovitzer (2008) have called the “Crime-Immigration Nexus” continues to drive this process.

Anti-immigrant rhetoric and deportation practices serve as a helpful example. Under the Bracero Program, deportation was used by employers strategically, as a means of disciplining workers and keeping them vulnerable. In order to accomplish this, a discourse of the dangers of undocumented migration had to be constructed, and undocumented migrants associated with danger and criminality. A consequence of this was genuine concern over undocumented migration in the population, which boiled over once in the 50s, prompting Operation Wetback; again in 70s, prompting the IRCA; again in the 1990s, prompting Operation Gatekeeper and its ilk; and yet again after 9/11. In each instance, acts of direct violence were performed by specific actors out of convenience and a perceived opportunity at extra profits, but in each instance violent practices got away from those employing them and took on a life of their own. Over time, structures emerged which sustain these citizenship-workplace hierarchies and practices of enforced precarity, such as deportation. The “Immigration Industrial Complex” is a terrifying example of how this has run amok in immigration policy, with billions of dollars being spent each year with little show for it except thousands dead along the border, and thousands more in detention facilities (Golash-Boza 2009a, 2009b; Trujillo-Pagan 2014). The criminalization of migration has other violent consequences on migrants’ lives, beyond the immediate threat of deportation. Horton (2016) has documented the effects of the chronic stress of undocumented
living in conjunction with farmwork. Since the mid-1990s, the systematic exclusion of migrants from basic social services, such as social security, education, and healthcare, constitutes an egregious violation of human rights and a system of indirect violence.

The reliance of these kinds of labor markets on proto-segmented labor pools is also of interest. While obviously industrial agriculture did not bring about economic disruption in Mexico so as to exploit the peasants displaced by this process, it is significant that without that displacement, another source of it would have been necessary. This implies that, while segmentation clearly operates at different scales from such long-run processes as uneven national development, it relies on these processes to work. In other words, structures of segmented labor markets develop under conditions of violence, and thus they require ongoing violence as time goes on to be sustained.

Conclusion

What use is this knowledge? If it is true that the profitability of industrial agriculture is linked to segmented markets, which are in turn linked to ongoing violent practices, we cannot truly hope to eliminate violent practices without dismantling those structures within our societies that rely on them—but this is not enough. We are dependent upon social structures, such as unjust labor markets, for our very survival, and escaping our dependence on violent practices is a positive project as well as a negating one. New structures must be erected which both meet the needs of people and do not rely on violence for their ongoing survival. For those concerned specifically with immigrant livelihoods and rights, developing an alternative agricultural model would go a long way to dealing with violent practices that marginalize migrants from our society through such symbolic violences as racism. An alternative model of agriculture that does not require violence to sustain itself is perhaps very far away from our current reality, but it does exist. One of the key barriers to change within agriculture is the lack of political voice for those who are most intimately connected with the injustices of that system—namely, migrants. Giving political voice and power to migrant farm labors would allow for more equitable forms of agricultural production to emerge. This is the first, but not the only step in ridding our production systems of violence.

There is a temptation, demonstrated well by Holmes, to identify the violence experienced by migrants under this system as without an agent. This problem is the intellectual child of Farmer’s structural violence concept, which sought to show how those individuals were suffering from their inequalities as much as their infections. While Farmer was undoubtedly right in a certain sense (it is equally inaccurate to blame victims of poverty for the condition as it is to blame abstract structure), displacing blame (and therefore, in a sense, agency) onto structures is self-defeating. Following Wacquant, what good may come of adopting “a concept that somehow diffuses responsibility in order to expand its ambit” (Wacquant 2004:322)?

Holmes and Farmer both propose an approach to addressing the issues they analyze, what they call pragmatic solidarity. By joining with the everyday struggles of the oppressed, it is argued, we can begin to denaturalize their social suffering. Holmes goes a step further in his admiration for a friend whose public advocacy for migrants resulted in her loss of employment, and whose solidarity “went beyond the pragmatic to challenge power structures and representations that are harmful to migrant farmworkers” (Holmes 2013:192). What is powerful about this approach is that it (correctly) observes that acts of human agency in opposition to oppressive structures are the only thing capable of changing these structures. Conversely, what prolongs the existence of unjust structures is acts of human agency which reify and support them. Pragmatic solidarity must involve recognizing the ways in which our lives and habitus are dependent,
in a sense, on the suffering of others—how the fresh fruits we eat are predicated on the broken bodies of migrants. Illuminating the history of this bargain, and denaturalizing the oppressive structures which sustain it, must also examine where, in every instance, acts of violence which continue to structure our societies are located—and they are not located in the abstract realm of social structures, as Holmes and Farmer maintain, but in the concrete realm of human interaction and human choice.

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Lark Cummings recently graduated from Eastern Washington University with two bachelor’s degrees in Anthropology and Geography. His interests include agriculture, immigration, and the anthropology of labor, as well as urban and economic geography. While taking the 2022–2023 school year off to pursue other projects, he plans to pursue a graduate degree in anthropology and continue studying immigrant labor markets and the role of violence therein.

This article was originally submitted to the 2022 Northwest Anthropological Conference Student Paper Competition and was awarded first place in the undergraduate category.
Inchelium Cultural Research Center

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Abstract  An Indigenous cultural research center is readying to open in the town of Inchelium, Washington, located on the banks of the Columbia River at the eastern edge of the Colville Reservation. In 2013, tribal member Kaye Perkins Hale coordinated with Nancy Michel to store, oversee, protect, and share Kaye’s decades-long research and archive—including books, files, notebooks, genealogies, and oral and written histories about her people and tribe. Despite setbacks and hardships spurred by the global pandemic and regional wildfires, a board of directors was assembled to fulfill the requirements necessary to gain status as a non-profit research center. The Inchelium Cultural Research Center (ICRC) is a community-based library located on a federally recognized reservation. ICRC is not an enterprise, subsidiary, or representative of the tribe, rather serves the tribal community of Inchelium as an independent, state incorporated, tribal member-led 501(c)(3). ICRC is preparing to open its doors to share and connect historical resources and cultural knowledge with the Inchelium community and the general public.

Keywords  Inchelium Cultural Research Center; Inchelium, Washington.

Undeterred by a series of momentous roadblocks, an Indigenous cultural research center is readying to open in the town of Inchelium located on the banks of the Columbia River at the eastern edge of the Colville Reservation in Washington (Attachments 1–3).

WAY’—a Salish “hello” from the Inchelium Cultural Research Center (ICRC) Board of Directors: Everything that has ever happened to us in the past brings us here— informs our purpose, who we are, and greets you today.

Travel back with us to 2013 when tribal member Kaye Perkins Hale asked her friend, Nancy Michel, to store, oversee, protect, and share Kaye’s decades-long research and archives. The boxloads of books, files, notebooks, genealogies, oral and written histories about her people and her tribe were transported into Nancy’s converted garage. A support team organized the collection and searched for a suitable building in Inchelium to permanently house the library.

The stored collection, perched atop a hill overlooking the town, was threatened during the catastrophic Labor Day fires of 2020. The fires swept eastern Washington. Fueled by high winds and intense summer heat, the rain-starved landscape burst into flames which began to seed new fires all over eastern Washington. Two towns south of Spokane, Malden and Pine City, were leveled within hours. Separate fires started in Inchelium and moved up the Hall Creek draw toward Nancy’s home. (Nearby neighbors’ rural homes were destroyed.) The flames reached within ten feet of the foundation where the vulnerable archives were kept. The tribal fire department arrived in time.

Pitched into both a fire and a pandemic, the dreamers of a cultural research center turned
these roadblocks into steppingstones. The board of directors, a group geographically widespread from Revelstoke, B.C., to Olympia, Winthrop, Spokane, and Inchelium, WA, was compelled to move forward. Virtual travel on Zoom enabled monthly planning meetings.

Step by step the board consistently fulfilled all the many requirements to gain status as a non-profit research center whose mission is to “create an accessible, welcoming space for research, sharing and dialogue; to provide community members an opportunity to store and contribute to the shared cultural record of our homeland; and to foster a meaningful connection between the community and the history of Indigenous groups of and around Inchelium” (Attachment 4).

The center is a community-based library located on a federally recognized reservation. Multiple members of the board are enrolled or descendants of the surrounding Confederated Tribes of the Colville Reservation. ICRC is not an enterprise, subsidiary, or representative of the tribe, rather serves the tribal community of Inchelium as an independent, state incorporated, tribal member-led 501(c)(3) (Attachment 5).

To date there is a lot of activity to report: the archive collection continues to grow. Encouraged by the Assistant Digital Archivist, Washington State Archives, Larry Cebula, and fueled by the urgency of preservation, we have begun digitizing the collection that is not yet in electronic format. Cebula, Eastern Washington University’s history professor, also cleared the way for one of his master’s students to do an internship with ICRC. The graphics for our logo and brochure were designed by a Sinixt descendant (Attachment 6). A 5-year lease has been negotiated with the Colville Confederated Tribes (CCT) for the tenancy of an in-town building; collaboration with the public schools and the Language House has been initiated; internships with upper-grade students are being offered. A community book event is scheduled for late fall 2022 to celebrate our open house, and the publication of Eileen D. Pearlke’s history of the Sinixt (Arrow Lakes) tribe, *The Geography of Memory: Reclaiming the Cultural, Natural and Spiritual History of the Snyackstx (Sinixt) First People* (2022, Rocky Mountain Books), which is an expanded edition of Pearlke’s 2002 book, *The Geography of Memory: Recovering Stories of a Landscape’s First People* (Kutenai House Press). A generous grant from The Association of Tribal Archives, Libraries, and Museums was awarded to ICRC this spring. The Interim Executive Director has been hired. A website is in development—although not live yet, it has a valid domain: incheliumcrc.org. The ICRC is on Facebook under its full name. Organization memberships are available. The brochure is being brought up to date. Donations, including memorials, are providing additional support for the cultural research center’s implementation and outreach.

The ICRC Board is in the driver’s seat—the destination is in view.

limlimtx (thank you) JONA editors for sharing the good news about ICRC!

Photograph of Kaye Perkins Hale (1935–2022) who supplied the extensive research and foundational archives (and inspiration) for ICRC.
Attachment 1. Map of the Inchelium location along the Upper Columbia River (south of Kettle Falls).
Attachment 2. Drone photograph of the town of Inchelium taken by Derrick LaMere (Sinixt), Indigenous filmmaker and owner of Warypony Pictures.

Attachment 3. Newly leased Inchelium Cultural Research Center building, which is connected to the tribal trading post store and located across the street from the Inchelium Community Health Center at 38 Short Cut Road, Inchelium, WA 99138. Plans include a sign and artwork on the outside of the building.
ICRC is a library and archive serving the Inchelium area. We have made great strides in planning to protect and preserve documents and artifacts that are evidence of our Upper Columbia River culture. These will be made available for viewing in-house to community members and researchers. Presently, we are searching for a home in Inchelium to house our growing collection of print and non-print items. These attest that we have always existed on our ancestral landscape – and remain.

Keep Us In Mind for historical items that need a home such as:
- Historical photos, family photos and oral history recordings and transcripts
- Family history research, genealogy documents
- Historical reference books and documents such as maps, government correspondence, and family records
- Artifacts relevant to areas of our ancestors including but not limited to regalia, beadwork, baskets and Tribal art

ICRC’s Mission:
To create an accessible welcoming space for cultural research, sharing and dialogue
To provide community members with an opportunity to store and contribute to the shared cultural record of our homeland; and
To foster a meaningful connection between our community and the history of Indigenous groups of and around Inchelium

ICRC has many tasks ahead, but does not want to miss opportunities to protect fragile and valuable items for future generations. For more information contact Nancy Michel, President, (H) 509-722-5135 (C) 509-690-4773 nancymichel@hotmail.com.

Attachment 4. Announcement of Inchelium Cultural Research Center.
Inchelium Cultural Research Center Receives $48,235 Award from The Association of Tribal Archives, Libraries, and Museums

Inchelium, WA – The Inchelium Cultural Research Center [ICRC] received a $48,235 grant through the Association of Tribal Archives, Libraries, and Museums (ATALM) American Rescue Plan: Humanities Grants for Native Institutions. This grant opportunity is intended to help Native Cultural Institutions to recover from the COVID-19 pandemic and provide humanities programming to their communities. Funds were provided by the National Endowment for the Humanities (NEH) as part of the American Rescue Plan Act of 2021 passed by the U.S. Congress.

Funds support the Sharing and Connecting Historical Resources and Cultural Knowledge with the Inchelium Community project that will increase access and outreach to its permanent collections through exhibitions and programming – online, in-person, and outdoors. The Research Center will work with the Inchelium Language and Culture Association, Indigenous knowledge keepers, schools, and local youth groups to share and connect historical resources and cultural knowledge with the Inchelium community and the general public.

ABOUT THE ORGANIZATION

*The Inchelium Cultural Research Center is a community-based library located on a federally recognized reservation. Multiple members of the board are enrolled or descendants of the surrounding Confederated Tribes of the Colville Reservation. The ICRC is not an enterprise, subsidiary, or representative of the tribe, rather, serves the tribal community of Inchelium, Washington, as an independent, state incorporated, tribal-member led 501(c)(3).

Attachment 5. Press release: Inchelium Cultural Research Center receives grant.
Attachment 6. First edition of the Inchelium Cultural Research Center brochure designed by Marsha McInnis (Sinixt).
ICRC is a library and archive serving the Indigenous community of the Inchelium area, as well as other non-Indian researchers throughout Canada and the United States. We have made great strides in planning to protect and preserve documents and artifacts that are evidence of our Upper Columbia River culture. These will be made available for viewing in-house to community members and researchers. Presently, we are searching for a home in Inchelium to house our growing collection of print and non-print items. These attest that we have always existed on our ancestral landscape – and remain.

**Keep us in mind** for historical items that need a home such as:
- Historical photos, family photos and oral history recordings and transcripts
- Family history research, genealogy documents
- Historical reference books and documents such as maps, government correspondence, and family records
- Artifacts relevant to areas of our ancestors including but not limited to regalia, beadwork, baskets and Tribal art

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**ICRC ANNUAL MEMBERSHIP APPLICATION**

Name ____________________________
Address __________________________
______________________________
City ____________________________
State/Province ___________ Zip ______
Phone __________________________
E-mail __________________________

☐ New Membership $20
☐ Renewal Membership $20

☐ $ ______ In Memory Of: __________________________

☐ $ ______ In Honor Of: __________________________

Please send application with your check payable to:

ICRC
P.O. Box 206
Inchelium, Wa., 99138

The Inchelium Cultural Research Center (ICRC) is a 501(c)(3) tax exempt organization. No material goods or services have been provided in exchange for your membership and/or contribution. Tax ID 83-4168217

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Attachment 6. (cont.) First edition of the Inchelium Cultural Research Center brochure designed by Marsha McInnis (Sinixt).
The *Journal of Northwest Anthropology (JONA)* is pleased to present the 2022 *Northwest Anthropological Conference Proceedings*. This is the second year that JONA has teamed with the Northwest Anthropological Association to publish the conference papers and posters.

Following the approach we took for the inaugural year, we have included all of the papers and posters submitted to us for inclusion; all have been published as submitted, with minor editing and style changes as needed.

We firmly believe that the NWAC Proceedings has the potential to play a major role in disseminating the contributions of anthropological research to peoples of the Northwest.

By publishing the NWAC Proceedings, we have an opportunity to build a Northwest anthropology community that includes this diverse group of people.

Open Access Available now at:
[www.northwestanthropology.com/nwac-proceedings](http://www.northwestanthropology.com/nwac-proceedings)
The Shoshone-Paiute of the Duck Valley Indian Reservation (DVIR) are traditional fishing Tribes of the northern Great Basin at the virtual upper end of the salmon migration route through Washington, Oregon, Idaho, and into Nevada. The Tribes have been increasingly deprived of salmon by the sequence of dams constructed during the nineteenth and twentieth centuries, resulting in significant cultural, dietary, and even economic losses. The Shoshone-Paiute have, in fact, been among those Tribes most affected by the reduction in fish passage due to dams, irrigation, industrialization, and other factors such that they do not have local access to salmon at this time. Because of these developments, the Shoshone-Paiute have been forced to increasingly expand their geographic range to the far reaches of their homeland and beyond in search of still existing salmon runs.

Phase I of this research reviews the published literature concerning Shoshone-Paiute fishing and documents the processes by which the Shoshone-Paiute have systematically been deprived of their fishing resource through the developments, their loss of ready accessibility to this vital resource on the DVIR, the continuing importance of fish to the Shoshone-Paiute people, and the Tribes’ claims of fishing rights to realize changes in the dams’ operation or other mitigation measures. It is clear that the right of the Shoshone-Paiute to continue fishing remains in effect despite the absence of fish runs proceeding from the Pacific to their homeland. Phase II examines three river systems in the Great Basin: the Owyhee, the Bruneau, and the Jarbidge and attempts to suggest potential traditional fishing sites and areas based on several criteria.

AVAILABLE AT NORTHWESTANTHROPOLOGY.COM/STOREFRONT OR AMAZON.COM