

CHAPTER 8

DECIPHERING POINT-OF-ORIGIN FOR PREHISTORIC HUNTER-GATHERERS AT YELLOWSTONE LAKE, WYOMING: A CASE STUDY IN LITHIC TECHNOLOGY AND SETTLEMENT PATTERN STUDIES

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ABSTRACT

Yellowstone Lake, Wyoming, is an excellent location to study hunter-gatherer lithic technological organization in prehistory. Well-defined lake-access routes, as well as a fairly well understood toolstone universe, facilitate an understanding of human settlement and land-use at the lake. The large size of the lake and its location at an apparent territorial nexus also leads to interesting lithic use and mobility patterns visible in archaeological refuse at prehistoric sites on the lake shores. Lithic data from archaeological excavations at sites on the northwest, northeast, southeast, and southwest shores of the lake reveal contrasting travel and lithic use patterns depending on individual point-of-entry to the lake shore. Ethnohistoric and archaeological data provide useful information in evaluating whether one or more ethnic groups from different regions utilized Yellowstone Lake in prehistory.

INTRODUCTION

At an elevation of 2,360 m (7,750 ft.) amsl, Yellowstone Lake, Wyoming, is North America's largest high-elevation natural body of water (Figure 8.1; YNP 2010:20). In addition, the lake provides abundant natural resources to sustain human populations. For the last 12,000 years, hunter-gatherers from all over the northwestern Plains, northern Great Basin, and Rocky

Mountains ventured to the lake to exploit animal, plant, and fish resources. Because these hunter-gatherers transported stone with them, Yellowstone Lake provides an excellent location to study hunter-gatherer lithic technological organization in prehistory.

Due to numerous prior studies (Canon et al. 1993, 1996, and 1997; Davis et al. 1995; Hale 2003; Hale and Livers 2013; Johnson et al. 2004; MacDonald et al. 2012; MacDonald and Hale 2013; Park 2011), the lithic landscape is well-defined at Yellowstone Lake and the surrounding ecosystem. In addition, prior work has established that access routes to Yellowstone Lake were constrained within several stream and river valleys. As discussed elsewhere (MacDonald et al. 2012), the large size of the lake and its location at an apparent territorial nexus also leads to interesting lithic use and mobility patterns visible in archaeological refuse at prehistoric sites on the lake shores. This paper compares lithic data from archaeological sites on the northwest, northeast, southeast and southwest shores of the lake. The data reveal variable travel and lithic use patterns depending on individual point-of-entry to the lake shore.

Prior research has defined two general models of hunter-gatherer use of Yellowstone Lake, both well defined by Johnson et al. (2004: 142-144) in their report on the Osprey Beach site on the southern shore of the lake. The first model, identified here as the Single User Model (SUM), proposes that Yellowstone Lake was seasonally utilized as part of an annual round by one group. The SUM is most recently advocated by Scheiber and Finley (2011) who further suggest that the single group was the Shoshone, at least in recent prehistory. The second model, defined here as the Multi-User Model (MUM), posits that a variety of ethnic groups from multiple regions utilized Yellowstone Lake in prehistory. The MUM is supported by the ethnographic literature, as well as by archaeological data provided by Park (2010, 2011).

LITHICS IN THE WEST

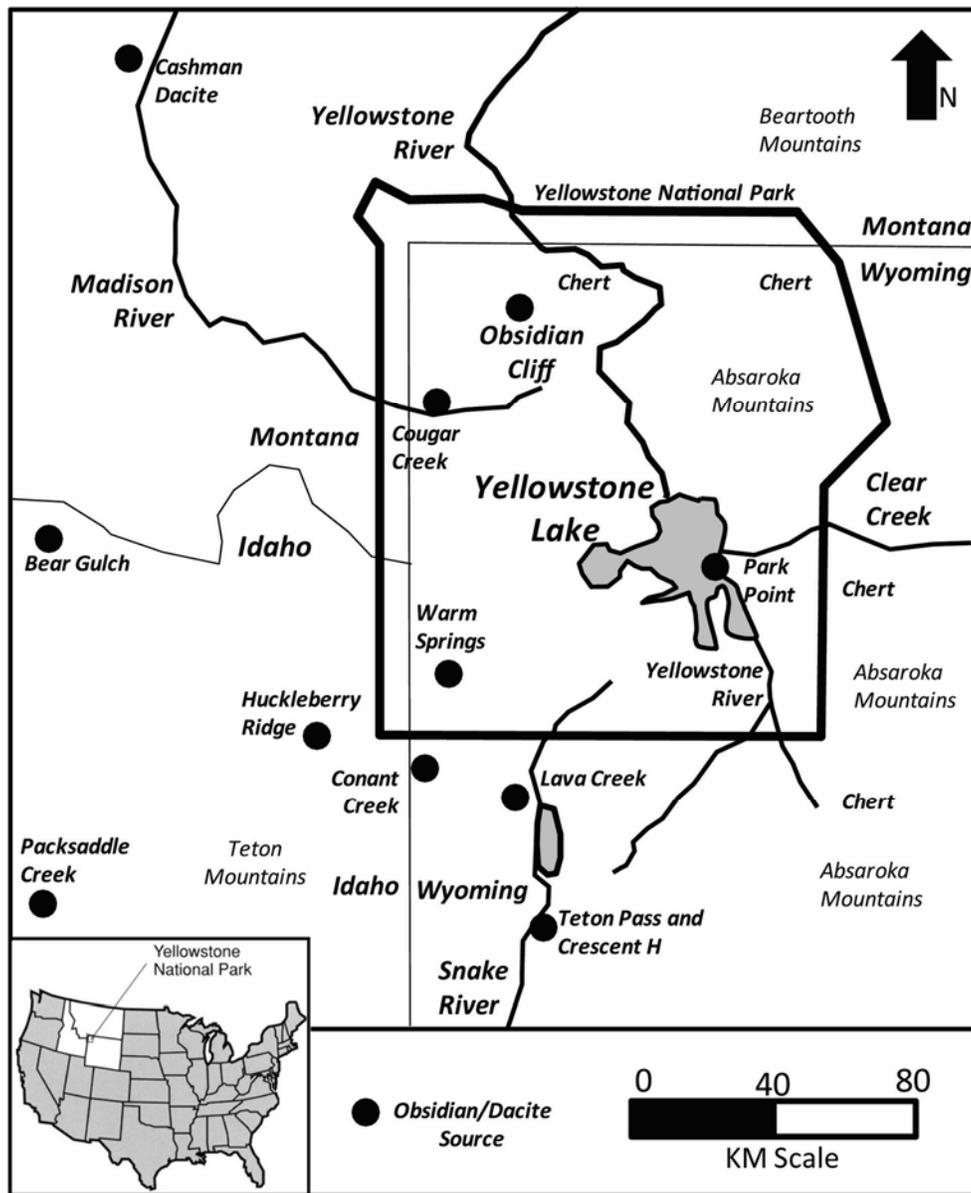


Figure 8.1. A Map of the Greater Yellowstone Ecosystem showing Yellowstone Lake and Regional Lithic Raw Material Sources.

The current paper evaluates the viability of each model — the SUM and the MUM — to determine if one ethnic group or multiple groups used Yellowstone Lake in the past. Ethnographic data are briefly summarized that largely support the MUM. More importantly for this paper, I utilize lithic data to evaluate the two models of lake use. In this regard, lithic raw material source data are presented for volcanic materials and, to a lesser extent, non-volcanic materials (e.g., chert,

orthoquartzite, petrified wood) that lend insight into hunter-gatherer mobility patterns. In this regard, the lithic data largely support the MUM in showing that multiple points of origin were utilized in the past, most likely by a variety of groups from at least three regions within the interior western United States.

LITHICS IN THE WEST

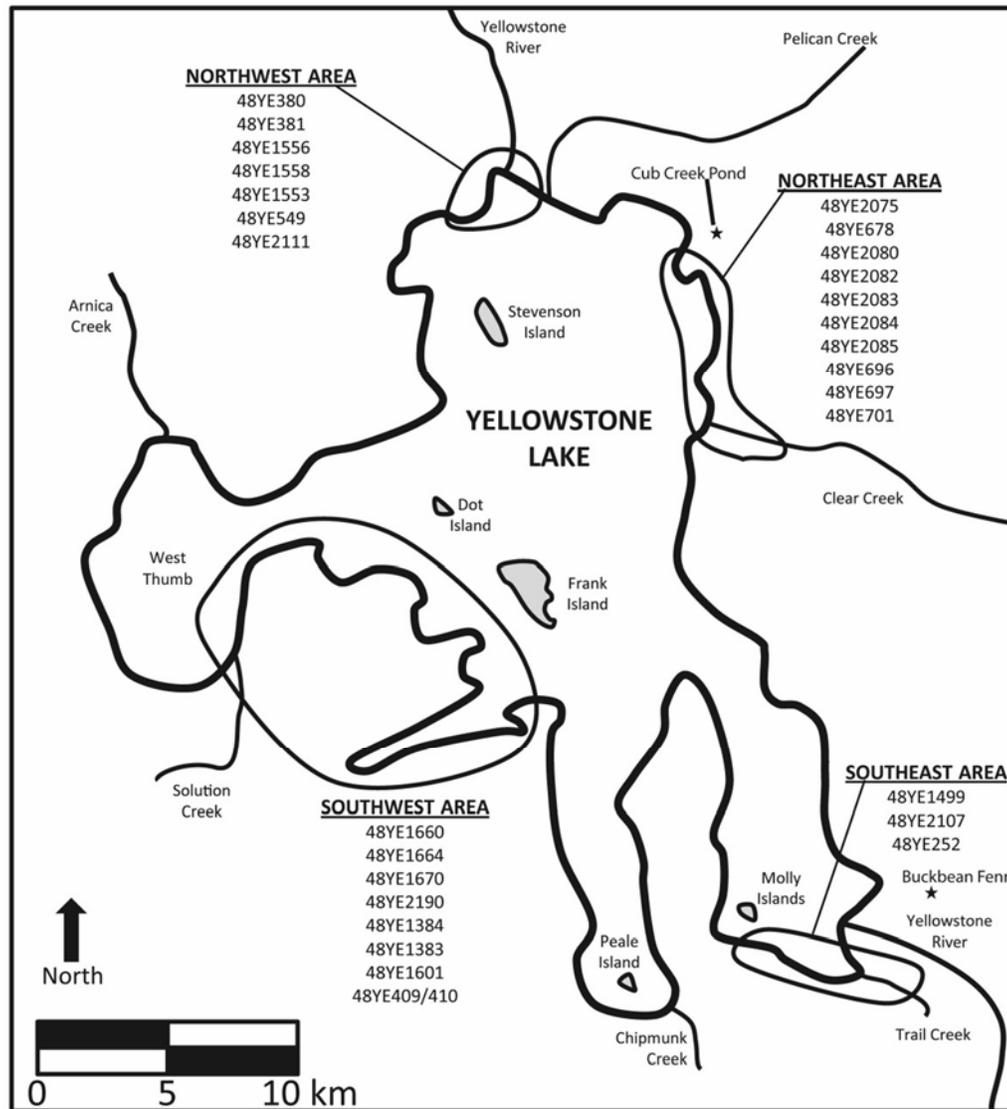


Figure 8.2. Map of Yellowstone Lake, including Key Archaeological Sites and Geographic Features Mentioned in Text.

BACKGROUND

Yellowstone Lake is the heart of the Greater Yellowstone Ecosystem (GYE) which encompasses nearly 80,000 sq. km. within northwest Wyoming, south-central Montana, and northeast Idaho (Figure 8.1). Measuring 32 km north-south and 22 km east-west with a shoreline measuring 225 km, Yellowstone Lake is bordered by the Absaroka Mountains to the east and the Teton Range to the south (YNP 2010:20). The Yellowstone River is the major tributary (Figure 8.2) and flows into the lake on its

southeast corner and out of it ca. 30 km to the northeast. Beyond the lake, the Yellowstone River flows 1,100 km across Montana and Wyoming as North America's largest free-flowing river. Among 60 or so other smaller streams that flow into the lake, Clear Creek arrives on its northeastern shore and has its headwaters in the Absaroka Range, nearly meeting the Shoshone River which flows eastward to the Big Horn Basin. Each of these three major waterways — the southern and northern Yellowstone Rivers and Clear Creek — were active travel routes in prehistory (MacDonald and Hale

LITHICS IN THE WEST

2013; Park 2011:125-129). Other major lake-feeder streams include Pelican Creek on the north, Trail Creek on the southeast, Solution Creek on the southwest, and Arnica Creek on the west. The Madison River to the west of the lake was also a major regional route utilized in prehistory to gain access to the GYE (Johnson et al. 2004: 142-145).

Seasonality is important to understanding human use of the GYE. May through October are the only months with average temperatures around or above 10° centigrade (50° F). November through March puts the lake area in snowfall zones averaging ca. 50 cm or more per month with accumulation of a meter or more from November through April. Yellowstone Lake is frozen several feet thick between approximately early December and mid-late May.

Yellowstone Lake's shores contain several vegetative zones, including mesic subalpine fir, forested riparian, graminoid riparian, and sagebrush or shrub and grass habitats (Despain 1990). Interspersed among the extensive pine forests that enclose the lake, these open meadows and riparian areas are extremely diverse, containing as many as 400 plant species (Elliot and Hektner 2000). The University of Montana (UM) identified 52 different plant species within a 20-acre meadow on the northwest shore of the lake, of which 15 species were recognized as food sources, 17 species as medicinal, and eight species as spiritually important (Kershaw et al. 1998). Wright et al. (1980:183) conducted a plant-use study for the nearby Jackson Hole region to the south of the lake, with similar findings.

This diversity of plant resources supports more than 60 mammal species, including bison, elk, moose, big horn sheep, deer, antelope, grizzly and black bear, mountain lions, coyotes, and wolves. A vast majority of Yellowstone's bison and other medium and large ungulates are seasonally migratory, moving up in elevation in warm seasons and down in elevation in cold seasons (Cannon 2001). Another seasonally migratory subsistence resource in Yellowstone Lake is cutthroat trout (*Oncorhynchus clarki bouvieri*), one of only two surviving original native cutthroat trout species left in North America. Cutthroat trout are abundant at the lake

(and were in the past), especially in spring when they run up the lake's creeks to spawn.

PRIOR ARCHAEOLOGICAL RESEARCH AT YELLOWSTONE LAKE

This paper's evaluation of the SUM and MUM models of lake-use is influenced by various projects conducted during the last 50 years at Yellowstone Lake, Wyoming. Since the first archaeological inventories of Yellowstone Lake's West Thumb area during the late 1950s, many archaeological studies have been performed around Yellowstone Lake. These are detailed by Hale and Livers (2013) and I only briefly summarize them here. Figure 8.2 shows the locations of important lake-area sites discussed in the text. Montana State University, Missoula (now the University of Montana) was the first to survey Yellowstone National Park (Malouf 1958; Hoffman 1961; Taylor et al. 1964). Hoffman (1961: 16-18) subsequently recording a high density of sites at Yellowstone Lake. Taylor et al. (1964) performed the first excavations at Yellowstone Lake at the Fishing Bridge Site (48YE1) near the Yellowstone River outlet, with additional work there by Cannon et al. (1993) and UM (Livers and MacDonald 2011).

In the 1980s, more-focused academic research was conducted by a handful of researchers associated with the Midwest Archaeological Research Center (MWAC) on the southwestern shore of the lake, results of which are discussed more fully below (Reeve et al. 1981; Samuelson 1983; Wright et al. 1978, 1980). In the 1990s, Cannon et al. (1996, 1997) of the MWAC conducted excavations at several sites on the west and north shores of the lake. Finally, on the lake's south shore, Ann Johnson (Johnson et al. 2004; Shortt and Davis, 2002) led excavations at the Late Paleoindian Osprey Beach site (48YE409/410) with its extensive Cody Complex (ca. 9,300 B.P.) occupation. More recently, Yellowstone National Park provided funding to the University of Montana (UM) to complete survey and testing of archaeological sites on the northwest, eastern, and southern shores of Yellowstone Lake (MacDonald 2012; MacDonald and Hale 2013; Vivian et al. 2007, 2008).

LITHICS IN THE WEST

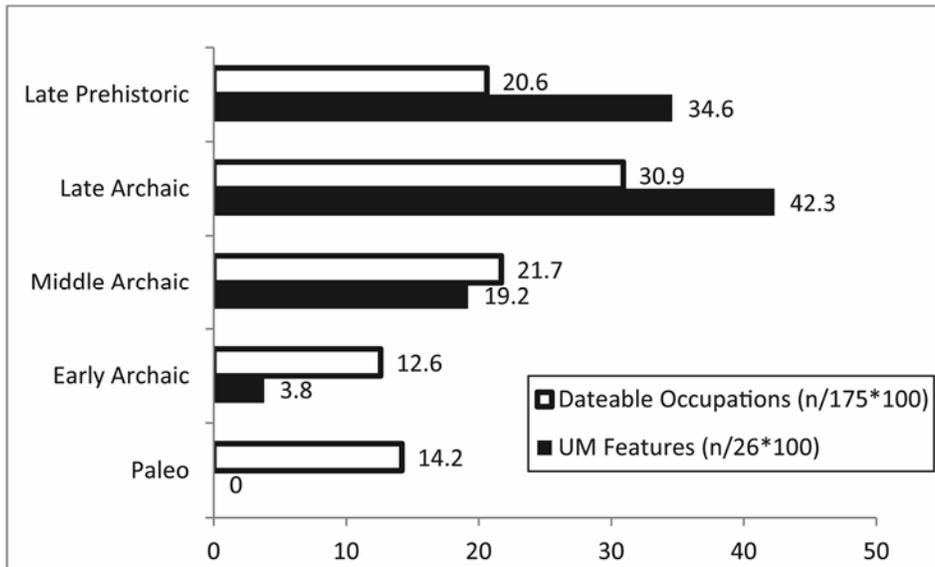


Figure 8.3. Prehistoric Use of Yellowstone Lake: Site & Feature Counts by Time Period.

YELLOWSTONE LAKE CULTURE HISTORY

These various studies have identified 285 archaeological sites along the shores of the lake, with 104 of those yielding 175 dateable occupations (Hale 2003; Hale and Livers 2013; McIntyre 2012). Recent excavations by UM at dozens of lake-area sites confirm active use of the lake since the Paleoindian period (Figure 8.3) (MacDonald and Livers 2011; Livers and MacDonald 2012; MacDonald et al. 2012). Of the 27 radiocarbon-dated features excavated by UM between 2009-2011 at 11 sites, only one (a ca. 6,800 B.P. hearth at 48YE381) predates 3,400 calibrated years ago (MacDonald et al. 2011), with Middle Archaic (n=5), Late Archaic (n=11), and Late Prehistoric (n=9) features dominating the feature assemblage. As of 2011, the various archaeological studies conducted at the lake have identified 25 Paleoindian, 22 Early Archaic, 38 Middle Archaic, 54 Late Archaic, and 36 Late Prehistoric occupations (McIntyre 2012). Based on research from other studies (MacDonald et al. 2012), lithic use is fairly consistent over time, with some exceptions (MacDonald et al. 2011, 2012). However, for the purposes of this paper, I hold time constant, instead preferring to focus

on geographic use of lithics in the various regions of the lake.

METHOD AND THEORY

Understanding the lithic raw material use trends over time and space are the ultimate goals of UM's research at Yellowstone Lake (MacDonald 2009). While Binford's (1979, 1980) seminal works provide much of the basis for the current paper's theoretical perspective, I also rely extensively on Michael Schiffer's artifact life cycle models (1972) which fall

squarely in the organization of technology approach to lithic analysis (Andrefsky 1994). Margaret Nelson's

1991 paper on the organization of technology gives a small nod to Schiffer's work, discussing it in the contexts of artifact discard; however, Schiffer's life cycle model provides the first and still the most straightforward organizational model of human technological organization in the archaeological literature. By understanding the life cycle of artifacts, we can fully understand how those artifacts fit into the world of their users and understand a great deal about their lives, from material procurement, to tool manufacture, to tool use, recycling, and tool discard (MacDonald 2009).

Because of the variable life cycles of tools and the various life spans of those tools during their existence in the systemic context, we need to look at various assemblages of artifacts from the archaeological context to understand prehistoric hunter-gatherer culture. Every lithic assemblage from a site has multiple sub-assemblages that reflect different site-use behaviors. We need to look not just at the whole assemblage, but also at these sub-assemblages.

A problematic analytical trend in the regional work on settlement patterns in the "obsidian west" is the nearly exclusive sourcing of formal tools, as defined by Andrefsky (1994, 1998), rather than representative

samples of the entire lithic assemblages of sites. Projectile points are the most obvious kind of formal tool, those tools that remain in the tool kits of hunter-gatherers for a comparatively long time, take a longer time to make, are retouched for extensive use, and are generally cared for so they can be used over and over. Curated tools are important in understanding lithic technological organization, but they only represent a certain class of artifact, a sub-assemblage of a specific and perhaps even special kind of tool. But what about the other lithics we find at sites, the non-formal items, or even the debris from the production and maintenance of all tools?

Lithic sourcing of formal tools will inform us about two levels of movement that are important to hunter-gatherers, areas that I've referred to in the past as macro- and meso-movement areas, areas beyond the realm of daily travel (MacDonald 1999:148). Macro-movements consist of long-distance travel that might occur only a few times in a lifetime, while meso-movements consist of semi-regular travel to edges of defined territories. But what about the daily travel realm, the area of micromovement? This area reflects the daily world of hunter-gatherers, where they likely spent most of their time, likely to be revealed through debitage.

The presence of that formal item in the assemblage, however, only reflects the distance that tool traveled, not necessarily the distance its user traveled. But, flakes are going to more effectively tell us about the direct procurement of stone and the micro- and meso-movements of stone and people, especially if the debitage sample is selected from a range of flake types to reflect the entire tool production activities at the site.

Thus, by sourcing lithics used to produce debitage and a variety of tools, we can understand the entire universe of toolstone sources. At Yellowstone Lake, lithic materials occur in volcanic and non-volcanic form. Volcanics — including obsidians and dacites mostly — come from about 10 or so well-established and well-understood locations on the landscape (see Figure 8.1; MacDonald et al. 2012; Park 2011). At the lake, volcanic materials come from the north, south, and west, with one type (Park Point obsidian) also found to the east.

Sources for non-volcanics, including chert, chalcedony, petrified woods, and quartzites, are a bit more uncertain. We know that one group of cherts and chalcedonies has its origins north of Yellowstone Lake, from the Crescent Hill sources up along the Yellowstone river between Gardiner and Tower Junction. These cherts are well-described and defined by Adams et al. (2011) and MacDonald and Maas (2011). A large variety of chert, chalcedony and orthoquartzite also originates within Madison Limestone formations within the Absarokas and Wind River Mountains to the east and south of the lake. In addition, these cryptocrystalline lithics also occur in small nodules as secondary glacial gravels along the shore of Yellowstone Lake (Johnson et al. 2004; MacDonald et al. 2012).

At the very least, we can distinguish northern and eastern/southern cherts in terms of basic directionality. Yellowstone Lake's lithic landscape, thus, is composed of: 1) the sourceable-volcanics; 2) the northern cherts (represented by Crescent Hill chert); and 3) the eastern/southern cherts from the Absaroka Mountains and gravels of the lake itself. Our understanding of mobility of prehistoric hunter-gatherers thus is well-informed, but could be improved with accurate fingerprinting of the non-volcanic sources.

The current paper analyzes the various sub-assemblages of lithics from various site occupations along the lake shore. I look mostly at the flaking debris data associated with well-dated site components, with analysis of tools a lesser focus. As noted above, research indicates that the two assemblages tell different stories about the people that lived at Yellowstone Lake; formal tools telling us where the artifacts traveled and perhaps the people's meso and macromovements, while the flakes tell us more about the daily lives of the people and their local realm of micromovement and mesomovement.

EVALUATING THE SUM AND MUM

In conjunction with ethnohistoric data (Nabakov and Loendorf 2002, 2004), I provide archaeological data to evaluate these previously proposed ideas regarding use

of the lake. As reported herein and elsewhere (MacDonald et al. 2011; MacDonald and Hale 2013), I attempt to evaluate the two models of Yellowstone Lake use, including the Single-User Model (SUM) and the Multi-User Model (MUM), previously described by Johnson et al. (2004). I start this evaluation with a brief summary of the ethnographic literature, followed by a much more extensive overview of the Yellowstone Lake archaeological data.

ETHNOHISTORIC AND ETHNOGRAPHIC DATA

Our ethnohistoric and ethnographic data are largely, but not exclusively, compiled from Nabakov and Loendorf's (2002, 2004) seminal studies of contemporary Native American use of the GYE and Yellowstone Lake. While recent archaeological analysis by Scheiber and Finley (2011) largely focus on use of the GYE by the Shoshone, the ethnographic literature suggests that a diverse suite of ethnic groups utilized the region. Among these groups include the Shoshone, Bannock, Crow, Blackfeet, Salish, Kiowa, Nez Perce, among many others (Nabakov and Loendorf 2002, 2004).

In particular, the Blackfeet and Crow are known to have used the northern tier of the lake, while Nabakov and Loendorf suggest that the Wind River Shoshone were focused in the lake's southern tier. The Bannock and Nez Perce mostly used the northern tier of the lake as well, with the latter apparently focused in the Pelican Creek Valley as a main warm-season bison hunting area. It is simply not reasonable to think that the Shoshone were the exclusive users of the Greater Yellowstone Ecosystem, even in later prehistory, in light of extant ethnohistoric and archaeological data.

Ethnographic studies completed for Nabakov and Loendorf's work suggest that the various groups who used the lake incorporated a wide variety of subsistence strategies into their survival repertoire. Among the tribes, the Shoshone and Bannock are the only groups likely to have used the lake for fishing (Nabakov and Loendorf 2004:174). MacDonald et al. (2012) show that fishing likely was a minor component of the subsistence patterns for most people at Yellowstone Lake. In fact,

Nabakov and Loendorf do not provide specific ethnographic accounts of the Shoshone fishing at the lake, only noting that the Shoshone fished in the region and had origin stories for fish at Yellowstone Lake (Nabakov and Loendorf 2004: 174-176, 242-244). The ethnographic literature does not support any fishing by the Blackfeet or Crow at the lake (McAllester 1941). Thus, if the lake was used for fishing, it was likely by the Shoshone/Bannock in the spring, at least in recent history and prehistory.

Thus, while it may have occurred at Yellowstone Lake, fishing is not well-documented in the ethnographic literature. Nabakov and Loendorf (2004: 60-61, 93, 113, 139, 179) provide several descriptions of the hunting and gathering of land-based resources in Yellowstone, including the collection of a wide variety of plants, roots, seeds, and nuts. For the Shoshone, these account for 30-70 percent of their diet. Elliot and Hektner's (2000) study of riparian areas of Yellowstone identified more than 1,200 species of plants, many of which are edible and/or medicinal. Blue camas was especially attractive for the Bannock and Shoshone, one of the key edible plant species identified by the University of Montana within the lake's shoreline meadows. Wright et al. (1980) and Johnson et al. (2004: 139) also speculate that camas (*Camassia* sp.) was likely the most important spring root crop for Native Americans at Yellowstone Lake and vicinity. Mammal hunting was also vital to the lake-area subsistence regime during recent history. As noted above, more than 60 species of mammals inhabit the lake's environs, including elk, bison, deer, bear, rabbits and sheep, all of which were hunted.

The ethnohistoric, ethnographic, and ecological research summarized here explains why Native Americans were attracted to Yellowstone Lake. Following others (Johnson et al. 2004: 138-139; MacDonald et al. 2012), I propose that the lake served as a concentrated resource area in which a host of seasonally available resources were procured by mobile hunter-gatherer populations. In terms of seasonality, we propose that the use-cycle was initiated in early spring with snow still on the ground and ice still on the lake, thus explaining the presence of archaeological materials on the lake's five

islands. In terms of the two models of lake use, the ethnographic and ecological data summarized here support the multi-user model (MUM), with multiple Native American groups traveling to the lake from a variety of regions.

ARCHAEOLOGICAL DATA: METHODS

As with the ethnohistoric discussion above, this paper now presents archaeological data to evaluate the SUM and the MUM models of lake-area use. The ethnographic literature supports active use of the lake by the Shoshone; however, it is clear that many other ethnic groups used the lake as well. Figure 8.2 above shows the 28 key archaeological sites used in this study. These sites have yielded more than 24,000 lithic, faunal, and ethnobotanical artifacts from the excavation of more than 240 sq.m. around the entire circumference of the lake. As shown in Figure 8.2, this paper focuses on sites within four areas of the lake — northwest, northeast, southeast, and southwest — with excellent comparative data on lithic use.

As depicted in Figure 8.1 above, lithic source data are useful in determining the point of origin for hunter-gatherers who used the lake in prehistory. In this analysis, I focus on the overall lithic material trends on the respective shores of the lake, regardless of period of occupation (MacDonald et al. 2011; MacDonald et al. 2012). I use two sets of lithic material data in the current analysis. First, I compare the use of obsidian and chert at sites on the northwestern, northeastern, southeastern, and southwestern lake shores. To simplify comparison of the data, all volcanic materials are included within the obsidian category, including dacite, while in the chert category, I include all cryptocrystalline silica materials, including chert, chalcedony, silicified/petrified wood, and orthoquartzite. Sources for these various materials are identified in Figure 8.1.

Second, I use energy-dispersive x-ray fluorescence (EDXRF) analysis results of volcanic lithic artifacts at the lake, collected during our own and other's research, with all analyses completed by Richard Hughes (2010a, 2010b, 2011a, 2011b, 2012a, 2012b). The EDXRF data distinguish

four major volcanic-material source areas, including: 1) Obsidian Cliff, located 35 km (20 miles) northwest of the lake (Davis et al. 1995); 2) western sources, including Bear Gulch and Cougar Creek obsidians and southwest Montana dacites, located between 60-200 km (40-120 miles) west-northwest of the lake; 3) eastern sources, including only Park Point obsidian from the eastern shore of Yellowstone Lake (McIntyre et al. 2013); and 4) southern sources, including Teton Pass, Conant Creek, Packsaddle Creek, Crescent H, Warm Springs, Huckleberry Ridge, and Lava Creek, between 45-150 km (30-90 miles) (Park 2011: 125-126). Both of these sets of information — the obsidian vs. chert and the EDXRF data — help resolve the points of origin for Native Americans that used Yellowstone Lake.

In total, the lithic material study encompasses more than 24,000 artifacts from 28 well-studied sites at the lake (see Figure 8.2), including 23 by UM and five by others. On the northwest shore, I use data from seven sites near the Yellowstone River outlet (48YE380, 48YE381, 48YE1556, 48YE1558, 48YE1553, 48YE549 and 48YE2111; MacDonald and Livers 2011; Livers and MacDonald 2011). On the northeast shore, I combine our data from seven sites along Cub and Clear Creeks (48YE2075, 48YE678, 48YE2080, 48YE2082, 48YE2083, 48YE2084, and 48YE2085; Livers 2012) with those collected by Cannon et al. (1997) at three sites near Steamboat Point (48YE696, 48YE697, and 48YE701). On the southeast shore, I combine our data (Livers 2012) from sites 48YE1499 and 48YE2107 near the Yellowstone River inlet with those collected by Lifeways (Vivian 2009) at the nearby Donner Site (48YE252). On the south-central and southwest lake shore, I combine our data (MacDonald 2013) from seven excavated sites on the south-central lake shore (48YE1660, 48YE1664, 48YE1670, 48YE2190, 48YE1384, 48YE1383, and 48YE1601) with those collected by Lifeways (Johnson et al. 2004) at Osprey Beach (48YE409/410) on the southwest lake shore (West Thumb area). Numerous additional data are available from other studies and other areas of the lake, but for the purposes of this paper, these four areas — northwest, northeast, southeast, and southwest—provide adequate samples to

evaluate points of origin and the function of the lake in prehistory.

ARCHAEOLOGICAL DATA: LITHIC MATERIAL RESULTS

Northwest Shore

In the presentation of results, I present data in a clockwise fashion around the lake, starting on the northwest shore. Overall, obsidian accounts for 88 percent of all lithics at the northwest shore sites. Chert (8%) is a minority and largely derives from the Crescent Hill chert source to the north along the Yellowstone River. EDXRF data ($n = 234$ total sourced lithics) suggest mobility to the west-northwest as well. As shown in Figure 8.4, sites on the northwest shore of the lake are heavily dominated by Obsidian Cliff obsidian (79.5% of XRF-sourced lithics) with sources 30 km (20 miles) northwest. In addition to the high percentage of Obsidian Cliff obsidian, southwest Montana dacites (largely Cashman dacite) and Bear Gulch obsidian account for 11.7 percent of sourced lithics, while the Park Point source on the eastern lake shore accounts for 6.8 percent of sourced lithics. EDXRF data do not support active travel or even trade to the south, with only one percent ($n = 2/234$) of obsidians at northwest shore sites deriving from Jackson area obsidian sources.

The focus for north shore Native Americans was squarely to the north and northwest, with those areas comprising 91.2 percent of sourced EDXRF lithics. Together with the dominance of Crescent Hill chert among cryptocrystalline silica materials, these volcanic material data indicate that people living near the mouth of the Yellowstone River on the northwest shore likely originated from the north/northwest, likely using the Gardiner, Madison, and Yellowstone River Valleys as the main travel corridors to access the lake.

Northeast Shore

There are significant differences in obsidian and chert use between northeastern and northwestern lake users ($\chi^2 = 44.103$; $df = 1$; $p = .000$), with more obsidian on the northwest shore (88%) compared to the northeast shore (69%) due to the northwest shore's proximity to Obsidian Cliff. Increased chert on the northeast shore (31%)

compared to the northwest shore (8%) is due to the northeast shore's proximity to Absaroka cherts. Northeastern shore hunter-gatherers also used significant amounts of Park Point obsidian (30%) from the eastern lake shore. They also apparently targeted Obsidian Cliff, given that it represents nearly 67 percent of the obsidian at northeastern shore sites. Other sources represented in northeast lake shore EDXRF data include Teton Pass ($n = 2$) and Conant Creek ($n = 1$), indicating minimal use of southern sources.

As reflected in Figure 8.5, eastern-sourced materials — including Absaroka cherts and Park Point obsidian — account for 66 percent of the total lithic assemblage from UM's northeastern shore sites, with west-northwest sources constituting 34 percent. At northwest lake shore sites, eastern sources account for only 7 percent of lithics, with northern and western sources accounting for more than 91 percent. These differences in lithic raw material use are significant between the northwest and northeast lake shores and point in the direction of origin for people that used the respective areas of the lake ($\chi^2 = 198.00$; $df = 1$; $p = .000$).

The differences in chert and obsidian use reflect different points of origin for people living on the respective lake shores, with northwestern lake users deriving from the north-northwest and northeastern lake users deriving from the east along the Clear Creek Valley and the Big Horn Basin. Considering that these lake shores are only seven miles apart, the variation in lithic raw material use between them is impressive. These data likely indicate segregation of populations that visited the lake based on their points of origin, with people arriving to the lake and not venturing much beyond. For example, people travelling from the east to the lake along the Clear Creek Valley apparently focused their time along the lake's east shore, with occasional travel to Obsidian Cliff to collect obsidian, which they curated with them as they traveled back eastward to their winter camps along the Shoshone River (e.g., Mummy Cave; Husted and Edgar 2002) and onward to the Big Horn Basin. As recorded by Hughes (2012), Obsidian Cliff obsidian was the main volcanic material procured by inhabitants of Mummy Cave.

LITHICS IN THE WEST

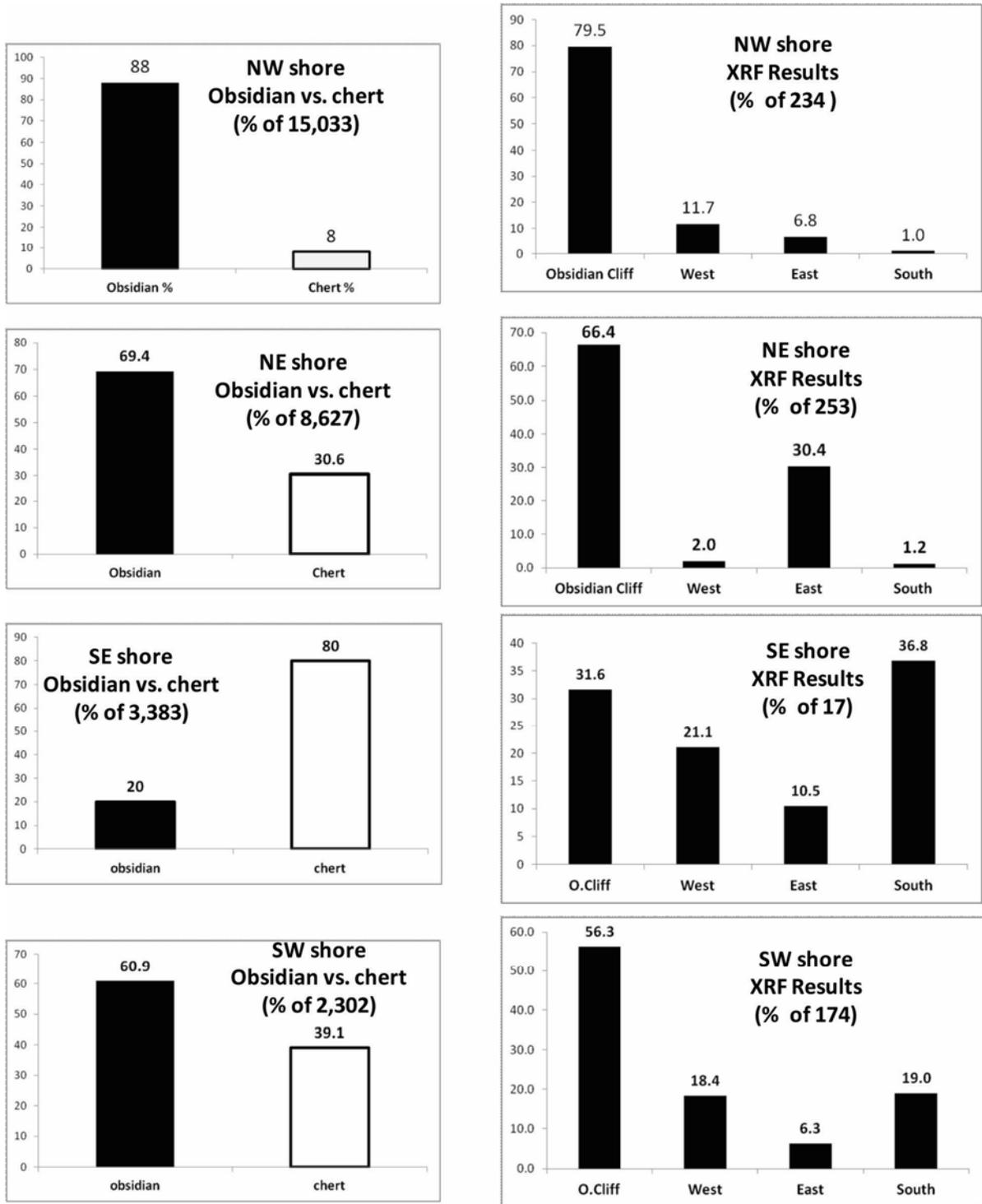


Figure 8.4. Comparison of Lithic Raw Material Use at Yellowstone Lake.

LITHICS IN THE WEST

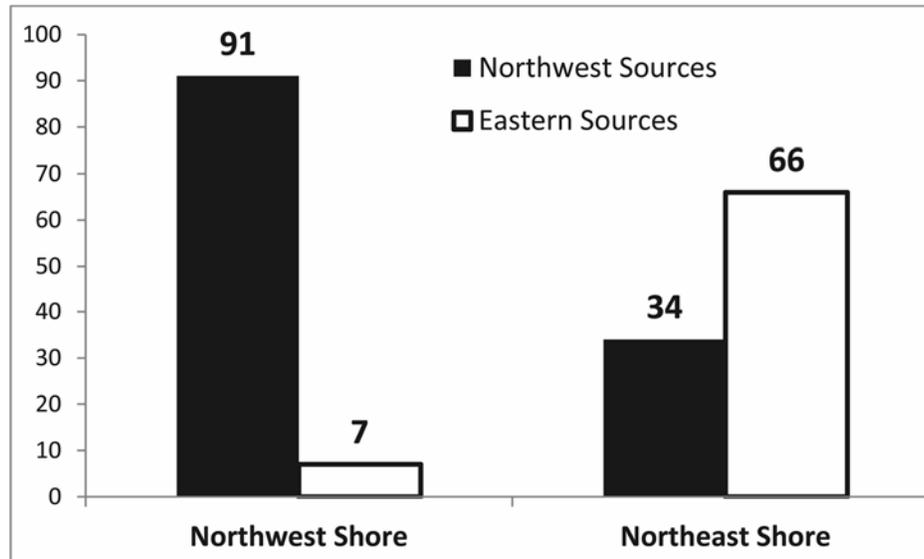


Figure 8.5. Comparison of Lithic Raw Material Use on the Northeast and Northwest Lake Shores.

Southeast Shore

On the southeast shore of the lake, there is a much more diverse use of obsidians and cherts than on either the northwest or northeast shores. In contrast to the northern lake shore, the southeast shore yields predominantly materials with southern origins. It is important to note that the closest sources of materials to the southeast shore are Absaroka cherts, with sources along the lower (southern) Yellowstone River, ca. 15-30 km (10-20 miles) south. While these cherts are found occasionally as gravels on the lake shore, their small morphology and unpredictable distribution indicates that the primary sources were preferred locations of procurement. The most proximate obsidian sources are the southern (Jackson-area) sources at a distance of ca. 50 km. Obsidian Cliff would be directly accessed from the southeast lake shore only by walking around the entire lake perimeter (40 km) with another 35 km to the cliff.

As might be expected given their source-proximity, Absaroka cherts ($n = 2,709$) comprise more than 80 percent of lithics at sites on the southeast lake shore ($N = 3,383$), with obsidian ($n = 675$) comprising the remainder of the southeast shore lithic assemblage. The lithic material data collected in the Southeast Arm by UM and Lifeways are not significantly different ($\chi^2 = 0.466$; $df = 2$;

$p = .495$), suggesting continuity in material use among the three different sites used in our studies.

Sourced obsidian artifacts from the southeastern lake shore sites ($n = 17$) derive from five different sources, with 32 percent Obsidian Cliff and 37% southern sources. Western sources comprise 21 percent with eastern shore Park Point obsidian accounting for only 11 percent of southeast shore obsidian artifacts.

It is important to remember, however, that only approximately 20 percent of the entire lithic assemblages at southeastern lake shore sites are obsidian. Thus, in terms of the total lithic assemblage from the Donner Site ($n = 3,329$), for example, Obsidian Cliff obsidian represents only ca. nine percent (ca. 300 lithics), compared to 89 percent (ca. 3,029 lithics) originating from southern/eastern sources (including Absaroka cherts and southern/eastern obsidians).

In order to more realistically compare Obsidian Cliff use between the four lake-shore areas, I calculated a relative percentage: (total obsidian artifacts x Obsidian Cliff %) ÷ total lithics. When this relative source percentage is calculated, Obsidian Cliff comprises only 6.3 percent of the southeastern shore sites' lithic assemblages, compared to 70 percent on the northwest shore (Figure 8.6). These data support a southern origin for southern lake shore users. The overall low densities

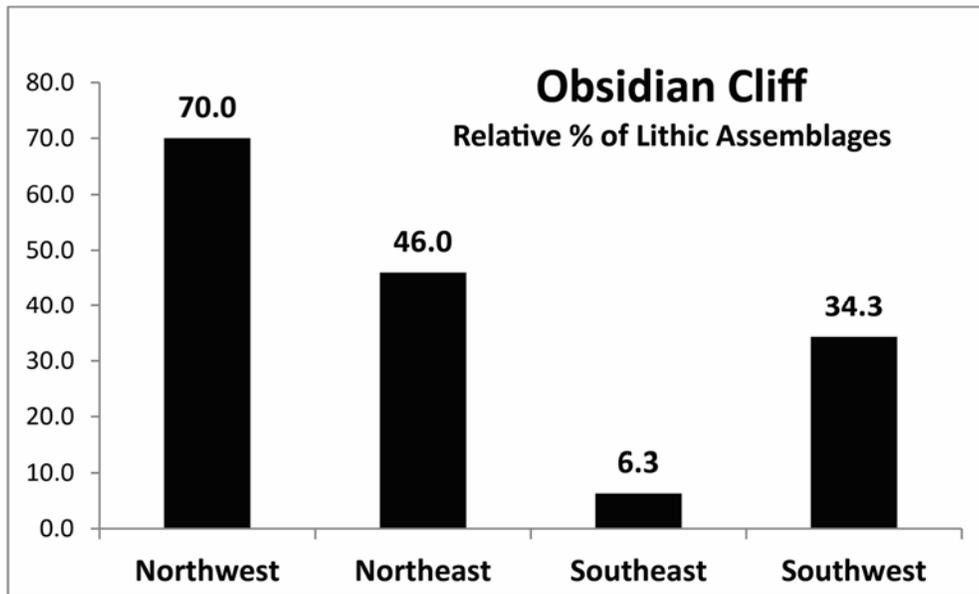


Figure 8.6. Relative Percentage of Obsidian Cliff Obsidian by Lake Area.

of Obsidian Cliff obsidian — in terms of the entire lithic assemblages at southeastern sites — likely indicates procurement via trade with other lake users to the north, rather than direct procurement. In other words, southeastern lake users traveled from the south northward up the Snake and Yellowstone Rivers to the mouth of the river on the southern lake shore. There, they hunted and gathered and occasionally socialized with other people visiting the lake, at which time they probably acquired Obsidian Cliff obsidian via trade.

Southwest Shore

Interestingly, lithic material trends on the southwest shore are not quite as clear as the other three areas discussed above. Here, at eight sites investigated by UM ($n = 7$) and Lifeways ($n = 1$), obsidian (61%; $n = 1,401$) and chert (39%; $n = 901$) percentages are nearly equally represented. These trends are distinct from both the northwest and southeast lake shores, the former of which had 90 percent obsidian and the latter only 20 percent.

In terms of the EDXRF data, the southwest shore generally appears to be a mix of northern, western, and southern sources. Fourteen different sources of obsidian

are present in the southwest shore site assemblages. However, given its closer proximity, Obsidian Cliff obsidian occurs in high percentages (56.3%; $n = 98$). Bear Gulch obsidian was also popular (18%; $n = 32$), perhaps indicating a western origin using the Madison River. Southern sources comprise 19 percent ($n = 33$) of the southwest shore lithic assemblages. These data suggest use of southern, western, and northern sources by people living on the southwest shore, possibly indicating that these were mixing areas used by many different groups moving back and forth to the Yellowstone River and Obsidian Cliff.

LITHIC MATERIAL SUMMARY

The archaeological data collected by UM and others at these 28 lake-area sites support the hypothesis of use by multiple hunter-gatherer groups from multiple regions. On the northwest lake shore, individuals were oriented northward toward Obsidian Cliff and the Yellowstone, Madison, and Gardiner River Valleys. On the northeast shore, individuals were focused eastward up the Clear Creek and Shoshone River Valleys. On the southeast shore, the southern Yellowstone River was the likely origin route, while the southwestern shore appears

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to have been somewhat of a multi-use area for multiple groups from the south, west, and north. Overall, Native Americans actively traveled to the lake from multiple regions, likely representing diverse ethnic groups and/or bands, rather than a single group with a massive territory. Our data, thus, corroborate the multi-users model supported recently by Park (2010, 2011), rather than the single-user model (e.g., Shoshone-centered) recently promoted by Scheiber and Finley (2011).

ARCHAEOLOGICAL DATA: DIFFERENTIAL STONE TOOL USE AND MANUFACTURE ON THE LAKE SHORES

In addition to the significant variation in lithic material use, lithic artifact data support differential production and use of stone tools on the northern and southern shores of the lake as well. I first compare two fairly proximate areas of the lake, northwest and southwest, separated by 15 km across the lake, but 50 pedestrian km due to the presence of the West Thumb (see Figure 8.2).

On the northwest lake shore, UM excavated 70 1x1-m test units at seven sites, yielding 13,995 lithics from test units for a mean of 199.9 per sq.m. On the southwest shore, combining UM and Lifeways excavations, archaeologists excavated 94 sq. m. at eight sites, revealing 2,178 lithics from test units for a mean of 23.2 per sq. m. Both of these areas yielded high percentages of Obsidian Cliff and/or cherts from northern lithic sources.

These lithic density trends are not restricted to the northwest and southwest shores (Figure 8.7). The overall character of all sites along the entire north shore is of lithic abundance, while on the south shore it is one of lithic scarcity. In addition to the northwest shore data (199/sq.m.), excavations at UM's six Clear Creek sites on the northeastern lake shore yielded 107 lithics per sq.m.. Only 27.5 lithics per sq.m. were recovered at the Osprey Beach site on the southwest shore's West Thumb, while only 14 lithics per sq.m. were recovered at seven sites excavated by UM on the south-central lake shore. UM recovered only 17 lithics per sq.m. at two sites on the

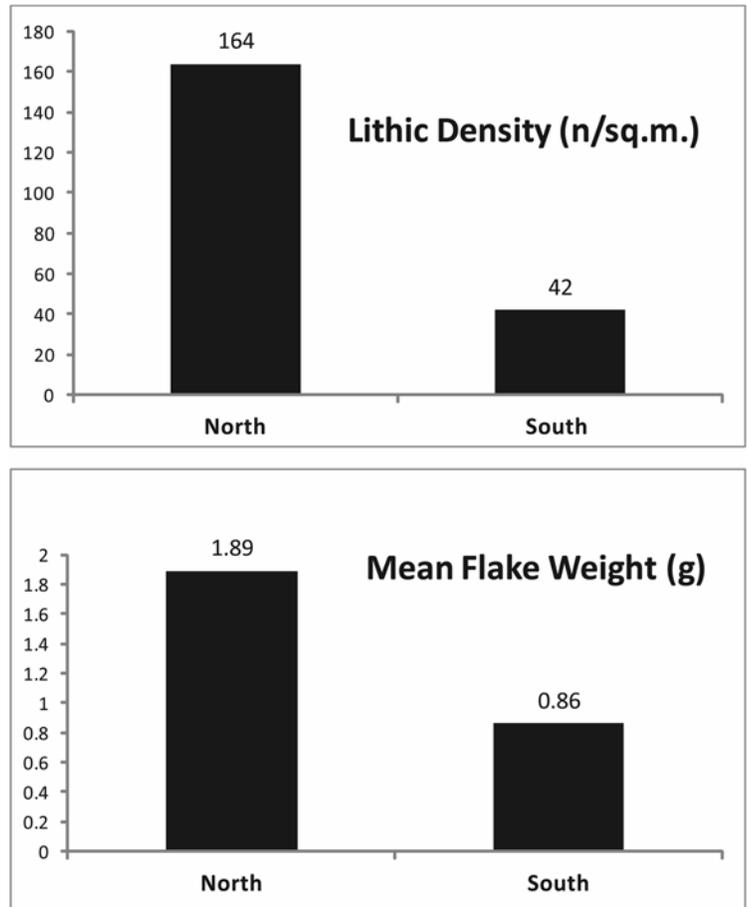


Figure 8.7. Comparison of Lithic Densities and Mean Flake Weights, North and South Shore Sites, Yellowstone Lake.

southeast arm of the lake. Excavations at the Donner Site on the southeast arm revealed 97 lithics per sq.m., comprising largely southern-oriented cherts.

Overall, the lithic density at southern lake shore sites is 42 lithics per sq.m. (n=5,557 lithics; 131 1x1m test units; 11 sites) compared to 164 lithics per sq.m. at sites on the north shore (n = 18,809 lithics; 115 1 x 1m test units; 13 sites). The sheer volume of lithics from test units on the north shore—18,809 lithics— compared to the south shore — 5,557 lithics — is even more striking considering that 16 additional sq. m. of excavation were conducted on the south shore compared to the north.

Mean flake weights for the northwest shore and southwest shore sites excavated by UM between 2009-2011 are also significantly different, with southwest

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shore flakes ($n = 403$; 470.4g) weighing 0.86g on average compared to 1.89g for northwest shore flakes ($n = 14,361$; 7,582.7g). These flake data support the hypothesis that south shore hunter-gatherers used and produced fewer lithics of smaller sizes, likely to conserve material in the face of the toolstone-depleted environment.

Material was also transported to south shore sites in finished or nearly-finished state, reflecting the low availability of lithic raw material sources in this region. Biface-reduction and shaping flakes account for 77.1 percent of typed flakes at south shore sites, compared to 78.0 percent at northwest shore sites, suggesting that biface manufacture was a focus of hunter-gatherers in both areas of the lake. However, the major difference between the northwest and southwest shores in this regard is the greater numbers of final-stage shaping/pressure flakes on the southwest shore (51.7%) compared to biface-reduction flakes (48.3%) compared to the northwest shore (44.9% vs. 55.1%). While this difference is not significant at the .05 level ($\chi^2 = 2.145$; $df = 1$; $p = .143$), the overall ratio of biface-reduction flakes to shaping flakes is 0.93 on the southwest shore (61 shaping flakes; 57 biface-reduction flakes) compared to 1.23 on the northwest shore (2,084 biface-reduction flakes; 1,697 shaping flakes). These flaking debris data suggest that bifaces and projectile points were in a more finished state by the time they reached the southwest shore compared to the northwest shore.

Also, it is clear that significantly greater numbers of late-stage biface-reduction and shaping flaking debris were produced at northwest shore sites ($n = 3,781$) versus southwest shore sites ($n = 118$) (with similar amounts of excavation). These data support those discussed above that tool production was a focus on the northwest shore, but not on the southwest shore in which tools were curated and carried beyond sites.

In support of this curation mode on the south shore, an interesting and somewhat unique type of lithic artifact — freehand cores — were recovered in limited quantities ($n = 8$) at UM's southwest shore sites. Such cores are small (~palm-sized) chert and obsidian cobbles with multiple flake removals from all faces. At the southern

shore lake sites, the cores are produced from both obsidian ($n = 4$) and chert ($n = 4$). These cores are rare to non-existent on the northwest shore, with only two identified at the seven UM-excavated sites around Fishing Bridge and Lake Lodge (MacDonald and Livers 2011).

The use of these small cores on the south shore suggests that they functioned as portable lithic material for mobile hunter-gatherers in the material-depleted south shore. These cores were not used abundantly on the north shore of the lake, likely due to the proximity of the Obsidian Cliff material source and chert sources to the east in the Clear Creek Valley and to the north in the Yellowstone Valley. Material was abundant in this region, but not so on the south shore.

Overall, these lithic data suggest a significant fall-off in lithic use in locations further away from sources, suggesting the curation of lithics to the south shore which lacks adequate replacement stone (Andrefsky 1994; Bamforth 1986; Binford 1979, 1980). This is a pattern exemplified by pedestrian hunter-gatherers minimizing risk in the face of possible stone shortage while travelling in lithic-deficient areas. As discussed more extensively elsewhere (MacDonald et al. 2012), we propose that this pattern of lithic resource use rejects the hypothesis that boats were used by hunter-gatherers at the lake. If they were, such significant fall-offs in lithic material use would not be evident (cf. Blair 2010). Our lithic data from more than two dozen lake-area sites suggest that pedestrian hunter-gatherers curated bifaces and small cores to the south shore of the lake, as evidenced by the low numbers of lithics, their comparatively small sizes, and the high density of late-stage reduction debris and small, portable freehand cores. Hunter-gatherers ensured subsistence success by conserving lithic material in a south shore environment lacking proximate lithic sources.

SUMMARY AND CONCLUSION

In this paper, archaeological and ethnohistoric data were utilized to inform our view of the prehistoric use of Yellowstone Lake. These data were used to evaluate the

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single-user model (SUM) versus the multi-user model (MUM) of lake use in prehistory. As discussed above, our lithic data support multiple points of origin for hunter-gatherers that visited Yellowstone Lake in prehistory. People camping on the north shore were likely Plains-adapted hunter-gatherers spending most of their time in the northern Yellowstone Valley and vicinity. People camping on the east shore of the lake were likely occupants of the Plains as well and the hot-dry portions of northwestern Wyoming, including the Big Horn Basin. People on the southeast lake shore were likely residents of the Jackson area and points south, while people on the southwest and western shores may derive from north, south, and west, including the northern Great Basin of eastern Idaho. The data thus do not support the SUM model, in which Yellowstone Lake was the center of a large territory used by a single group, as recently argued by Scheiber and Finley (2011). Rather, data presented herein support the MUM model of lake use, in which the GYE and Yellowstone Lake were at the crossroads of multiple tribal and/or band territories, a model best defined by Johnson et al. (2004) and Park (2010, 2011).

Archaeological data from Yellowstone Lake also indicate the differential use and manufacture of stone tools by Native Americans on the north and south shore. Curation was the *modus operandi* on the southern lake shore due to the scarcity of high quality lithic materials. Here, archaeological sites contain low densities of lithic debris, few stone tools, and abundant evidence of curation behavior. People curated stone tools and did not waste it in a toolstone-deficient setting. In contrast, lithic production on the northern lake shore was more wasteful, generating comparatively abundant lithic debris and stone tools due to the proximity of Obsidian Cliff obsidian and Crescent Hill chert sources, both of which are located ca. 30-40 km north.

Both the ethnographic and archaeological data support the multi-user model of Yellowstone Lake use. Many different groups used the lake, deriving from the north, south, east, and west. As North America's largest, high-elevation lake, Yellowstone Lake attracted Native Americans to its shores from the northwestern Plains,

the northern Rocky Mountains and the northern Great Basin. The lake, and the Greater Yellowstone Ecosystem in general, were at the nexus of a variety of tribal territories throughout prehistory, reflected in the variable lithic raw material and stone tool use at sites on its shores.

ACKNOWLEDGMENTS

Thanks to the Department of Anthropology at the University of Montana for providing resources useful in the completion of this paper. I also thank Yellowstone National Park, the Rocky Mountain Cooperative Ecosystem Study Unit, and the National Park Service for funding UM in its efforts to study the prehistory of Yellowstone Lake. Thank you to UM staff and students, as well as NPS employees Tobin Roop, Staffan Peterson, Elaine Hale, and Robin Park for their support and participation in the projects. Thanks also to Ann Johnson, Yellowstone's retired archaeologist, for pursuing the funding for the Yellowstone Lake project. Without her persistence, this paper would not have been possible. Thanks to Richard Hughes (EDXRF) for his work in the lithic sourcing.

REFERENCES CITED

- Adams, Jacob S., Douglas H. MacDonald, and Richard E. Hughes 2011. Prehistoric Lithic Raw Material Use in the Gardiner Basin, Montana. In *Yellowstone Archaeology: Northern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1): 98-106.
- Andrefsky, William, Jr. 1994. Raw Material Availability and the Organization of Technology. *American Antiquity* 59: 21-34.
- Andrefsky, William, Jr. 1998. *Lithics: Macroscopic Approaches to Lithic Analysis*. Cambridge University Press, New York.
- Bamforth, Douglas B. 1986. Technological Efficiency and Tool Curation. *American Antiquity* 51: 38-50.

LITHICS IN THE WEST

- Binford, Lewis R. 1979. Organization and formation processes: Looking at curated technologies. *Journal of Anthropological Research* 35: 255-273.
- Binford, Lewis R. 1980. Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45: 4-20.
- Blair, S. E. 2010. Missing the Boat in Lithic Procurement: Watercraft and the Bulk Procurement of Tool-stone on the Maritime Peninsula. *Journal of Anthropological Archaeology* 29: 33-46.
- Cannon, Kenneth P. 2001. What the Past Can Provide: Contribution of Prehistoric Bison Studies to Modern Bison Management. *Great Plains Research* 11: 145-74
- Cannon, Kenneth P., K. L. Pierce, P. Stormberg, and M.V. MacMillion 1993. *Archeological Investigation Along the Fishing Bridge Peninsula, Yellowstone National Park, Wyoming: The Archeology, Geology, and Paleoenviroment*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.
- Cannon, Kenneth P., K. L. Pierce, P. Stormberg, and M.V. MacMillion 1996. *Archeological Investigation Along the Arnica Creek to Little Thumb Creek Section of the Grand Loop Road, Yellowstone National Park, Wyoming*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.
- Cannon, Kenneth P., K. L. Pierce, P. Stormberg, and M.V. MacMillion 1997. *Results of the Archeological and Paleoenvironmental Investigation Along the North Shore of the Yellowstone Lake, Yellowstone National Park, Wyoming: 1990-1994*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.
- Davis, Leslie B. S. A. Aaberg, and J. G. Schmitt 1995. *The Obsidian Cliff Plateau Prehistoric Lithic Source, Yellowstone National Park, Wyoming*. National Park Service, Rocky Mountain Region, Selections from the Division of Cultural Resources, No. 6. Denver, Colorado.
- Despain, Donald G. 1990. *Yellowstone Vegetation Consequences of Environment and History in a Natural Setting*. Roberts Reinhart Publishers, Boulder, Colorado.
- Elliot, C. R. and M. M. Hektner 2000. *Wetland Resources of Yellowstone National Park, Yellowstone National Park, Wyoming*. National Park Service, Mammoth, Wyoming.
- Hale, Elaine S. 2003. A Culture History of the Yellowstone River and Yellowstone Lake, Yellowstone National Park, Wyoming and Montana. Unpublished Master's Thesis, Department of Anthropology, University of Montana, Missoula.
- Hale, Elaine S. and M.C. Livers 2013. Prehistoric Culture History and Prior Archaeological Research in Southern Yellowstone. In *Yellowstone Archaeology: Southern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2): 2-21.
- Hoffman, J.J. 1961. A Preliminary Archeological Survey of Yellowstone National Park. Unpublished Master's Thesis, Department of Anthropology, University of Montana, Missoula.
- Hughes, Richard E. 2010a. Geochemical Research Laboratory Report 2009-113. Report submitted by Geochemical Research Laboratory to University of Montana, Missoula.
- Hughes, Richard E. 2010b. Geochemical Research Laboratory Report 2010-38. Report submitted by Geochemical Research Laboratory to University of Montana, Missoula.
- Hughes, Richard E. 2011a. Geochemical Research Laboratory Report 2010-87. Report submitted by Geochemical Research Laboratory to University of Montana, Missoula.
- Hughes, Richard E. 2011b. Geochemical Research Laboratory Report 2011-15. Report submitted by

LITHICS IN THE WEST

Geochemical Research Laboratory to University of Montana, Missoula.

Hughes, Richard E. 2012a. Geochemical Research Laboratory Report 2011-113. Report submitted by Geochemical Research Laboratory to University of Montana, Missoula.

Hughes, Richard E. 2012b. Geochemical Research Laboratory Report 2011-114. Report submitted by Geochemical Research Laboratory to University of Montana, Missoula.

Husted, William M. and R. Edgar 2002. *The Archeology of Mummy Cave, Wyoming: An Introduction to Shoshonean Prehistory*. Midwest Archeological Center Special Report No. 4, and Southeast Archeological Center Technical Report Series No. 9, National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

Johnson, Ann, B.O.K. Reeves, and M. W. Shortt 2004. *Osprey Beach: A Cody Complex Camp on Yellowstone Beach*. Report Prepared by Lifeways of Canada for Yellowstone National Park, Mammoth, Wyoming.

Kershaw, L. 1998. *Edible and Medicinal Plants of the Rockies*. Lone Pine Publishing, Edmonton, Alberta.

Livers, Michael C. 2012. *2010-2011 Montana Yellowstone Archaeological Project: Survey and Evaluation of Sites along Yellowstone Lake's Eastern Shore*. Report Prepared by the University of Montana for Yellowstone Center for Resources, Mammoth, Wyoming.

Livers, Michael C. and D. H. MacDonald 2011. *Survey and Evaluation of Archaeological Sites at Fishing Bridge, Yellowstone National Park, Wyoming*. Report Prepared by the University of Montana for Yellowstone Center for Resources, Mammoth, Wyoming.

MacDonald, Douglas H. 1999. Modeling Folsom Mobility, Mating Strategies, and Technological Organization in the Northern Plains. *Plains Anthropologist* 44(168): 141-161.

MacDonald, Douglas H. 2009. Understanding Decision-Making among Prehistoric Hunter-Gatherers via the Study of Lithic Technological Organization. *Lithic Technology* 34(2): 71-92.

MacDonald, Douglas H. 2012 *2010-2011. Montana Yellowstone Archaeological Project: Evaluation of Sites along the South Shore, Yellowstone Lake, Wyoming*. Report Prepared by the University of Montana for Yellowstone Center for Resources, Mammoth, Wyoming.

MacDonald, Douglas H. 2013. Hunter-Gatherer Use of America's Highest, Largest Lake: Comparative Analysis of Data from 27 Prehistoric Archaeological Features around Yellowstone Lake. In *Yellowstone Archaeology: Volume 2, Southern Yellowstone*, D. MacDonald and E. Hale (eds.). University of Montana Contributions to Anthropology 13(2): 212-226.

MacDonald, Douglas H. and E. S. Hale (editors) 2013. *Yellowstone Archaeology: Southern Yellowstone*. University of Montana Contributions to Anthropology 13(2), Missoula, MT.

MacDonald, Douglas H. and M. C. Livers 2011. *2009-2010 Montana Yellowstone Archaeological Project: Survey and Evaluation of Sites along Yellowstone Lake's Northwest Shore*. Report Prepared by the University of Montana for Yellowstone Center for Resources, Mammoth, Wyoming.

MacDonald, Douglas H., R. E. Hughes, and J. W. Gish 2011. Late Paleoindian versus Early Archaic Occupation of Yellowstone Lake, Wyoming. *Current Research in the Pleistocene*, 28: 110-111.

MacDonald, Douglas H. and Lester E. Maas 2011. Late Archaic Lithic Technology and Land Use within the Gardiner Basin, Upper Yellowstone River, Montana/Wyoming. In *Yellowstone Archaeology*:

LITHICS IN THE WEST

Northern Yellowstone, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1): 56-71.

MacDonald, Douglas H., J. C. McIntyre, and M.C. Livers 2012. Understanding the Role of Yellowstone Lake in the Prehistory of Interior Northwestern North America. *North American Archaeologist* 33(3): 251-289.

Malouf, Carling 1958. *Preliminary Report, Yellowstone Nation Park Archeological Survey, Summer 1958*. Yellowstone National Park, Mammoth, Wyoming.

McAllester, D.P. 1941. Water as a Disciplinary Agent Among the Crow and Blackfoot. *American Anthropologist* 43: 593-604.

McIntyre, Jordan C. 2012. A Human Behavioral Ecological Assessment of the Yellowstone Lake Basin, Yellowstone National Park, Wyoming. Unpublished Master's Thesis, Department of Anthropology, University of Montana Missoula.

McIntyre, Jordan C., Michael C. Livers, Douglas H. MacDonald, Richard E. Hughes, and Kristin Hare 2013. Park Point Obsidian: Geologic Description and Prehistoric Human Use of a Primary Obsidian Source at Yellowstone Lake. In *Yellowstone Archaeology: Southern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2): 42-58.

Nabokov, Peter and Lawrence Loendorf 2002. *American Indians and Yellowstone National Park, National Park Service*. Report Prepared for Yellowstone Center for Resources, Mammoth, Wyoming.

Nabokov, Peter and Lawrence Loendorf 2004. *Restoring a Presence: American Indians and Yellowstone National Park*. University of Oklahoma Press, Norman.

Park, Robin 2010. A Culture of Convenience? Obsidian Source Selection in Yellowstone National Park.

Unpublished Master's Thesis, Department of Anthropology, University of Saskatchewan, Saskatoon.

Park, Robin 2011. Obsidian, Culture, and Convenience: New Perspectives from Yellowstone. In *Yellowstone Archaeology: Northern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2): 116-131.

Reeve, Stuart, T. Marceau, and G. A. Wright 1981. *Mitigation of the Sheepeater Bridge Site (48YE320), Yellowstone National Park*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska..

Samuelson, Ann E. 1983. *Archeological Investigations in the Grant Village-West Thumb Area of Yellowstone National Park, Wyoming*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

Schieber, Laura L. and J. B. Finley 2011. Obsidian Source Use in the Greater Yellowstone Area, Wyoming Basin, and Central Rocky Mountains. *American Antiquity* 76: 372-394.

Schiffer, Michael C. 1972. Archaeological Context and Systemic Context. *American Antiquity* 37(2): 156-165.

Shortt, Mack W. and L. B. Davis (editors) 2002. *The Archeological Inventory of Portions of the South Shore of West Thumb and Testing of the Osprey Beach Locality, Yellowstone National Park: The 2000 Field Season Final Report*. Report Prepared by the Museum of the Rockies for Yellowstone National Park, Mammoth, Wyoming.

Taylor, Dee C., K. Wood and J.J. Hoffman 1964. *Preliminary Archeological Investigation in the Yellowstone National Park*. Report Prepared by Montana State University, Missoula, Montana, for Yellowstone National Park, Mammoth, Wyoming.

Vivian, Brian C. 2009. *Historical Resource Mitigative Excavations at 48YE252: The Donner Site*. Report

LITHICS IN THE WEST

Prepared by Lifeways of Canada for Yellowstone Center for Resources, Mammoth, Wyoming.

Vivian, Brian C., D. Mitchell, and K. Thorson 2007. *Archaeological Inventory of Yellowstone Lake Shoreline Survey, Solution Creek to Southeast Arm*. Report Prepared by Lifeways of Canada for Yellowstone Center for Resources, Mammoth, Wyoming.

Vivian, Brian C., B.O.K. Reeves, and A. Johnson 2008. *Historical Resource Mitigative Excavations at Site 24YE353, Malin Creek Site*. Report Prepared by Lifeways of Canada for Yellowstone Center for Resources, Mammoth, Wyoming.

Wright, Gary, S. Bender, and S. Reeve 1980. High Country Adaptations. *Plains Anthropologist* 25: 181-193.

Wright, Gary A., T. E. Marceau, F.A. Calabrese, and M. Tune 1978. *Archaeological Report: Greater Yellowstone Cooperative Regional Transportation Study*. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

Yellowstone National Park (YNP) 2010. *Yellowstone Resources and Issues*. Division of Interpretation, Yellowstone National Park, National Park Service.