**Table of Contents**

TABLE OF CONTENTS........................................................................................................................................ i

LIST OF CONTRIBUTORS........................................................................................................................................ iii

PREFACE............................................................................................................................................................. 1
Douglas H. MacDonald and Elaine S. Hale, editors

CHAPTER 1......................................................................................................................................................... 2
PREHISTORIC CULTURE HISTORY AND PRIOR ARCHAEOLOGICAL RESEARCH IN
SOUTHERN YELLOWSTONE
Elaine S. Hale and Michael C. Livers

CHAPTER 2......................................................................................................................................................... 22
A REASESSMENT OF PREHISTORIC LAND-USE PATTERNS WITHIN THE YELLOWSTONE
LAKE BASIN AND HAYDEN VALLEY REGION, YELLOWSTONE NATIONAL PARK
Paul H. Sanders

CHAPTER 3......................................................................................................................................................... 42
PARK POINT OBSIDIAN: GEOLOGIC DESCRIPTION AND PREHISTORIC HUMAN USE OF A
PRIMARY OBSIDIAN SOURCE AT YELLOWSTONE LAKE
Jordan C. McIntyre, Michael C. Livers, Douglas H. MacDonald, Richard E. Hughes, and Kristin Hare

CHAPTER 4......................................................................................................................................................... 59
PRECONTACT OCCUPATIONS AT OSPREY BEACH, YELLOWSTONE LAKE
Ann M. Johnson, Brian O.K. Reeves, and Mack W. Shortt

CHAPTER 5......................................................................................................................................................... 76
EARLY AND MIDDLE HOLOCENE HUNTER-GATHERERS AT THE FISHING BRIDGE POINT
SITE, NORTHERN YELLOWSTONE LAKE
Douglas H. MacDonald

CHAPTER 6......................................................................................................................................................... 92
FROM ARNICA CREEK TO STEAMBOAT POINT: PREHISTORIC USE ON THE WEST AND
NORTHEAST SHORES OF YELLOWSTONE LAKE
Kenneth P. Cannon and Elaine S. Hale

CHAPTER 7......................................................................................................................................................... 116
RESULTS OF EXCAVATIONS AT THE DONNER SITE, SOUTHEASTERN YELLOWSTONE LAKE
Robin J.M. Park
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DEDICATION

To the memory of Nathaniel Mathew Scherr, M.A.

Good friend and colleague (1982-2013)

We miss you, Nate
MAP OF SOUTHERN YELLOWSTONE SHOWING KEY SITES AND LANDMARKS

- Yellowstone River
- Yellowstone National Park
- Warm Springs
- West Yellowstone
- Obsidian Cliff
- Fishing Bridge Lake Lodge
- Osprey Beach
- Yellowstone Lake
- Teton Pass and Crescent H
- Snake River
- Yellowstone River
- Absaroka Mountains
- Beartooth Mountains
- Wind River Mountains
- Jackson Hole
- Jackson Lake
- Gardiner
- Mammoth
- Ennis
- Cashman Dacite
- Bear Gulch
- Huckleberry Ridge
- Packsaddle Creek
- Teton Mountains
- Absaroka Mountains
- Yellowstone National Park

City
Archaeological Site
Obsidian/Dacite Source

KM Scale
0 40 80
PREFACE

Douglas H. MacDonald and Elaine S. Hale, editors

The prehistory of Yellowstone National Park is rich, dating back more than 10,000 years. To date, Osprey Beach is the oldest archaeological site in the park. This site, located on Yellowstone Lake’s West Thumb, contains a record of prehistoric occupation that is unparalleled in southern Yellowstone. Many other archaeological sites exist around Yellowstone Lake—285 identified so far—that provide evidence of ancient prehistoric use of Yellowstone Lake and southern Yellowstone over the last several thousand years.

Each of the 14 chapters in this book contains important information about archaeological sites in this area. The contributors are experts in their fields, ranging from archaeologists to ethnobotanists to geomorphologists, and everything in between. Many of the papers were originally prepared for a symposium at the 2011 Rocky Mountain Anthropology Conference held in Missoula, Montana. This current volume—entitled Yellowstone Archaeology, Volume 2: Southern Yellowstone—covers the southern portion of the park and predominantly Yellowstone Lake. Without a doubt, this project could legitimately be entitled the Prehistory of Yellowstone Lake, Wyoming.

The predecessor—Yellowstone Archaeology, Volume 1: Northern Yellowstone—was published in 2011 and focused on archaeological research around Gardiner, Montana. The University of Montana, among others (University of Wyoming, Lifeways of Canada, Midwest Archaeological Research Center), have been working in the southern park area for many years now, providing a rich body of knowledge for this book.

We hope you enjoy this collection of 14 papers on the historic and prehistoric archaeology of the southern portion of Yellowstone National Park and Yellowstone Lake. We certainly enjoyed working on these projects and hope the research proves useful.

We would like to acknowledge the participation and financial support of the Yellowstone Park Foundation. Based in Bozeman, Montana, the YPF is the official fundraising partner of Yellowstone National Park. It works in close cooperation with the National Park Service to fund projects and programs that protect, preserve, and enhance the natural and cultural resources and the visitor experience of Yellowstone. We are certainly grateful to the YPF for funding the publication of this volume. We encourage all of our readers to donate to the YPF at www.ypf.org.

We also acknowledge the support of the National Park Service, including Tobin Roop, Staffan Peterson, Pei-Lin Yu, Robin Park, Christie Hendrix, Ann Johnson (now retired), among many others who facilitated the success of these various projects in Yellowstone. Thanks to the Rocky Mountain Anthropology Conference for facilitating the success of the 10th annual meeting in Missoula in 2011. Thanks to the Department of Anthropology at the University of Montana and the publications committee for agreeing to publish this, as well as its sister volume on northern Yellowstone. Thanks also to the dozens of UM archaeology students who participated in excavations and laboratory work on these projects, especially Stocky White for helping with proof-reading and reference checking. We blame him for any remaining mistakes. Finally, thanks to all of the authors who provided their research.

Please note that all photographs and figures are courtesy of Yellowstone National Park and are credited to the authors of the chapters, unless otherwise stated. Radiocarbon dates are presented in uncalibrated radiocarbon years B.P. (BP), unless otherwise stated. These chapters were peer-reviewed. Site locations have been left intentionally vague for their protection.
CHAPTER 1
PREHISTORIC CULTURE HISTORY
AND PRIOR ARCHAEOLOGICAL
RESEARCH IN SOUTHERN
YELLOWSTONE

By Elaine Skinner Hale and Michael C. Livers

Abstract

Prehistoric hunter-gatherer occupation of the Greater Yellowstone Area (GYA) in the Northern Rockies Intermountain Region extends as far back as 11,500 uncalibrated radiocarbon years B.P. (BP) with the recovery of Paleoindian artifacts from Gardiner, Montana and Jackson Lake, Wyoming during the seminal years of archaeological inquiry. Christened during the late 1940s, formal archaeological survey did not come to force in Yellowstone National Park until the late 1980s after the 1988 fire. Since this time, archaeologists and cultural resource staff have documented well over 2,000 cultural resources including both prehistoric and historic sites. Even though documentation of cultural resources remains largely based in areas of historic development, YNP staff and archaeology consultants have developed and continue to add to the cultural record associated with Native American use of the Yellowstone Region, documenting continued use of the park over the last 10,000 years. The culture history of Southern Yellowstone is the culmination of more than 50 years of archaeological research around Yellowstone Lake, composed of data from a dozen or more projects involving dozens of people in pursuit of knowledge about those who lived off the land now cherished and protected by millions.

Introduction

It was obvious to the early trappers, prospectors, and explorers who ventured into the area that native people were familiar with and engaged in using the many resources in the land which later was designated Yellowstone National Park. Their accounts document peaceful and not so peaceful encounters with various groups of Indians (Haines 1965). The 1871 Hayden Expedition sent to create the first geological survey of the park had one of the supply pack strings “liberated” – an unauthorized procurement- by Native Americans near Henry’s Lake just east of the park. The Hayden Survey made numerous references to native peoples camping near or inside the park and traveling along the parks’ ancient trails (Baldwin 1976). What was poorly understood for the first century of the park’s formal existence is that people had traveled through the park and made good use of the flora and fauna on the landscape for many thousands of years. Between 1887 and 1897, Supt. P. W. Norris, the U.S. Geological Survey, and the Bureau of American Ethnology removed hundreds of Native American artifacts from the park, including spear, atlatl, and arrow points, stone knives, scrapers, soapstone vessel fragments, stone celts and axes, pottery sherds, shaft straighteners, stone drills, much flake stone debris, a steatite tube or pipe, and a pecked round stone, —which were sent to the Museum of Natural History, Smithsonian Institution, where they reside today (Sanders 2006). Although provenience of the early collected artifacts lacks locational details for the most part, there is some reference to artifacts retrieved from Yellowstone Lake and the south half of the park. A general view of the Museum of Natural History artifacts indicates they were left by people from the Paleoindian cultures nearly 10,000 years before present, through the Early, Middle, and Late Archaic cultures, on through the Late Prehistoric cultures 1,000 years before present. Most likely a few collected objects date to the Protohistoric period after contact with Euro Americans although no trade goods such as glass beads or metal points are present in that collection.

No evidence of long-term habitation or even over-winter camps have been identified in southern Yellowstone National Park (YNP), although it is clearly evident that early bands of hunter-gatherers –nomadic people who hunt game and collect plant food--were using the park’s southern landscapes in the warmer seasons for at least 10,000 years. Recent research by MacDonald et al. (2012) indicates that seasonal use of the lake area likely was initiated in early Spring, with ice still on the lake. An approximately 10,000 year old Folsom projectile point sourced to Obsidian Cliff was found just south of Yellowstone in the Bridger-Teton National Forest suggesting north to south movement of early peoples (Janetski 2002). The dense number of
prehistoric archeological sites located on the southern shores of Yellowstone Lake containing Paleoindian Cody points dating some 9,000 BP attest to the fact that people were engaged in seasonal rounds of hunter-gather and domestic activities in the park’s southern half for thousands of years. High quality dark green chert found in a Cody complex site on the south of Yellowstone Lake matches the dark green chert projectile point embedded in a bison skull recovered from the Cody “type-site”, the Horner site, just east of the park (Frison, personnel communications with author, 2003), suggesting movement of people from east of the park to the south of the park or visa-versa. Ancient trails from the north along the Yellowstone River, from the west along the Madison River, from the south along the Snake, Bechler, Yellowstone, Falls, and Lewis rivers, and from the east following Crow Creek, Middle Creek, the Shoshone River, and the Jones Pass trail are a few examples of the ancient corridors of passage used by early visitors to southern Yellowstone.

For a variety of reasons mostly centered on the difficulty of access to the remote regions of the south half of the park, much less is known about the prehistoric use of the vast landforms that comprise southern Yellowstone. The park has now completed archeological survey of some of the developed areas such as Old Faithful, Lake, and Fishing Bridge and some of the road systems such as the Grand Loop Road, the East Entrance Road, and a small part of the South Entrance Road. As we finish initial survey and National Register testing of archeological sites along the shores of Yellowstone Lake we are aware of the vast amount of area in the south of the park for which no archeological survey has been conducted. There is very little survey of Shoshone Lake, Lewis Lake, Heart Lake and the many smaller bodies of water in the south of the park. The park’s system of backcountry trails connecting the Bechler/Falls River area to Shoshone Lake; the Snake River trails; the Thorofare trail system; the Yellowstone River trail system; the Mist Creek Pass trail connecting the north of Yellowstone Lake to the Lamar River trail system in the north end of the park; and the Mary Mountain Wagon Road connecting the Firehole River to the Yellowstone River have had no systematic archeological survey. Vast areas of high plateaus in the south half of the park such as the Madison Plateau, the Pitchstone Plateau, the Central Plateau, the Red Mountains, Big Game Ridge, Chicken Ridge, the Two Ocean Plateau, and The Trident have had no archeological survey but we know from scattered visitor and backcountry rangers reports that there is evidence of pre-contact period human use in all of these areas.

Nevertheless, headway is being made in our recovery of archeological data valuable in understanding the prehistoric and early historic use of the south half of Yellowstone National Park. This chapter will provide some background in archeological research conducted in the southern portion of the park, and provide a basic prehistoric culture history for Southern Yellowstone developed from what is currently known from the archeological data.

**Prior Archeological Research**

Much of Yellowstone’s archaeology is reactive in nature and is usually conducted in heavily developed areas that are in continuous use by park visitors. With the increased number of federal projects occurring in Yellowstone since the inception of the National Historic Preservation Act of 1966 and President Nixon’s 1970 Executive Order # 11593 strengthening the Act, whether highway projects, utility upgrades, or visitor services buildings, the amount of archeological work performed in the park has grown exponentially. Yellowstone currently has over 2,000 cultural properties on file with the Montana and Wyoming State Historic Preservation Offices for both historic and prehistoric archeological sites. These 2,000 plus sites exist within an inventoried area no greater than 4%, a mere 140 of the entire 3,472 square miles (8,987 km²) making up YNP. Putting the inventoried area into perspective, this 4% amounts to roughly 88,883 acres, of which the last four years of the University of Montana’s and Yellowstone National Park’s (YNP) Montana Yellowstone Archeological Project (MYAP) surveys have amounted to almost 4,000 acres of inventoried area. It has taken over 40 years to approach 4% archeological inventory of the park. With funds in generally short supply and the NPS mission to keep wild places wild (meaning little project driven funds for archeology), it is difficult to predict future progress towards a more complete archeological record, especially in the less developed southern portions of the park.
The chronological listing of archeological work in the park begins with the previously discussed collections by P. W. Norris and a discussion of Obsidian Cliff by William H. Holmes in 1879. After a 62-year gap in the parks archeological record, the inadvertent discovery of a native burial at Fishing Bridge brought members of the Missouri River Basin survey crew to Yellowstone to investigate the burial site (Shippee and Hughes, 1947). A decade later a park ranger, Wayne Replogle, walked some of the park’s ancient trails and mapped the locations of approximately 80 prehistoric sites generally described as “chip strewn areas.” Renowned wildlife conservationist George Schaller was studying pelican behavior on the Mollie Islands on the Southeast Arm of Yellowstone Lake in 1962 when he noticed many prehistoric artifacts on the south shore of the lake. He mapped and collected 187 artifacts and turned them over to the park where they were curated into the museum in 1967 and sat in storage until 2006 when the artifacts were re-examined (Szamuhel 2007.)

Replogle’s maps inspired Dr. Carling Malouf, head of the Montana State University (now the University of Montana) Anthropology Department to initiate the first “systematic” archeological survey of Yellowstone National Park in 1958. The two month field survey covered drainages along the Yellowstone River (both inside the park and north of the park), the Madison River, the Gallatin River (partially outside YNP), and Yellowstone Lake. Dee C. Taylor, co-director of the Yellowstone Survey, continued the University’s work in Yellowstone an additional season in 1959 with Mission 66 program money (Hoffman 1961.) The crew located and recorded 195 sites within the park, 78 of which were sites Replogle had previously mapped and many were recorded without revisiting the site. Their survey work in the park’s southern half included Yellowstone Lake and its tributaries with a majority of the recorded sites located on the north end of the lake and on the shores of West Thumb, presumably for the Mission 66 development of Grant Village. Their survey work along Thorofare Creek, the Snake River drainage including Shoshone, Lewis and Heart lakes, and the Bechler River resulted in only two sites documented along the Snake River. The Madison and Firehole River survey produced 41 documented sites sparsely scattered along the river banks. Although their survey work was cursory, the crew did identify and excavate the first site in the park from which pottery was recovered, 4BYE449, located along a creek draining into Yellowstone Lake (Hoffman 1961.) This is one of two pottery bearing sites known to date in YNP.

The park’s Cultural Sites Inventory (CSI) indicates that during the 1960’s, 1970s, and the 1980s archeological survey in the south end of the park was very spotty, with limited survey being conducted for small-scale projects such as minor trail reroutes, utilities or structural work within developed areas, backcountry cabin documentation, and mostly road inventories in support of the parks fledgling park-wide road reconstruction program (MWAC 2008). Initially the work was performed by J. J. Hoffman, whose work with the 1958-59 Montana State University survey gave him a good background for the small project inventories. Gary Wright, who was actively engaged in archeological survey work for Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway from 1972 until 1990, provided published research and hypotheses of migration routes between the Jackson Hole area and the south portion of Yellowstone National Park (Bender and Wright 1988.) In the late 1970s, Wright began conducting small archeological survey projects in YNP. Wright (1979) compiled the early archeological report for the assessment of the Greater Yellowstone Cooperative Regional Transportation Study, including archeology from Grand Teton and the Rockefeller Parkway. Wright conducted utility inventories throughout the developed areas of the park and block inventories at Grant Village and West Thumb in the south end of the park (CSI 2008.)

By the 1980s most of the archeological survey work was still small project work and was being conducted by the staff of the Midwest Archeological Center (MWAC), a NPS facility in Lincoln Nebraska. In the late 1980s, Doug Scott and Melissa Conner, both with MWAC, conducted archeological survey in the southern part of the park in the Fishing Bridge-Lake area and for the Craig Pass segment of road between Old Faithful and West Thumb. By the late 1980s, Ann Johnson from the NPS Regional Office was actively engaged in additional small project archeological surveys. The aftermath of the fires of 1988 required archeological assessment efforts from both the Regional Office and MWAC. Post-fire assessments of
sites along the backcountry trails and associated campgrounds continued in 1989 and 1990.

With the 1989 formalization of the road reconstruction program in Yellowstone National Park, the archeologists with MWAC became more actively engaged. Ken Cannon conducted archeological inventory, National Register testing, and excavated a few sites to recover archeological data along 27 miles of the East Entrance road, including work within the Fishing Bridge sites 48YE304 and 48YE1. At the same time MWAC provided archeological support for proposals to expand staff housing inside the park, working mainly in developed areas such as Old Faithful, Grant Village, Fishing Bridge, and Lake in the southern portion of the park. By 1992, road inventory expanded to the Arnica Creek to Little Thumb Creek segment of road around the West Thumb of Yellowstone Lake. MWAC staff was also conducting various utility corridor archeological surveys in the Fishing Bridge-Lake-Bridge Bay areas and expanding the road inventory to Madison to Old Faithful area on the south end of the Grand Loop Road.

By the mid-1990s, archeological work associated with the parks road program concentrated on road segments in the north of the park. In 1996, the NPS Submerged Resources Center conducted the first underwater archeological survey of Yellowstone Lake, identifying submerged prehistoric sites off shore of the Lake Developed area and the remains of the legendary 1880 lake tour boat the Zillah (Bradford, et al. 2003). Johnson, now the park archeologist, conducted several small inventories in 1996 for the Trail Creek and Pelican Creek placements of wolf pens for the wolf re-introduction program. Also in 1996, the Office of the Wyoming State Archaeologist (OWSA) began inventory and testing work for the park’s road program working on the Bridge Bay to Lake section of the Grand Loop Road. In 1997, the OWSA crew conducted archeological test excavations adjacent to Pelican Creek in support of bridge replacement. YNP staff continued to conduct archeological inventory for small trail re-routes and utilities work.

Cannon (1999) reported inventory conducted with Kenneth Pierce in 1997 around the Trail Creek Cabin area which included the Donner site. The Museum of the Rockies salvaged a hearth at the Donner site and conducted inventory around the bay of the South Arm of Yellowstone Lake in 2000 (Shortt 2001.) Starting in 2000, a crew of volunteers from Wichita State University, under the direction of Johnson, began to survey the lakeshore along the West Thumb area and identified the multi-component Osprey Beach Cody Complex site.

In 2002, the OWSA conducted archeological survey on 1.6 KM of the South Entrance Road and the Museum of the Rockies archeological crew documented four prehistoric sites in the Pelican Valley and three prehistoric sites on the east side of Heart Lake. Johnson conducted several small inventories for hazard fuels reduction around several backcountry cabins and the South Entrance Ranger Station. In 2003, Johnson and a crew of volunteers ventured to the south area of Yellowstone Lake along Trail Creek and identified the area as rich in prehistoric archeological sites and in need of intensive inventory. A well known Livingston photographer, Tom Murphy, oversaw the collection of archaeological artifacts at the Donner site in 2000 and again in 2006. The artifacts were eroding out of the shores of the south end of the lake due to uplift in the northern part of the lakes’ thermal domes pushing excess water to the south end of the lake. Johnson was able to acquire funding from the Yellowstone Park Foundation (YPF) to carry out mitigative investigations at the Osprey Beach site in 2002 and at site 48YE252 in 2008, both sites actively eroding out into the lake. YNF also funded Yellowstone Lake shoreline inventory between Solution Creek to the Southeast Arm in 2006 that recorded 156 sites (Vivian et al. 2007.)

In 2007, a 490-acre block archeological inventory of the Old Faithful developed area was conducted by the OWSA (Sanders et al. 2008.) A 130 acre block inventory surrounding the Lake developed area was conducted by the OWSA, filling in the areas not survey in the small projects of the last 20 years (Sanders et al. 2009.) The University of Montana archeological crew filled in the gaps in archeological survey in the northwest shoreline of Yellowstone Lake (MacDonald and Livers 2011) and also filled in the gaps of the Bridge Bay-Lake-Fishing Bridge block survey for the parks comprehensive planning program. This survey work included survey of the Fishing Bridge recreational vehicle park and survey for Fishing Bridge developed area utility upgrades (Livers et al. 2010; Livers and MacDonald 2011) During the summer of 2010 the University of Montana closed the approximately 24 mile wide gap of un-surveyed shoreline...
along the eastern shore of Yellowstone Lake from the northern bank of the Yellowstone River Delta to the parking lot located off the East Entrance Road below the Lake Butte lookout as the roads heads east out of the park (Livers and Hare 2011)

The University of Montana archeological crew has been working to complete survey and National Register testing on the remaining sites on the south portion of Yellowstone Lake shores. Work on this project continued in field season 2012 and it is hoped that the 2013 field work will complete the recording and National Register testing of the lake shore sites. Efforts to document the Nez Perce Trail through YNP were conducted in 2007, 2008, and 2009 by the OWSA, some of which was in the south end of the park (Eakin 2009; 2010; 2011).

Much of the southern park remains without archeological survey but the work to date gives a great amount of information with which to develop a culture history of the southern portion of Yellowstone National Park.

**Prehistoric Culture History of Southern Yellowstone**

In order to provide a context for the description of archaeological findings, we provide a brief summary of the prehistory of the area. Few of the prehistoric archeological sites investigated in the 1950s through the 1990s have been radiocarbon dated (Cannon et al. 1996). Without corroborating absolute dates, archaeologists must rely on point technology phases as well as important stratified sites in the area like Mummy Cave (40km east of Yellowstone Lake) and Medicine Lodge Creek (80km northwest of Yellowstone Lake) (Cannon et al. 1996). Following Frison (1991) and Hale (2003), we organize the following culture history into six chronological periods (uncalibrated radiocarbon years BP), including: Paleoindian (11,000 to 8,000 BP); Early Plains Archaic (8,000 to 5,000 BP); Middle Plains Archaic (5,000 to 3,000 BP); Late Plains Archaic (3,000 to 1,500 BP); Late Prehistoric (1,500 to 300 BP); Contact and Historic Period (300 years ago to 150 BP). Without these classifications, it would be very difficult for archaeologists to establish a context of significance for Early to Late Archaic use of upland areas in the Greater Yellowstone Area (GYA) (Cannon et al. 1996) as little evidence has been documented.

The Upper Yellowstone River Valley, created by the Yellowstone River as it flows in to the park from Wyoming to the south, through the park and exits the park to the north flowing through Paradise valley, was in constant use over thousands of years by hunter-gatherer populations from all over the northern Rockies and northern Plains. The Yellowstone River—both its southern and northern branches provide a natural corridor or conduit for the migration of animals and people following resources along the valley (Davis et al. 1995; Hale 2003). Native Americans traveling from the Snake River Plain to the southern Yellowstone River arrived at Yellowstone Lake’s southern shore, while those traveling southward along the upper Yellowstone River from Montana arrived at its northern shore (Park 2010.)

The continued use of similar landforms, or the same landforms, by prehistoric groups, especially in the intermountain regions around YNP is well documented in archaeological research. High altitude upland valleys and foothills in the Greater Yellowstone region show a continued occupation by hunter-gatherer populations throughout the last 10,000 BP (Baumler et al. 1996; Bender and Wright 1988; Frison 1976; Kornfeld et al. 2001; Meltzer 1999; Reeves 1973; Shortt 1999a, 1999b; Smith and McNees 1999). Sites like Osprey Beach (Shortt and Davis 2002; Johnson et al, 2004), Fishing Bridge (Reeve 1989), and the Donner Site (Vivian et al. 2007a) detail the continued use of the upland areas of the park since at least 9,000 BP. Through absolute and relative dating techniques, these intermountain areas have proven to be habitable living locations for these groups for thousands of years. Knowledge of continued land use is important in order to understand settlement patterns of prehistoric populations in intermountain regions over time; however, understanding the use of the upland regions of the park by the same cultural groups living on the Plains comes with its challenges.
A majority of the archaeological sites in the park consist of ephemeral or short-term camps used for lithic reduction activities or hunting. The remains of these open-air campsites consist mainly of lithic debitage scattered over a utilized area with possible features such as hearths or boiling pits. Archaeology surveys along the
first 10 miles of the Yellowstone River north of Fishing Bridge resulted in almost 100 of these ephemeral lithic scatter sites (Reeves 2006; Sanders et al. 1996; Shortt 1999c). More than 280 lithic scatters or “chipping stations” have been documented around Yellowstone Lake with the highest concentration occurring between the Fishing Bridge peninsula heading south along the western shore to the Bridge Bay area (Cannon 1990). Additional lithic scatters have been identified sporadically along the East Entrance Road and on the east shore of the Lake (Cannon 1990). Survey along the southern shoreline of Yellowstone Lake has resulted in another 80 or more lithic scatters (Vivian et al. 2007a), adding even more evidence to support the extended use of Yellowstone Park during prehistory. On-going National Register inventory and testing of archeological sites along all of the shoreline of Yellowstone Lake by the University of Montana has provided a great deal of additional information about hunter-gatherer use of the resources and landscape of southern Yellowstone. (Livers and MacDonald 2010; Livers and MacDonald 2011; MacDonald and Livers 2011; Livers and Hare 2012; MacDonald et al. 2012; this volume).

**Paleoindian (12,000 to 8,000 BP)**

The early prehistory of Yellowstone National Park is a period of human colonization of a previously uninhabited landscape due to glaciations. The earliest known occupation in the Yellowstone region is the Clovis culture, radiocarbon dated from 11,500 to 10,900 BP. Clovis hunters utilized projectile points that are long, finely crafted lanceolates with retouched edges and a flat, or slightly concave or convex proximal end that is sometimes rounded. Fluting at the proximal ends is another characteristic of the Clovis Complex projectile points. Percussion flaking initiated at one margin and terminating at the opposite margin is characteristic of Clovis and can be seen in both their biface preforms as well as their projectile points.

The Clovis people would have been the first groups to traverse Yellowstone country, hunting all available game. Few Clovis points have been recovered within park boundaries. The 2007 MYAP team recovered a Clovis point fragment from the ground surface approximately one mile north of Airport Rings (48YE357) along the Yellowstone River (Maas and MacDonald 2009). However, the point was likely secondarily deposited at the site, either from upland slopes or by later site occupants via recycling. The second-most proximate Clovis point recovered was from the construction of the Gardiner Post Office (Janetski 2002). Approximately 100 miles north of the project area, the Anzick Clovis Cache yielded a wealth of data regarding Clovis burial and cache behavior in the northern Plains (Lahren 2006).

As with Clovis, the Folsom complex is rare in YNP and this portion of the Yellowstone River basin. The Folsom cultural complex dates to approximately 10,800 to 10,300 BP, and the culture is characterized by a subsistence pattern oriented toward bison hunting (MacDonald 1999, 2009; Hill 2007). A Folsom point found in the Bridger-Teton National Forest south of Yellowstone was sourced to Obsidian Cliff, indicating that Folsom individuals clearly entered the park to collect stone as early as 10,900 BP (Cannon et al. 1997; Frison 1991). An unfluted Folsom or Plainview point, geochemically similar to stone from Obsidian Cliff, was recovered during archaeological excavation on the shores of Yellowstone Lake (Hughes 2003a, b). Also, as presented by Hale at the 62 Plains Anthropological Conference, Billings, Montana in 2004, two fluted point bases—possibly Clovis or Folsom—have been sourced to Obsidian Cliff, implying use of the Greater Yellowstone Ecosystem during the Early Paleoindian period.

When looking at the range of Paleoindian artifacts recovered from the West Thumb area of Yellowstone Lake it is not surprising that 80% of the sourced obsidian artifacts came from Obsidian Cliff. A Pleistocene paleontology and prehistoric archeology site in the Centennial Valley of Northwest Montana, the Merrell Locality near Lima Reservoir investigated by Montana State University and the Bureau of Land Management in 1983, recovered obsidian flakes sourced to both Bear Gulch and Obsidian Cliff possibly in association with Pleistocene fauna (Hill and Davis 2005). This information provides additional evidence of the invested use of Yellowstone Park and its resources by Paleoindian groups throughout the Paleoindian period; occupational use that most people tend to dismiss due to the small number of Paleoindian artifacts. Not only were these Paleoindian groups investing time in obtaining obsidian from the park, it is evident from the point found in the Boundary Lands (Maas and MacDonald 2009) that groups were
using the raw material chert source from the Crescent Hill formation as early as the Paleoindian Period.

The Goshen/Plainview complex has been documented at the Mill Iron site on the Northern Plains in Montana (Frison 1996) and dates around 10,500 to 11,000 BP. It was rumored that a Goshen point base was recovered along the south shore of the West Thumb of Yellowstone Lake but no record of that find currently exists. The initial inventory of sites on the Southeast Arm of Yellowstone Lake (Vivian et al. 2007) recovered a complete and a basal portion Goshen points on the surface of the shore. However, recent work in the findspot by UM did not confirm the presence of a Goshen site, unfortunately (MacDonald, pers.comm. 2012).

Folsom culture persisted in the Greater Yellowstone Area and the Great Plains until approximately 10,200 BP. At that time, archaeological data indicate that individuals ceased to use Folsom points, in favor of Agate Basin and Hell Gap stemmed lanceolate points and, subsequently, a variety of other unfluted point types. Although the location where the artifact was found is unknown, the oldest recognized projectile point collected from the interior of YNP by Supt. Norris in the late 1880s was described as Agate Basin like (Sanders 2006). It has been dated in other areas outside of the park at 10,500-10,000 BP (Taylor et al. 1964; Cannon and Hughes 1993). Taylor identified two Agate Basin points found in the Mammoth Museum prior to the Montana State University 1958-59 survey (Taylor et al. 1964). One Agate Basin point was collected from Alum Creek, a drainage of the Yellowstone River in the Hayden Valley and the other from Fishing Bridge at the outlet of Yellowstone Lake. Taylor (1964) recovered two additional Agate Basin like projectile points from pedestrian inventory from the shores of Yellowstone Lake between Fishing Bridge and Pumice Point. Later, in the 1990s Cannon collected an Agate Basin style point in the Fishing Bridge area (Cannon et al. 1994) that sourced to Obsidian Cliff. Agate Basin projectile points are elongated lanceolates with narrow, tapered bases and straight-convex blades.

Hell Gap points are similar, and are described as distinctively shouldered with a broad point which tapers to a straight or slightly concave base with medial flaking pattern that result in a lenticular cross section (Hofman and Graham 1998.) The 1958-59 survey recovered four Hell Gap points from the surface; three from sites along the shores of Yellowstone Lake and one on the banks of the Yellowstone River near Cascade Creek. Records of two additional Hell Gap points previously collected and curated in the Mammoth Museum indicate one point was found at the mouth of Bridge Creek on Yellowstone Lake (Taylor et al. 1964.)

Cody sites generally are associated with bison hunting, although blood residue analysis of Osprey Beach, the park’s most significant Cody site, did not indicate bison hunting and clearly represented a longer term camp where curation of tools and other domestic activities were taking place, rather than the very ephemeral hunting locals. Diagnostic projectile points associated with the Cody Complex are stemmed lanceolate projectile points, including Alberta, Eden, and Scottsbluff varieties. Each of these point styles is a cultural descendent of Agate Basin/Hell Gap style points, as represented by the fine bifacial flaking and use of high quality lithic materials in their manufacture (Kornfeld et al. 2009: 88, 493). Another diagnostic tool of Cody Complex sites is a beveled cutting tool called a Cody Knife, one of the most interesting knife forms in the prehistory of the Plains. The Cody knife is essentially a Scottsbluff/Alberta projectile point re-sharpened to an asymmetrical blade, useful in bison processing and other cutting activities (Frison and Todd 1987; Agenbroad 1978).

The 1958-59 inventory work recovered a Cody knife from the south shore of the West Thumb portion of the lake. 1989 excavations on the Fishing Bridge peninsula (Reeve 1989) recovered a Cody Complex lanceolate (Scottsbluff) projectile point. In support of the reconstruction of the East Entrance road, the Midwest Archeological Center recovered three Cody Complex tools from the Fishing Bridge area in 1992, including a Cody knife and portions of two stemmed projectile points. Blood residue analysis on one of the points indicated to Cannon et al. (1994) the tool was in contact with rabbit.

The 2000 Wichita State University surface reconnaissance of beachfront on the south shore of West Thumb produced two Cody knives, and diagnostic portions of Eden and Scottsbluff projectile points. Analysis indicated that some of the obsidian tools came from the park’s Obsidian Cliff and from Bear Gulch, Idaho. Shortt and Davis (2002) analysis of the artifacts
indicate that tools such as hide abraders, perforators, gravers, and choppers suggest domestic activity and tools such as shaft abraders indicate preparation of hunting tools. The blood residue analysis of the tools indicates contact with rabbit, dog (wolf, coyote, or fox), deer and sheep. Charcoal from the site provided a 9,360 BP date for the camp (Johnson et al. 2004). Other articles in this volume will provide more information on the Cody Complex in the southern portion of the park.

The Terminal Paleoindian Period, commonly termed regionally as the Foothill-Mountain Late Paleoindian Tradition (Frison 1991) produced diagnostic projectile points in the Pryor Stemmed, Lovell Constricted, and Foothill-Mountain Traditions. These types of projectile points have been recovered on the south end of the Yellowstone River and the north and south shores of Yellowstone Lake. Taylor et al. (1964) recovered a Lovell Constricted point from the lake shore Cannon et al. (1997) excavated a site along the northeast shore of Yellowstone Lake, the Steamboat Point site, and recovered a Lovell Constricted point. Cannon (1997) also recovered a Mountain-Foothill lanceolate from the Fishing Bridge area on the north of the lake. Sanders (2001) recovered a “fishtail” point similar to those oldest occupations of Mummy Cave at a site on the southern banks of the Yellowstone River before the outlet at the north end of Yellowstone Lake.

The record of Paleoindian occupation in the southern portion of the park remains limited, but the existing data points to a diverse subsistence pattern between approximately 11,000 and 8,000 BP.

The Plains Archaic or Holocene Period (8,000 to 1,500 BP)

By the end of the Paleoindian period—approximately 8,000 years ago—Plains Native Americans embraced a diverse subsistence pattern and used the atlatl in hunting. A variety of notched projectile points dominate lithic artifact assemblages from all three sub-divisions of the Archaic, including:

1) Early Archaic—8,000 to 5,000 BP
2) Middle Archaic—5,000 to 3,000 BP
3) Late Archaic—3,000 to 1,500 BP

The Archaic period is characterized by a decline in bison use during the Early Archaic, an increase by the end of the Middle portion, and a dramatic increase during the Late Archaic portion. This change over time largely is due to dramatic environmental shifts over the course of the Archaic period. A period of increased aridity and warm weather around 8,000 BP, indicated by warm weather adapted plants, marked the beginning of a period known regionally as the Altithermal. Pollen sites in the southern half of the park suggest maximum dryness after 7,000 BP with Yellowstone’s modern climate developing around 1,500 BP (Whitlock 1993). Projectile point technology changed over time, with the use of large side-notched points in the Early Archaic, bifurcated points during the Middle Archaic, and smaller side- and corner-notched points in the Late Archaic.

Early Plains Archaic (Early Holocene) (8,000 to 5,000 BP)

At the same time as the warm, dry conditions of the Altithermal developed, the Paleoindian stemmed and lanceolate projectile points decreased in frequency and the use of large side notched points increased. These are named Pahaska and Blackwater Side Notched and were identified in Mummy Cave, Hawken Side-Notched points found in Wyoming sites, and Elko-Bitterroot Side-Notched points found to the west. Early Plains Archaic side-notched projectile points are distinctive but Early Plains Archaic corner-notched points possess similarities to Middle Archaic corner-notched points. Projectile points from the Early Plains Archaic are diversified, with attributes not clearly defined, leading to misidentification of these early points as Late Archaic points (Buchner 1980; Frison, Schwab et al. 1996; Gryba 1980; Larson 1997; Reeves 1973; Roll and Hackenberger 1998).

One of the hallmark characteristics of the Early Archaic period is a lack of well-excavated archaeological sites and an apparent decline in human population. Early Archaic sites are as rare as Paleoindian sites and are also less visible, possibly due to a decreased reliance on bison hunting. This decreased role of bison hunting was largely due to the decreasing herd populations as a result of the emerging Altithermal climatic period (Antevs 1953; Wolfe et al. 2006). The Altithermal period is characterized by comparatively hot and dry climate, resulting in decreased forage for bison. Bison teeth that date to the Early Archaic period are badly worn, suggesting more dry grass and grit in their forage. Surface water was likely reduced during this time and...
springs and summers were likely much warmer than during the previous Late Paleoindian period. Regionally, people seem to increase their dependence on plant foods and small game such as marmots, grouse, and rabbit; they used more local stone sources for tool manufacture and there is a noticeable decline in the quality of lithic technology, as documented in Mummy Cave (Frison and Mainfert 1996; Larson 1997).

Early Plains Archaic (or Early Holocene) sites have been recorded on the north shore of Yellowstone Lake, along the West Thumb area, on the shoreline of the Southeast Arm of Yellowstone Lake and along the Yellowstone River. Cannon et al. (1996) recorded a site with an Early Archaic component near West Thumb, recovering Pahaska Side Notched points from buried levels dating around 6,780 years before present. Analysis of the obsidian indicated Obsidian Cliff as the source and blood residue analysis suggesting contact with sheep (Cannon and Hale, this volume).

Excavations at the multiple component Donner site, discussed in another chapter of this volume, recovered two Early Archaic Bitterroot Side-notched points. The Breeze Point Site (48YE1645), another lithic scatter recorded by Vivian et al. (2007a) along the southern shore of Yellowstone Lake, also contained an Early Archaic element. Two Salmon River Side-Notched points typologically dated at many sites in Idaho to 7,750-4,500 BP were recorded at the site. This site contained heat-treated chert flakes, suggesting possible tool manufacturing at the site. A biface tip was sourced to the Packsaddle Creek obsidian source, 100km to the southwest of Yellowstone Lake in Eastern Idaho, providing information pertaining to prehistoric mobility patterns during the Early Archaic Period.

One final Early Archaic site important to discuss is the Fishing Bridge Point Site (48YE381) located southwest of the Fishing Bridge area (MacDonald, this volume). This site was the first and only excavated site in Yellowstone Park to provide an Early Archaic occupation date based on a radiocarbon sample date from a buried hearth feature. Site 48YE381 was formally excavated during the summers of 2009 and 2010, providing excellent depositional stratigraphy from which to examine distinct episodes of prehistoric occupation along Yellowstone Lake from the Early Archaic through Late Prehistoric Period.

Middle Plains Archaic (Middle Holocene) (5,000 to 3,000 BP)

The Middle Plains Archaic period is best characterized as a time of transition, by more varieties of projectile points on the Northwestern Plains, including several with bifurcated bases such as Oxbow, McKean, and Mallory points, and other slightly later varieties without bifurcated bases such as Duncan and Hanna. It appears the large, side-notched projectile points from the Early Plains Archaic period disappeared or were replaced by smaller, distinctive Oxbow points. Mainly a Northern Plains manifestation, Oxbow points are found in Southern Montana and Northern Wyoming and, although short-lived, may form a temporal bridge between the Early and Middle Archaic periods (Frison, Toom, et al. 1996). The McKean Complex is usually identified by the presence of several types of projectile points such as the indented base McKean lanceolates; side-notched Hanna points with straight-to-concave lateral margins; Duncan points with convex margins, expanded stems and notched bases, and Mallory points with deep, narrow side notches about 1/3 of the distance from the base to the tip (Kornfield 1998).

Variations in a number of other categories such as technology, social and economic organization, as well as settlement strategies during this period should be expected due to the nature of short term and long-term changes (Hofman 1997). These seasonal and yearly changes likely affected where different cultural groups lived, the boundary of the territories they exploited, the duration of their occupations, as well as the extent of their social networks. Rock filled fire (roasting) pits, sandstone grinding tools, beveled edge side-notched knives, and concentrations of stone circles are cultural hallmarks of the Middle Archaic (Holocene) (Frison 1991).

Five thousand years ago, because the intensity of summer solar radiation was decreasing, the climate returned to conditions similar to those of the present marking the end of a 3,000 to 4,000 year hot, dry spell, although Yellowstone was still subject to occasional drought cycles (Whitlock and Bartlein 1991). Shrubs, herbs, and grasses also increase their proportions and distributions. This climate change coincides with the re-emergence of substantial bison herds and Native Americans began to transition back to bison hunting –
although not just bison hunting. Faunal remains found in archeological context on the shores of Yellowstone Lake are identifiable mainly though analysis of blood residues remaining on stone tools. Although providing only a broad range of possible association, blood residue yielded positive results for deer (deer, elk, moose, and pronghorn), rabbit (rabbit, hare, and pika), dog (coyote, wolf, fox and dog), bear (black and grizzly), sheep (goats and sheep), cat (bobcat, lynx, and mountain lion) and bovine (bison) (Cannon 1996; Shortt and Davis 2002).

Although it is not known how many, Superintendent Norris collected McKean complex projectile points from the park in the late 1880s and added several Duncan and Hanna points to the museum collection (Sanders 2006). Taylor et al. (1964) recovered Duncan and Hanna type points from both the Yellowstone River and Yellowstone Lake and a Mallory point from the Alum Creek area of the Yellowstone River.

Also in southern Yellowstone, obsidian Oxbow points have been recovered eroding out of the banks of the Yellowstone River (Marceau and Reeve 1984) and from excavations on the north end of Yellowstone Lake where a basalt Oxbow point tested positive for deer anti-sera (Cannon et al. 1994). Middle Archaic radiocarbon dates have been recovered from the Arnica Creek Site along the West Thumb (Cannon et al. 1996) and the Chittenden Bridge site (48YE516) on the Yellowstone River approximately 12 miles northwest of Fishing Bridge (Cannon et al. 1994). The 1962 collection of artifacts from the Schaller site on the Southeast Arm of Yellowstone Lake recovered a chert Oxbow point, three obsidian McKean lanceolate points, and one obsidian and one chert Hanna stemmed points.

The Arnica Creek, or First Blood site, yielded Oxbow or Elko Eared points as well as McKean points and radiocarbon dates around 4,500 BP. One Middle Archaic obsidian point was sourced to Bear Gulch, Idaho. Nearby, the Teton View site provided a radiocarbon date calibrated to 4,157 BP. Other Middle Archaic sites around Yellowstone Lake include the Donner Site and the Linden Site. Prior to Vivian et al.’s (2007a) collection of eight McKean phase projectile points, similar artifacts were recovered by park archaeologists between 2000 and 2006. McKean points were sourced to Teton Pass, Cougar Creek, Park Point, Packsaddle Creek and Bear Gulch in Idaho. The Linden Site (48YE1703), located on the west side of the south arm, was recorded as a domestic activity site due to the presence domestic artifacts like knives, unifaces, and scrapers (Vivian et al. 2007a). Three McKean points sourced to Teton Pass were collected from the site.

Recent archeological study of the complex and diversified use of the Yellowstone Lake landscapes and resources, as described in this volume, have increased our understanding of Middle Archaic hunter-gatherer use of southern Yellowstone.

Late Plains Archaic (Late Holocene) (3,000 to 1,500 BP)

Native Americans across Montana, southern Alberta/Saskatchewan, the Dakotas, and Wyoming once again focused upon bison as the focal point of their subsistence patterns. This period marks the emergence of the classic Plains Bison Hunting Culture, including the use of buffalo jumps and corrals that dominate the archaeology of the region. The Late Archaic period also witnessed the first use of pottery, the widespread use of tepees, trade of obsidian and Knife River flint across the U.S., and perhaps the last use of the atlatl as the weapon of choice for natives utilizing YNP and the Northern Plains.

Bison was a commodity across the Plains and Native Americans actively traded bison meat, hides, and tools with neighboring groups which were unable to regularly hunt bison. In addition to bison products, Plains Native Americans traded a variety of other goods during the Late Archaic period. In particular, Knife River flint from North Dakota and obsidian from Yellowstone National Park’s Obsidian Cliff have been traced to Middle Woodland-period archaeological sites—especially those of the Hopewell culture—in Ohio, Pennsylvania, and Michigan, among other states, during the Late Plains Archaic (Davis et al. 1995; DeBoer 2004.)

One Hopewell site in Ohio yielded over 10,000 pieces of Obsidian Cliff obsidian and an Illinois site of the same time period yielded one Obsidian Cliff obsidian core weighing over 10 kg (over 22.05 lbs.) While most of these goods are thought to have been transported indirectly via down-the-line trade from the Plains and Rocky Mountains to the Midwest and eastern United States, DeBoer (2004) proposes that some individuals within the Scioto River Hopewell culture of Ohio actively
travelled to Montana and Wyoming to obtain rare goods for use in ceremonies. Such goods include obsidian, Knife River flint, bison, as well as big horn sheep horns, among other unique Plains and Rocky Mountain items. Close to a hundred archaeological sites within the Mississippi, Ohio, and Missouri River Valleys, among others, contains obsidian from Wyoming – specifically Obsidian Cliff, Bear Gulch, and Teton Pass, all in close proximity in Idaho, and Wyoming (DeBoer 2004; Davis et al. 1995). Recent archeological investigations along the northwest shore of Yellowstone Lake yielded a large biface whose measurements only fit within Hopewell point typologies (MacDonald and Livers 2010.)

Late Plains Archaic Native Americans used three varieties of side- and corner-notched points: Pelican Lake points which date to around 3,000 to 1,500 BP (Davis 1998), Yonkee points whose use has been dated to 3,000 to 2,500 BP (Roll, 1998, and Besant points dating from 2,000 to 1,300 BP (Forbis 1998.) Pelican Lake projectile points are deeply corner-notched (creating sharp barbs on the corners) with straight blades and straight bases. The blade is triangular-shaped and the finely-made notches are u-shaped. Pelican Lake projectile points were well manufactured especially compared to their later Besant counterparts. Blades on some Pelican Lake points may be serrated, but most are not. There is noticeable variation in sizes for Pelican Lake points which range from 20-50 mm long, 15-35 mm wide, and 3-8 mm thick (Dyke and Morlan 2001.) Although the Pelican Lake style is more prevalent than Yonkee and Besant in the Yellowstone archaeological record, all three styles have been recovered from sites along the Upper and Lower Yellowstone River, at sites all around Yellowstone Lake, as well as along many other tributaries and drainages in the area.

As defined by Zeier (1983), Besant projectile points have triangular to lanceolate blades with straight-to-convex blade shapes. Their maximum width is at the shoulders, with simply-produced, u-shaped side-notches. The point base is concave to straight, but is occasionally convex. As defined from an assemblage of some 280 Besant projectile points from the Antonson site near Bozeman (Zeier 1983), typical Besant points measure 20-75 mm long (mean 25-40 mm), 9-26 mm wide (mean 16-20 mm), and 2.6-9.0 mm thick (mean 4.3-6.0 mm). The Besant point has been characterized by Zeier (1983:2) as the “last atlatl dart point.” After use of the Besant point, at approximately 1,500 BP, Native Americans quickly adopted bow-and-arrow technology, resulting in the demise of these Pelican Lake and Besant points.

Pelican Lake points have been recovered on the ground surface and from excavations in many areas, constituting a majority of Yellowstone’s Late Archaic sites as well as artifacts (Johnson 2002, Hale 2003). The Schaller site on the southeast shore of Yellowstone Lake yielded one complete Yonkee point and one Pelican Lake point. According to Cannon et al. (1994), a peak in prehistoric usage occurred around the end of the Late Archaic Period. Similar data are presented in the current volume in chapters by Sanders and MacDonald. Shortt & Davis (2002) touches on the fact that blood residue results for Late Archaic artifacts vary across the park, while Cannon et al. (1996) found variation in the record of Late Archaic subsistence patterns, ranging from big game hunting to prickly pear cactus roasting. Late Archaic projectile points from the First Blood site (48YE449/457) tested positive for sheep and canid blood residue while a Late Archaic point from 48YE652 tested positive to rabbit antiserum (Cannon et al. 1996). Both sites are located on the West Thumb of Yellowstone Lake.

Sanders (2001a; this volume) notes the increased use of the Hayden Valley during the Late Archaic and into the Late Prehistoric Periods. Cannon et al. (1994) summarize the evidence for the increased use of Yellowstone by Late Archaic groups. Late Archaic and Late Prehistoric projectile points account for over 50% of the Fishing Bridge artifact assemblage recovered between 1990 and 1994. At least three Late Archaic artifacts tested positive for blood residue. The points include a terminal Late Archaic point similar to the Avonlea style, testing positive for to deer anti-sera, an un-typed Late Archaic corner-notched point which tested positive for bear anti-sera, and a retouched flake from shallow deposits which tested positive for canid anti-sera, representing any member of the family, including coyote, fox, wolf, or dog (Cannon et al. 1994: 135).

More information concerning the Late Archaic (or Late Holocene) culture period can be found in the articles featured in this volume. Although the extent of the use of the parks’ southern landscapes during the Late Archaic has not been investigated to the depth needed, we do
have a beginning for the development of history of this culture period.

**Late Prehistoric (1,500 to 300 BP)**

In addition to heightened organizational complexity, the Late Prehistoric period witnessed another first—the introduction of the bow and arrow—which facilitated the increased hunting of bison. This innovative technology allowed for the use of smaller projectile points that were more easily produced in bulk and did not necessarily require the best lithic raw material. This was particularly useful for bison hunters forcing hundreds of animals over bison jumps and for hunters who travelled frequently away from sources of high quality lithic material in pursuit of bison herds. The small stature of the arrow points allowed for use of more local lithic materials of variable quality. The bow and arrow also allowed for improved hunting of other fauna because it allowed for clandestine firing behind protective cover. The Archaic-period atlatl required firing from a standing position, effectively forcing the hunter to reveal him or herself during the attack; the bow and arrow allowed for more discrete assault techniques (MacDonald 2012).

Many of the hallmarks of the Late Holocene, such as side-notched arrow points, pottery, and wider use of plants and animal resources are found in the southern portion of the park. However, many other hallmarks of the period, such as bison drives and jumps, sheep and pronghorn traps, aggregations of domestic stone circles, winter habitation sites, horticulture evidence by bison scapula hoes, rock art, medicine wheels, and variations in pottery styles (Frison et al. 1996) have yet to be found in YNP (Hale 2003).

The use of slab-lined food preparation pits for processing both plants and animal food increased during the Late Prehistoric (Conner 1989), with evidence of plants, seeds, and bone grease processing taking place in the slab lined pits. Deer, bison, and dog protein residues, as well as plant pollens identified on ground stone artifacts recovered from a Yellowstone Lake site in association with a radiocarbon date of 1,250 years before present, may indicate the production of pemmican, a dried mixture of plant and animal products (Cannon, et al. 1997) Stone lined roasting pits and ground stone tools became more prevalent in archeological sites along the Yellowstone River and on Yellowstone Lake during this time period, as the further discussed in this volume.

It is generally accepted that the first appearances of Avonlea projectile points mark the boundary between the Late Archaic and the Late Prehistoric periods. The earliest dates for the transition from atlatl to bow and arrow are around 1,800 BP lasting until around 800 BP in southwestern Montana (within the Greater Yellowstone Area) (Foor 1988). The Avonlea people were semi-nomadic hunters and gathers and although largely dependent on bison, the highly organized Avonlea peoples employed a variety of adaptive strategies using various foods to sustain themselves in the harsh Northern Plains environment (Davis and Fisher 1988; Dyck and Morlan 2001; Frison, Schwab, et al. 1996.) The Avonlea archeological entity is considered to be widespread and relatively long-lived (Davis and Fisher 1988.)

The most clearly diagnostic attribute of all varieties of Late Prehistoric arrow points is their significantly smaller size compared than their Late Archaic counterparts. Late Prehistoric arrow points are, on average, half the size and sometimes a quarter of the size of an Archaic atlatl point. Some Late Prehistoric points are the size of a fingernail as evident from the photo. With the exception of the Avonlea style of arrow point, Late Prehistoric arrow points generally are not as finely manufactured as their atlatl counterparts and were frequently produced using low to medium grade material.

Between approximately 1,200 and 300 BP, the predominant style of point is called the Late Prehistoric Side-notched point, or LPSN. While Kehoe (1960) describes a large variety of these arrow points, the overall form of the arrow points is similar, with diversity coming in notching, blade and base shape. The typical LPSN point has shallow side notches and a straight base. Arrow point blades are typically straight to slightly convex with a triangular shape. Just before the contact period, approximately 500 BP, and some Late Prehistoric hunters added a third notch to the bases of their projectile points; these arrow points are sometimes referred to as Late Prehistoric tri-notch (LPTN) points.

Rose Springs arrow points are commonly associated with Late Prehistoric archeological sites in the Great Basin (Aikens and Madsen 1986). Rose Springs point types are also found in the Eastern Plateau culture region where excavations at an Idaho bison jump and another
bison kill site recovered Rose Springs arrow points sourced to Obsidian Cliff (Roll and Hackenberger 1998). A multiple component site on the south shore of Yellowstone Lake produced a Rose Springs-like point (Shortt & Davis 2002) and serrated obsidian Rose Springs points were recovered from excavations on the north shores of Yellowstone Lake (Cannon, et al. 1997). Small Rose Springs-like points were recovered from excavations in the West Thumb area in association with Intermountain pottery and radiocarbon dates between 1,350-1,500 BP (Cannon 1996.)

The Old Women’s Phase is understood to begin about 1,000 years ago and extended past the end of the Late Prehistoric and the people associated with the small side-notched arrow points are generally recognized as specialized bison hunters. These points are present in the Yellowstone River Corridor and on the shores of Yellowstone Lake in the same archeological context as Avonlea and Rose Springs arrow points. Taylor et al. (1964), Samuelson (1983) and Cannon (1990; 1996) collected the small corner-notched points from various location on the shores of Yellowstone Lake. Yellowstone River sites have also yielded small side-notched points from the surface (Shortt 1998, 1999a, 199b; Shortt and Davis 2002) and subsurface excavations (Sanders 2000) and in association with radiocarbon dates (Marceau and Reeve 1984; Sanders 2001a)

While pottery has been recovered from at least a dozen sites in the valleys along the Upper Yellowstone River (Arthur 1966), pottery inside the boundaries and at higher elevations within the park remains extremely rare. The only officially recorded Intermountain pottery occurring in the southern portion of the park is from the First Blood Site, surveyed in the late 1950s during Hoffman’s initial survey of Yellowstone archaeological potential. Hoffman (1961) recovered 33 sherds, including six rim and three flanged base fragments. The sherd thickness was similar to the other Intermountain Ware recorded north of the park in the Upper Yellowstone River Valley. Other pottery sherds have been recovered at a site in the northern portion of the park along the Yellowstone River.

Rock filled roasting pits, a grinding stone (mano) and grass and sunflower seeds recovered from a radiocarbon dated (1070 years ago) Late Prehistoric sites along the Yellowstone River corridor in Hayden Valley indicate use of plant resources and associated diagnostic projectile points indicate hunting of animals (Sanders 2000, 2001a). Projectile point sourcing from one site has also provided data on raw material acquisition from the Bear Gulch and Packsaddle Creek obsidian sources in Idaho, as well as the local Obsidian Cliff source.

The Historic Period (300 to 150 BP)

The end of the prehistoric cultural history in southern Yellowstone is marked by contact with Euro Americans, trade goods, horses, guns, and a multitude of written records. The first Euro Americans to enter southern Yellowstone were undoubtedly early fur traders although exactly who is debatable. We do know that John Colter passed through Yellowstone in 1807, after being engaged in the Lewis and Clark expedition from 1804-06. Colter was in the employ of a trapper/trader named Manual Lisa under instructions to contact surrounding bands of Indians about Lisa’s new trading post. Colter passed through the park many times during his employ with Lisa and on one occasion was captured by Indians (Colter thought they were Blackfeet, Chittenden thought they were Gros Ventres, and another fur trade historian, James, thought they were Flatheads and Crows) north of the park, who chased him relentlessly, Colter finally escaping under a log jam in a river (Chittenden 1986).

The first printed account of the “Yellowstone Wonderland” was from a member of Jedediah Smith’s California party published in the Philadelphia Gazette in 1827, titled “From the West”. It says, “that of the Yellow Stone has a large fresh water lake near its head on the very top of the mountain, which is about one hundred by forty miles in diameter an as clear as a crystal.” In 1829 a 19 year old trapper named Meek got lost from the party with which he was traveling and wandered through the hot springs country just east of the Yellowstone River before being found. In the spring of 1834, W. A. Ferris, a member of the American Fur Company traveled to Yellowstone’s Upper Geyser Basin and published an account of his visit in the Western Literary Messenger in Buffalo, New York (Chittenden 1986).

Osborne Russell, in his autobiographical Journal of a Trapper (1834-1843) describes numerous travels through Yellowstone where he encountered friendly Shoshone and Flathead Indians, not so friendly Blackfeet who attacked Russell’s party east of Pelican Creek in 1838 and
again when they were camped on Yellowstone Lake in 1840. In fact Russell records eight battles with the Blackfeet both in and out of the park (Haines 1965). In association with Yellowstone Park, Russell notes the presence of Flathead, Crow, Bannock, Shoshone, Grosventre, Sheepeaters, Snake (both referring to Shoshone and Sioux) and Pagan (cf. Piegan), Blood and Blackfeet Indians having a presence in the park during his 1834 through 1843 years as a trapper (Haines 1965). Little evidence of these more recent, contact period habitations have been documented in the south of the park although recent effort to locate remnants of the 1877 Nez Perce flight through the park have heightened our awareness of the possibility of contact period archeological sites, as will be discussed in this volume.

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CHAPTER 5
EARLY AND MIDDLE HOLOCENE
HUNTER-GATHERERS AT THE
FISHING BRIDGE POINT SITE,
NORTHERN YELLOWSTONE LAKE

By Douglas H. MacDonald

Introduction
Archaeological data from sites in the northwestern Plains and Rocky Mountains of Wyoming and Montana, U.S.A., suggest that some portions of the region were attractive to Early and Middle Holocene hunter-gatherers. Several archaeological sites in the region indicate active use of high-elevation watersheds and lakes between 8,000 and 5,000 uncalibrated radiocarbon years ago (BP). During this period—usually referred to as the Early Plains Archaic or Early Archaic (Frison 1991) and documented by Antevs (1953) as the Altithermal climatic period—temperatures increased and precipitation decreased across the Great Plains and Rocky Mountains (Oetelaar 2004; Yansa 2007). The impact on people is a bit more controversial (Artz 1996; McBrinn 2010; Reeves 1973; Sheehan 1994), but it is generally accepted that the climate changes led to reduced bison herds, increased human subsistence diversity, and displacement of human populations from more-arid settings to cooler, wetter settings (Benedict and Olson 1978; Mulloy 1958; Reider and Karlstrom 1987; Sheehan 1994).

Another key change in the Early Archaic is a dearth of sites in the hot and dry lowlands of the Great Plains (Mulloy 1958; Meltzer 1999). However, analysis of Early Archaic site data indicate that there are some regions—among them the Yellowstone River Ecosystem (YRE) of northwestern Wyoming and southern Montana—in which sites are comparatively well-documented (Kornfeld et al. 2010). As reviewed below, sites in the YRE are concentrated in uplands and at stable sources of water (e.g., rivers, streams, springs, and lakes), suggesting that human settlement during the period was tethered to stable water supplies (Yansa 2007; Reider and Karlstrom 1987; Sheehan 1994).

This paper provides data on another high-elevation Early Plains Archaic site—Fishing Bridge Point (48YE381)—along the shores of Yellowstone Lake (MacDonald et al. 2012). The site has yielded the only Early Archaic hearth feature in Yellowstone National Park. Lithic data indicate a tethered settlement pattern with reduced regional mobility and use of local resources. As discussed by Gish (this volume), paleoenvironmental data indicate the presence of a high-elevation shrub-grassland around the lake at the time of occupation. Results of this study suggest that the high-elevation Yellowstone Lake area attracted grassland-adapted ungulates, as well as their human hunters during a period in which game, water, and a variety of other resources may have been more sparse in the hot and dry lowlands.

Early Plains Archaic Background
Below, we evaluate the two major hypotheses regarding Early Archaic hunter-gatherer adaptation to the Altithermal: first, that hunter-gatherers diversified their resource base; and, second, that they constricted their settlement patterns to comparatively cool and well-watered habitats. This constriction of settlement patterns largely resulted in hunter-gatherer mobility patterns that were tethered to reliable water sources. We describe the general conditions of the Altithermal and subsequently the archaeological data for the region. These ecological and archaeological data provide a context for the subsequent discussion of Fishing Bridge Point, Wyoming.

The Altithermal orypsithermal period is characterized by comparatively hot and dry climate (Antevs 1953; Dean et al. 1996; Wolfe et al. 2006). Dean et al. (1996) provide an excellent summary of the effects of the Altithermal on the Midwestern U.S.A. based on analysis of fossil pollen, aeolian proxy variables in lake cores, and dune migration. Their research, confirmed by similar research in Saskatchewan by Wolfe et al. (2006), in Wyoming by Eckerle (1989), and in North Dakota by Yansa (2007), clearly shows that northern North America experienced hotter and drier conditions resulting in heightened dune movements during the middle Holocene (aka, the Early Plains Archaic) between approximately 8,000 and 4,000 BP.
The effect of the Altithermal was dramatic for bison, with the hotter and drier conditions resulting in decreased forage and habitat for bison in the Great Plains (Sheehan 1994). Bison teeth that date to the Early Archaic period are badly worn, suggesting more dry grass and grit in their forage (Meltzer 1999). In fact, it is generally accepted that the Altithermal is responsible for the demise of *Bison antiquus* and the emergence of modern *Bison bison* by 5,000 BP (McDonald 1981). Surface water was likely reduced during this time and springs and summers were likely much warmer than during the previous Late Paleoindian period (Meltzer and Collins 1987).

Within higher-elevation portions of the northern Rocky Mountains of North America, paleoenvironmental data collected by Whitlock (Whitlock 1993; Whitlock et al. 2001) among others suggest the presence of steppe vegetation after 7,600 BP. Whitlock and her colleagues also note that forest fire frequency increased during the mid-Holocene (Huerta et al. 2009), likely due to the increased summer insolation of the Altithermal (Millspaugh et al. 2000). Based on these various data, the Altithermal is best characterized as a period of hotter and drier conditions, leading to dynamic effects on people, animals, and habitats.

Based on the lack of an Early Archaic occupation at the famous Pictograph Cave site near Billings, Montana, William Mulloy (1958) was the first to suggest that humans abandoned the hot and dry open Plains in favor of uplands and water sources such as river valleys. However, Reeves (1973) among others have disputed the Plains abandonment theory, instead suggesting that the hot and dry conditions of the Altithermal resulted in less sediment accumulation in river valleys and a more unstable geoarchaeological environment (Eckerle 1989; Running 1995). The end result was reduced site preservation during this time period and fewer archaeological sites.

Regardless of the causes, no one disputes that there is a decline or at the very least a leveling off in archaeological site counts in the Plains and Rocky Mountains between 8,000 and 5,000 BP (Artz 1996; Benedict and Olson 1978; Frison 1991; Kornfeld et al. 2010; Sheehan 1994). Figure 1 shows data collected for sites in western North Dakota (Artz 1996:388) compared to data collected by Sanders (2001:219; Chapter 2, this volume) in the Yellowstone Lake area of northwestern Wyoming. Similar to these two studies, most surveys indicate reduced site counts or, at the very least, no increase in site counts between the Late Paleoindian and Early Plains Archaic periods, while noting a substantial increase in sites in the subsequent Middle Plains Archaic, after 5,000 BP.

![Figure 1. Site Counts during the Paleoindian Period (Paleo), the Early Plains Archaic (EPA), and the Middle Plains Archaic (MPA) in Western North Dakota, Southern Montana, and Northern Wyoming.](image)

While the causes are still controversial (Artz 1996; Sheehan’s 1991, 1994, 2002) research suggests that Early Plains Archaic Native Americans abandoned some portions of the Great Plains that lacked reliable water sources. In the southern Great Plains, Meltzer (1999) has recorded archaeological sites with excavated wells, suggesting an extreme water shortage, while Yansa’s (2007) study of North Dakota lakes indicates that severe droughts of the Altithermal resulted in some human movement away from the hot and dry northern Plains. In further exploration of this, we provide details below which indicate a movement from the hot and dry lowlands to higher-elevation settings along well-watered settings in the northwestern Plains and Rocky Mountains.
The Yellowstone River Ecosystem

In Montana and Wyoming, several key Early Archaic sites have yielded data that support the hypotheses of diversified subsistence and a tethered settlement pattern. Figure 2 shows a map of Early Archaic sites in the study region, including the Yellowstone River watershed, the core focus area for this paper. One of the most obvious regional trends shown on the map is the dearth of sites in the eastern portion of Montana during the period. Most Early Archaic sites are clustered along the Rocky Mountains and into the YRE. We focus the discussion below toward sites in the YRE to provide a context for the introduction of results of excavations of the Fishing Bridge Point Site at Yellowstone Lake. The YRE covers millions of square kilometers in Montana and Wyoming. As reflected in Figure 2 above, it is centered on the 680-mile-long Yellowstone River, which emerges from Yellowstone Lake in far northwestern Wyoming. Yellowstone Lake is the largest high-elevation lake in the continental United States.

The Yellowstone River remains its largest free-flowing (undammed) river. From its outlet at Fishing Bridge in Yellowstone National Park, the Yellowstone River flows northward and eastward through south-central and eastern Montana to its confluence with the Missouri River near the Montana-North Dakota border. The YRE covers much of southern and eastern portions of Montana and northern Wyoming, including its major tributaries, the Powder, Bighorn, and Tongue Rivers, among other major streams. Elevations in the region range from lows of ca. 2,000 ft. above mean sea level (amsl) near its terminus in western North Dakota to highs of greater than 13,000 ft. amsl in the Absaroka Mountains above Yellowstone Lake, Wyoming.

Early Archaic Sites and the Effect of the Altithermal

Early Archaic sites are rare in the lower (northeastern) reaches of the Yellowstone River basin, where elevations are reduced and hot and dry conditions of the Altithermal were likely exacerbated. As reflected in Figure 2 below, at an elevation of 5,100 ft. above mean sea level (amsl), the Myers-Hindman Site in Livingston, Montana, is the last Early Archaic site along the Yellowstone River. No sites exist north of Myers-Hindman, as elevations decrease to near 3,000 ft. amsl at Pictograph Cave in Billings to 1,950 ft. amsl near the Yellowstone’s confluence with the Missouri River near the Montana-North Dakota state line. Even today, there are significant climate differences between cities along the Yellowstone River. While they are only separated by 115 miles of river, Livingston receives 2.5 inches more rain annually and is four degrees cooler in July than Billings. In turn, Yellowstone Lake, at the headwaters of the Yellowstone River, receives nearly seven inches more annual precipitation than Billings and is 14 degrees (Fahrenheit) cooler.

Interestingly, no Early Archaic sites have been identified in this entire stretch of the Yellowstone River north of the Myers-Hindman site in Livingston. As discussed below, it appears that Native Americans avoided low-elevation settings, giving preference to areas near permanent water and at higher elevations. In fact, Mulloy’s (1958) study of Pictograph Cave in Billings notes the significant absence of an Early Archaic occupation between the Paleoindian and Middle Archaic occupations. The following discussion provides an overview of important Early Archaic sites in the region and identifies a general trend toward higher-elevation, well-watered settings.

As introduced above, the Myers-Hindman Site (24PA504) in Livingston, Montana, is arguably the most important Early Archaic site in Montana (Lahren 1976, 2006). At an elevation of ca. 5,100 ft. amsl, the site was excavated in the 1970s by Larry Lahren and colleagues along an upland feeder stream of the Yellowstone River.

Of most interest are the contrasting data provided by faunal remains (Figure 3) which show a 13 percent decrease in bison use between the Late Paleoindian site occupation of 8,900 BP and the Early Archaic occupation of approximately 5,300 BP (Lyman 2004). Lahren (2006:112-114) records a corresponding 15 percent increase in Bighorn sheep procurement between the Late Paleoindian and Early Archaic occupations of the site. These data exemplify the changes of the Early Archaic period in which Native Americans increased their reliance on game other than bison. Other faunal remains in the Early Archaic levels at Myers-Hindman include pronghorn antelope, deer, elk, bird, and canid.
Figure 2. Map of Early Plains Archaic and Lithic Procurement Sites Discussed in Text in Relation to the Yellowstone River Ecosystem.
Another important Early Archaic occupation in Montana is the Buckeye Site in Carbon County, south-central Montana (Peterson 1999; Peterson et al. 2004). At an elevation of 4,680 ft. amsl, the site is located in Kings Canyon near a permanent spring which feeds the Shoshone River and, ultimately, the Bighorn and Yellowstone Rivers. Radiocarbon dates on sediments from the well-stratified site indicate three occupations around 6,300 BP. Excavations yielded nearly 2,000 lithic artifacts, including one Early Archaic side-notched projectile point with protein-residue of pronghorn. Mussel shell was also abundant at the site, suggesting its collection was an important part of the Early Archaic subsistence realm in south-central Montana.

Ethnobotanical remains from Early Archaic features and soil samples at the Buckeye Site indicate use of prickly pear cactus and biscuitroot for food and sagebrush and pine for firewood. The pine likely derived from the nearby Pryor Mountains, suggesting that Early Archaic people travelled into the mountains for food and supplies. Overall, data from the Buckeye Site indicate a wide diet breadth for Early Archaic hunter-gatherers, confirming data collected from other sites in the region.

Another Early Archaic site worthy of mention is Pretty Creek (24CB4), also in Carbon County in the south-central portion of Montana. At an elevation of approximately 4,200 ft. amsl, the site is located adjacent to a tributary stream of the Bighorn River within the foothills of the Pryor Mountains (Loendorf et al. 1981). A radiocarbon date of approximately 7,750 BP (UGa-957) (reported by Loendorf et al. 1981:189, as 7,685±580) places its occupation in the early portion of the Early Archaic (Frison 2001: 133-135).

Among the most important Early Archaic sites is Mummy Cave, which yielded five substantial Early Archaic site occupations between approximately 7,700 and 5,600 years ago (Wedel et al. 1968; Husted and Edgar 2002: 26). Mummy Cave is located at an elevation of 6,215 ft. amsl adjacent to the Shoshone River. Each of the occupations is characterized by large side-notched projectile points, with the three main occupations at 7700, 7200, and 5700 BP. In each of the occupations, the faunal assemblage is dominated by Bighorn sheep, along with lesser amounts of deer, elk, marmot, and bird remains.

The Helen Lookingbill site is located at an elevation of greater than 10,000 ft. amsl within the Absaroka Mountains of northwestern Wyoming. Excavated by the University of Wyoming, the Lookingbill site is a testament to the heights that Early Archaic Native Americans went to survive in the hot and dry Alithermal climate. At an elevation of more than 10,000 ft. amsl, Kornfeld et al. (2001) recovered seven male deer within a bone bed dating to approximately 6,800 BP In addition, several Bighorn sheep are represented at the site with a notable lack of bison. Local cherts were procured at the site, suggesting a tethered settlement pattern around known resources in this rugged setting.

In addition to Lookingbill, two other northern Wyoming sites—Laddie Creek (Reider and Karlstrom 1987) and Medicine Lodge Creek (Frison and Walker 2007: 69-72)—support the hypothesis that human groups sought permanent water and cooler climates during the Early Archaic. Both sites yielded Early Archaic artifacts within well-watered steam valleys at elevations above 4,700 ft. amsl.

The prevalence of these high-elevation and well-watered sites stands in contrast to the lack of sites at lower elevations. In addition, none of these regional Early Archaic sites contained significant bison remains (Hill 2007; MacDonald 2012). Few substantial bison kill sites are recorded for the Early Archaic period anywhere in the northern Plains, even though several are present...
during earlier and later periods (Frison 1991; Kornfeld et al. 2010; MacDonald 2012). In our review of the archaeological literature, we observed only six sites in the entire northern Plains with bison remains during the Early Archaic, including Myers-Hindman (discussed above), Hawken (Frison et al. 1976), Beaver Creek Shelter (Alex 1991), Rustad Quarry (Running 1995), Licking (Fosha 2000), and Head-Smashed-In (Reeves 1983). Of these, only one—Hawken in the Black Hills, Wyoming (Frison et al. 1976)—can be considered a bison kill site on par with those identified during the Late Paleindian period. As discussed above, Myers-Hindman shows a decline in bison remains between the Late Paleindian and Early Archaic site occupations (see Figure 3). The other sites yielded small numbers of bison alongside the remains of other flora and fauna, suggesting a diverse diet breadth, rather than one focused on bison.

An increased number of Early Archaic occupations within uplands would support the hypothesis that hunter-gatherers of this time period at least partially abandoned the hot, open Plains for the cooler, upland mountains and foothills. Proximity to water would also confirm the hypothesis that such access resulted in a tethered settlement pattern. In the above review, several sites fit this bill, including Myers-Hindman in uplands above the Yellowstone River, the Pretty Creek and Buckeye Sites along south-central Montana creeks, Mummy Cave on the Shoshone River, Lookingbill in the Absaroka Mountains, as well as Laddie Creek and Medicine Lodge Creek in the Big Horn Mountains.

The lack of Early Archaic sites of any kind in the eastern portion of Montana on the lower Yellowstone River suggests that Early Archaic Native Americans steered clear of the very hot and dry portions of the northern Plains. None of the Early Archaic sites in the region are at elevations of less than 4,200 ft. amsl and all are near water. As reflected in Figure 2, several other Early Archaic sites have been studied beyond the limits of the YRE, with most of these also at higher elevations near permanent water sources as well. Below, we provide data from another high-elevation site—Fishing Bridge Point on Yellowstone Lake in Wyoming—which supports the information presented above that Early Archaic hunter-gatherers regarded mountains, foothills, and well-watered areas as excellent places to live during the Altithermal.

**Fishing Bridge Point Site (48YE381)**

Archaeological excavations by the University of Montana and Yellowstone National Park at the Fishing Bridge Point site (48YE381) provide supportive evidence for the use of the high-elevation portion of the YRE by Early Archaic Native Americans (MacDonald et al. 2011, 2012). Archaeological and environmental data suggest that Yellowstone Lake was an oasis of sorts during the Early Archaic (per Yansa 2007), providing an ungulate-friendly grassland and comparatively cool and moist setting next to America’s largest high-elevation lake. At an elevation of 7,785 ft. amsl, the Fishing Bridge Point Site (48YE381) contained a small Early Archaic component above stratified Middle Archaic, Late Archaic and Late Prehistoric occupations. Located along the northwest shore of Yellowstone Lake, the site is near the outlet/headwaters of the Yellowstone River near Fishing Bridge in Yellowstone National Park. Fishing Bridge Point is located on Pierce’s (Pierce et al. 2007) S2 lake shoreline landform which he interpreted as dating to the early Holocene.

In July 2009, the University of Montana excavated a total of 18 1x1-meter test units at Fishing Bridge Point, yielding 4,811 lithic artifacts, as well as six prehistoric fire-features (MacDonald and Livers 2011). The six prehistoric features at Fishing Bridge Point range in age from Early Archaic (n=1), Middle Archaic (n=3), Late Archaic (n=1), to Late Prehistoric (n=1). Figure 4 shows a schematic profile with the features at their relative depths at the site. Of interest to us here is the Early Archaic site occupation, since it documents the only Early Archaic hearth feature of its kind in Yellowstone National Park and provides data on lake use during the period in discussion. As shown in Figure 5, Feature 12 was a small rock cluster 75-80 cm below surface within Test Unit 18, approximately 25 meters from the edge of Yellowstone Lake. The Early Archaic Feature 12 was located at the interface of the Ab2 buried soil and the BC/C horizon sub-soil. As such, it was likely built on the incipient beach of the lake shore during the time of use.

The feature lacks well-defined boundaries and is largely comprised of a loosely-associated grouping of burned and fire-cracked rock (MacDonald and Livers 2011). Small charcoal fragments in the matrix of the feature were collected for AMS radiocarbon dating. Beta
(265310) returned a conventional radiocarbon age of 5910±50 BP with a 2-sigma calibration of Cal BC 4910 to 4690 (Cal BP 6860-6640).

Feature 12, thus, dates to the Early Plains Archaic period and is the only radiocarbon-dated feature in all of Yellowstone National Park to yield a date of this time period. While Early Archaic projectile points have been recovered in the park, no features had ever been excavated prior to Feature 12 at Fishing Bridge Point. As discussed below, studies by Cannon and Hale (this volume) at Arnica Creek yielded a date of ca. 4500 uncal BP (5200 cal BP) on a hearth, suggesting a late-Early Archaic to early-Middle Archaic age; however, it was associated with a Middle Archaic projectile point. Given the effects of the hot-dry Altithermal climatic period on hunter-gatherer populations in the northern Plains, it was long thought that Yellowstone Lake and vicinity would have provided an excellent habitat for human use during the Early Archaic (Johnson 2001; Sanders 2001).

As such, Feature 12 confirms the presence of Early Archaic hunter-gatherer populations at high elevations of Yellowstone National Park. The site is approximately 35 km west of the Mummy Cave site and 100 km northwest of Lookingbill, two other Early Archaic sites discussed above. Below, we discuss the results of lithic analysis data which provide insight regarding how Early Archaic Native Americans lived at Yellowstone Lake approximately 7,000 BP.

**Lithic Analysis, Fishing Bridge Point Site**

Comparison of lithic raw material data from Fishing Bridge Point with earlier Late Paleoindian occupations and later Middle and Late Archaic occupations at Yellowstone Lake suggest dynamic shifts in settlement patterns during the early and middle Holocene in the region. Below, we compare Fishing Bridge Point Early
Archaic lithic data with those from the Late Paleoindian occupations at Osprey Beach (Johnson et al. 2004; MacDonald et al. 2011; Shortt 2001, 2003), as well as with the other Archaic features at Fishing Bridge Point. The Osprey Beach site contained a substantial Late Paleoindian (ca. 9,000 BP) occupation on the southern shore of Yellowstone Lake, approximately 20 km south of Fishing Bridge Point (Johnson et al. 2004). As reflected in Figure 6, Late Paleoindian occupations at Osprey Beach contained significant amounts of chert (46%) from at least six sources and non-Obsidian Cliff-volcanics (24%) from another 10 sources to the south and west of the lake. In stark contrast, Early Archaic Fishing Bridge Point occupations yielded nearly exclusively obsidian (90%), with 95% of that sourced to Obsidian Cliff. Only one other non-Obisdian Cliff source (southwest Montana dacite) was identified in the Early Archaic assemblage at Fishing Bridge point, while chert and other non-sourced materials represent less than 10 percent of the entire Early Archaic assemblage (Figure 6).

Figure 6. Comparison of Late Paleoindian Osprey Beach Lithic Material Use with Early Archaic Fishing Bridge Point. Both Sites are within 12 miles of each other on Yellowstone Lake, Wyoming.

In total, at least 17 sources are represented in the Late Paleoindian Osprey Beach lithic assemblage, while only 6-8 sources account for the lithic assemblage at the Early Archaic Fishing Bridge Point Site (Figure 6). Total lithic assemblages from the two sites are not significantly different, with 127 lithics used in the Osprey Beach study (Johnson et al. 2004; this volume) and 90 used in the Fishing Bridge Point sourcing study (MacDonald and Livers 2011; MacDonald et al. 2011). The incredible diversity of lithic raw materials speaks to wide-ranging travel and trade patterns during the Late Paleoindian period in the northern Rocky Mountain region; this is in stark contrast to the constricted mobility of Early Archaic peoples living in virtually the same location.

Late Paleoindian hunter-gatherers at Yellowstone Lake incorporated a diverse suite of lithic raw materials into their repertoire, reflecting a settlement pattern encompassing much of the southern portion of the YRE. In contrast, Early Archaic occupations at Fishing Bridge Point indicate predominant use of a single source of obsidian (Obsidian Cliff) and comparatively few other materials, supporting the hypothesis of a tethered settlement pattern during the Altithermal.

In order to compare the chronological shifts in material use over time between Early, Middle and Late Archaic occupations, we compare the lithic artifact assemblages between the six dated features at Fishing Bridge Point (Table 1; Figure 7). Artifacts from immediate feature contexts—5 cm on the vertical and 50 cm on the horizontal—were utilized in these comparisons, with each feature typically having between 50-300 artifacts, thus making data samples sufficient for comparative statistics.
As shown in Table 1 and Figure 7, there are definite trends in lithic raw material use over time between the various features. Of particular interest, the Middle Archaic features contain significantly less (83%) obsidian than the Early Archaic feature (90%). There is remarkable consistency in obsidian and chert usage between the three Middle Archaic features and the Late Archaic feature, especially in the comparative use of obsidian and chert. Chi-square tests show no significant differences in amounts of obsidian and chert from the four Middle/Late Archaic features (e.g., \(x^2=1.321; \text{df}=1; p=.250\) between Middle Archaic Features 5 and 6; \(x^2=.536; \text{df}=1; p=.464\) between Middle Archaic Feature 6 and Late Archaic Feature 4). The trend of increased obsidian use during the Early Archaic corresponds to decreased use of Crescent Hill chert (from sources approximately 45 km north) and slight increases in dacite from southwest Montana (more than 150 km northwest). Thus, during the Middle Archaic, Native Americans used less obsidian and dacite, but more Crescent Hill and other materials compared to their Early Archaic counterparts. Grouped Middle/Late Archaic lithic material data also show significant differences to the Late Prehistoric Feature 10 at Fishing Bridge Point (\(x^2=7.632; \text{df}=1; p=.006\)).

In summary, the Late Prehistoric and Early Archaic occupations were similar to each other in having increased obsidian and decreased chert use (\(x^2=.075; \text{df}=1; p=.784\)), while the Middle and Late Archaic occupations also were uniform, having less obsidian and more chert use compared to the other site occupations, as described above.

In addition to the general lithic raw material trends discussed above, 141 obsidian and dacite artifacts were submitted for x-ray fluorescence analysis to identify sources of volcanic materials used by prehistoric site occupants (Hughes 2010). Of those 141 volcanic artifacts, 101 were from the dated features at Fishing Bridge Point and three other sites within 0.5 mile of that site. These data are summarized in Table 2 and Figure 8. Obsidian Cliff is the predominant source during all site occupations, but is even more dominant during the Early Archaic (95%) compared to the subsequent Middle Archaic (86.4%) and Late Archaic (84.0%) periods. Use of dacite from southwest Montana is fairly minimal during all occupations, while use of Bear Gulch obsidian (50 km west) was strongest in the Middle Archaic, accounting for eight percent of the artifacts. The Middle Archaic also witnessed the widest variety of obsidian use, with another eight percent of the Middle Archaic artifacts deriving from the Crescent H and Teton Pass obsidian sources near Jackson, Wyoming (ca. 90 km south). During the Early Archaic occupations, only two sources of volcanic materials are represented in the sampled feature contents, compared to four volcanic sources during the Middle Archaic. These trends in directionality of obsidian sources are significantly different between the Early and Middle Archaic (\(x^2=12.766; \text{df}=1; p=.000\)).

Overall, based on artifacts sourced from well-dated feature contexts, the Middle Archaic period witnessed the most diverse use of obsidian and dacite sources at

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**Table 1. Lithic Raw Material Use Over Time, All Lithics from Features, Fishing Bridge Point Site.**

<table>
<thead>
<tr>
<th>Site</th>
<th>C14 Date*</th>
<th>Obsidian (%)</th>
<th>C.Hill (%)</th>
<th>Dacite (%)</th>
<th>Other $^2$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Prehistoric Feature 10</td>
<td>760±40</td>
<td>95.1</td>
<td>1.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Late Archaic Feature 4</td>
<td>1730±40</td>
<td>82.9</td>
<td>5.7</td>
<td>0.0</td>
<td>8.6</td>
</tr>
<tr>
<td>Middle Archaic Feature 5</td>
<td>2920±40</td>
<td>82.9</td>
<td>4.9</td>
<td>0.0</td>
<td>12.2</td>
</tr>
<tr>
<td>Middle Archaic Feature 6</td>
<td>3090±40</td>
<td>82.9</td>
<td>6.3</td>
<td>0.0</td>
<td>10.8</td>
</tr>
<tr>
<td>Middle Archaic Feature 7.1</td>
<td>2840±40</td>
<td>83.8</td>
<td>5.4</td>
<td>0.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Early Archaic Feature 12</td>
<td>5870±50</td>
<td>90.0</td>
<td>3.8</td>
<td>1.3</td>
<td>5.1</td>
</tr>
</tbody>
</table>

* Conventional years B.P. All dates were assayed by Beta using AMS method on pine charcoal (MacDonald et al. 2012).

$^2$ Includes untyped chert, orthoquartzite, petrified wood, quartz and quartzite.

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sites along the northern beaches of Yellowstone Lake, with artifacts deriving from Obsidian Cliff, Crescent-H, Teton Pass, and Bear Gulch obsidian sources. In contrast, the Early Archaic period experienced a comparatively narrow suite of lithic materials, with an almost exclusive reliance on Obsidian Cliff obsidian (95%) and dacite (5%). Lithic material distribution—via hunter-gatherer mobility and trade—can be inferred from these data. At Yellowstone Lake, travel/trade appears to be constricted during the Early Archaic, as reflected by the reduced diversity of lithic raw material selection and the heightened reliance on Obsidian Cliff obsidian. This suggests a tethered settlement pattern with fairly regular movement in localized areas and perhaps less travel/trade to areas outside of that localized territory.

Figure 7. Comparison of Lithic Raw Material Use from Archaic Features at Fishing Bridge Point, Wyoming.

When long-distance travel or trade occurs during the Early Archaic, it appears to be oriented to the west toward southwest Montana. During the subsequent Middle and Late Archaic, a heightened use of Crescent Hill chert and other materials suggests a relaxation of the constricted settlement pattern that characterized the Early Archaic. While Early Archaic Native Americans traveled fairly locally with rare travels to southwest Montana, Middle Archaic Native Americans appear to have widened their settlement and trade networks to incorporate the Gardiner Valley to the north and the Snake River Valley to the south, as reflected by trace amounts of obsidian from around Jackson, Wyoming.

While little diversity in lithics indicates more local travel perhaps tethered within the Upper Yellowstone River watershed during the Early Archaic, diversity in resource procurement is noted in the presence of deer, bovine,
and bear protein on artifacts from the Early Archaic occupations (Table 3; MacDonald and Livers 2011). As discussed by Gish (this volume), the presence of edible grasses in the Early Archaic Feature 12 also suggests use of plant resources at Yellowstone Lake during the Early Archaic. These data support those found at other regional sites (discussed above) which indicate a move away from bison specialization to a generalized foraging pattern (MacDonald 2012: 61).

Table 2. Summary XRF Results, Five Evaluated Yellowstone Lake Sites (includes only dated feature artifacts).

<table>
<thead>
<tr>
<th>Period</th>
<th>Obsidian Cliff</th>
<th>Dacite</th>
<th>Bear Gulch</th>
<th>Teton Pass</th>
<th>Crescent H</th>
<th>Total XRF Lithics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Prehistoric</td>
<td>34</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>19</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>21</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Early Archaic</td>
<td>19</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>101</td>
</tr>
</tbody>
</table>

Figure 8. Comparisons of XRF Data (volcanic materials) for Early Archaic, Middle Archaic, and Late Archaic Features, Fishing Bridge Point Site, Yellowstone Lake, Wyoming.

Summary and Conclusions: Early Plains Archaic in the Greater Yellowstone Ecosystem

While the effects of the Altithermal on humans in the Great Plains and Rocky Mountains are still debated, archaeological data from the Fishing Bridge Point site at Yellowstone Lake supports the contention that Early Archaic Native Americans were significantly affected by the changing climate between 8,000 and 5,000 BP. In contrast to the preceding Paleoindian Period, in which bison hunting was fairly popular, Early Archaic Native Americans hunted a diverse suite of fauna, as represented by deer, bison, Bighorn sheep, pronghorn, elk and other game at Early Archaic sites in the Yellowstone River Ecosystem, including Myers-Hindman, Pretty Creek, Mummy Cave, Helen Lookingbill, Medicine Lodge Creek, Laddie Creek, and now, Fishing Bridge Point at Yellowstone Lake, Wyoming.

The tethered settlement patterns and overall low site counts in the northern Plains and Rocky Mountains indicate that the Early Archaic was a time of change for Native Americans in Montana and vicinity. Between 8,000 and 5,000 BP, archaeological sites in the region are concentrated near water and at high elevations likely due to the increased temperatures and decreased precipitation of the Altithermal.
Lithic data indicate a significant constriction of lithic raw material sources during the Early Archaic period compared to the earlier Late Paleoindian period and subsequent Middle and Late Archaic periods. Ninety-five percent of the xrf-sourced artifacts from the Early Archaic occupations derived from one source, Obsidian Cliff. This is a dramatic switch from the Late Paleoindian occupation at Osprey Beach (only 20 km south of Fishing Bridge Point), which is represented by 11 different obsidians and six different cherts from across the southern YRE. Subsequent Middle Archaic occupations at Fishing Bridge Point also yielded greater lithic material diversity than the preceding Early Archaic occupation. These data suggest that hunter-gatherers at Yellowstone Lake switched from a wide-ranging settlement pattern in the Late Paleoindian period to a constricted, tethered mobility pattern in the Early Archaic. With the diminution of the hot and dry Altithermal, settlement patterns once again opened up to a wider landscape than was previously used during the Early Archaic. As discussed elsewhere in more detail (MacDonald et al. 2012), chi-square tests show significant differences in use of Obsidian Cliff and other obsidians between the Early Archaic Fishing Bridge Point and the Late Paleoindian Osprey Beach sites, despite their being only 12 miles apart ($x^2=102.055$; $df=1$; $p=.000$).

Finally, as discussed by Gish (Chapter 14, this volume), paleoenvironmental data collected at Fishing Bridge Point indicate the presence of a shrub-grassland at Yellowstone Lake (elevation: 7,750 ft. amsl) approximately 6,000 BP. Our pollen data confirm soils data from the nearby Dead Indian Pass in the Absaroka Mountains, which also indicate substantial shrub-grasslands in the past at the same time (elevation: 7,900 ft. amsl) (Reider et al. 1988). As at the high-elevation Yellowstone Lake, the grasslands at Dead Indian Pass likely drew grass-hungry ungulates which also attracted their human predators during the Early Archaic period. Gish (this volume) also presents pollen data indicate increasing pine and decreasing grass pollen over the Holocene, suggesting the infiltration of lodgepole pine forest after the end of the Altithermal.

Archaeological data from the Fishing Bridge Point site support previously-collected data from other regional sites that the Altithermal was a significant climatic event for early and middle Holocene hunter-gatherers.

---

**Table 3. Results of Protein-Residue Analysis, Fishing Bridge Point Site (48YE381) (MacDonald and Livers 2011).**

<table>
<thead>
<tr>
<th>FS</th>
<th>Material</th>
<th>Protein</th>
<th>HRI</th>
<th>Description</th>
<th>TU</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>welded tuff</td>
<td>negative</td>
<td>--</td>
<td>Adze; near Feature 10 (LP)</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>65</td>
<td>obsidian</td>
<td>deer</td>
<td>.0313</td>
<td>Late Prehistoric point</td>
<td>3</td>
<td>--</td>
</tr>
<tr>
<td>193</td>
<td>O.Cliff</td>
<td>negative</td>
<td>--</td>
<td>Well-used Retouched Flake</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>271</td>
<td>Pet. Wood</td>
<td>bovine</td>
<td>0.5</td>
<td>multi-function tool</td>
<td>17</td>
<td>--</td>
</tr>
<tr>
<td>97</td>
<td>Crescent Hill</td>
<td>negative</td>
<td>.125</td>
<td>Late Archaic Besant</td>
<td>14</td>
<td>--</td>
</tr>
<tr>
<td>152</td>
<td>Crescent Hill</td>
<td>negative</td>
<td>.0625</td>
<td>Late Archaic Besant</td>
<td>10</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>obsidian</td>
<td>Deer, dog</td>
<td>.2125</td>
<td>Middle Archaic knife</td>
<td>5</td>
<td>5.0</td>
</tr>
<tr>
<td>80</td>
<td>B.Gulch</td>
<td>negative</td>
<td>.3125</td>
<td>Middle Plains Archaic</td>
<td>3</td>
<td>--</td>
</tr>
<tr>
<td>94</td>
<td>B.Gulch</td>
<td>negative</td>
<td>.375</td>
<td>Middle Archaic Mckean</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>128</td>
<td>Cres-H obs.</td>
<td>deer</td>
<td>--</td>
<td>point tip (archaic)</td>
<td>12</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>231</td>
<td>O.Cliff</td>
<td>deer</td>
<td></td>
<td>large well-used blade</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>268</td>
<td>O.Cliff</td>
<td>bovine</td>
<td>.1875</td>
<td>Early Archaic SN</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>27</td>
<td>O.Cliff</td>
<td>bear</td>
<td>0</td>
<td>untyped Archaic (early?)</td>
<td>2</td>
<td>--</td>
</tr>
</tbody>
</table>
Specifically, hunter-gatherers living in the northern Plains and Rocky Mountains during the Altithermal—8,000 to 5,000 BP—moved into areas with reliable and permanent water sources, including river watersheds and lakes, especially those at higher (cooler) elevations. The Altithermal climate reduced bison herds in the Plains and Rockies during the Early Archaic, apparently encouraging a generalized foraging pattern for human hunter-gatherers.

The Early Archaic period is among the most interesting, but least well known, of any of the prehistoric periods in the northern Plains and Rockies. While excavations at Fishing Bridge Point are an important step forward, more work needs to be done at Early Archaic sites so that we can better understand the dramatic changes that occurred during this time.

Acknowledgements

This research was funded by grants to the University of Montana from Yellowstone National Park and the National Park Service. Thanks to National Park Service employees Elaine Hale (Yellowstone), Tobin Roop (Yellowstone), and Pei-Lin Yu (Rocky Mountain CESU) for providing assistance during the project. Thanks to all of the Montana Yellowstone Archaeological Project staff and students and to the Department of Anthropology, University of Montana. This paper would not have been possible without the analytical skills of Jennifer Gish (Pollen/ethnobotany), Richard Hughes (XRF analysis), Robert Yohe (Immunological Analysis), and staff at Northern Arizona University (soil sample processing for pollen samples analyzed by the second author).

References Cited


CHAPTER 13
HUNTER-GATHERER USE OF AMERICA'S HIGHEST, LARGEST LAKE: COMPARATIVE ANALYSIS OF DATA FROM 27 PREHISTORIC ARCHAEOLOGICAL FEATURES AROUND YELLOWSTONE LAKE

Douglas H. MacDonald

Introduction
Archaeological features provide important information that capture specific moments in time in the past. At Yellowstone Lake, Wyoming, features largely reflect the short-term use of hearths and cooking features by mobile hunter-gatherers exploiting the lake’s abundant resources in a variety of subsistence activities (MacDonald et al. 2012). By analyzing artifacts associated with features, archaeologists can capture a picture of hunter-gatherer life at specific moments in time.

In this paper, we present data from 27 prehistoric features identified on the shores of Yellowstone Lake between 2009-2011 by the University of Montana (UM) and Yellowstone National Park (YNP). In the next chapter, Gish takes an in-depth look at the pollen and ethnoarchaeological remains at these sites. The features were identified during archaeological survey and National Register evaluations of 153 sites (Figure 1), including 18 on the northwest shore (MacDonald and Livers 2011; Livers and MacDonald 2011), 52 on the east shore (Livers and MacDonald 2012), and 83 to date on the south shore (MacDonald 2012) (Table 1). These studies were focused on the determination of eligibility of the sites for listing on the National Register of Historic Places (NRHP). UM continued this research on the south shore in 2012, identifying an additional four prehistoric features; however, analysis of data associated with these features is on-going and not included in this paper (although Gish covers them in the next chapter). Test excavations will be completed on the south shore in 2013.

Between 2009-2011, UM and YNP excavated 171 test units and identified 27 prehistoric features from 12 hunter-gatherer camps situated around the lake. UM collected a variety of artifacts from feature contexts, with results of those analyses presented here. The main type of artifact recovered at the sites are stone tools and the debitage from their manufacture. UM’s work at the lake between 2009-2011 has yielded 22,131 lithic artifacts, including 96 diagnostic projectile points dating to the Paleoindian (n=8), Early Archaic (n=5), Middle Archaic (n=17), Late Archaic (n=33), and Late Prehistoric periods (n=33). Obsidian dominates lithic assemblages on the northwest, northeast and southwest shores, while various Absaroka cherts dominate assemblages on the southeast shore (MacDonald et al. 2012).

As the main focus of this paper, UM describes and interprets archaeological data recovered in association with the 27 features to sketch diachronic—geographic and chronologic—trends regarding hunter-gatherer use of the lake in prehistory. This paper provides summary descriptions of the 27 features, radiocarbon dating results, lithic analysis results, x-ray fluorescence (XRF)-source data, as well as subsistence data, including ethnoarchaeological/pollen, organic-residue (FTIR), and protein-residue analyses results. Each prehistoric feature represents an event of hunter-gatherer use, with the associated artifacts providing data on specific activities conducted at that point in time. Based on data recovered in association with these features, it is clear that hunter-gatherers differentially utilized the various areas of the lake, with some chronological variation as well.

Data for the paper are summarized here from technical reports written by UM for YNP in four major areas of the lake with high densities of archaeological sites, including the northwest shore (Livers and MacDonald 2011; MacDonald and Livers 2011), the northeast shore (Livers and MacDonald 2012; Livers 2012; McIntyre and Sheriff, this volume; McIntyre et al., this volume), the southeast shore (Livers and MacDonald 2012), and the southwest shore (MacDonald 2012).
Table 1. Summary Results of UM Studies in the Various Lake Shores between 2009-2011.

<table>
<thead>
<tr>
<th>Project</th>
<th>Lake Area</th>
<th>Sites</th>
<th>Test Units</th>
<th>Features</th>
<th>Lithics</th>
<th>Lithic Density n/m²</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Lodge</td>
<td>Northwest</td>
<td>11</td>
<td>67</td>
<td>14</td>
<td>10,970</td>
<td>163.7</td>
<td>MacDonald and Livers 2011</td>
</tr>
<tr>
<td>Fishing Bridge</td>
<td>Northwest</td>
<td>7</td>
<td>14</td>
<td>4</td>
<td>4,295</td>
<td>306.8</td>
<td>Livers and MacDonald 2011</td>
</tr>
<tr>
<td>East Shore</td>
<td>Eastern</td>
<td>52</td>
<td>60</td>
<td>4</td>
<td>6,281</td>
<td>104.7</td>
<td>Livers and MacDonald 2012</td>
</tr>
<tr>
<td>South Shore'*'</td>
<td>Southern</td>
<td>83</td>
<td>30</td>
<td>5</td>
<td>585</td>
<td>19.5</td>
<td>MacDonald 2012</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>153</td>
<td>171</td>
<td>27</td>
<td>22,131</td>
<td>129.4</td>
<td></td>
</tr>
</tbody>
</table>

* fieldwork will finish in 2013; UM also excavated 53 sites in 2012, yielding four additional features, not included in this analysis.

Figure 1. Locations of 11 Key Sites with Prehistoric Features at Yellowstone Lake, Wyoming, Studied by the University of Montana between 2009-2011.
Background

As described by Livers and Hale (Chapter 1, this volume) and McIntyre and Sheriff (Chapter 12, this volume), Yellowstone Lake is North America’s largest, high-elevation, natural lake and was used extensively during prehistory by Native Americans from the north, south, east and west (MacDonald et al. 2012). The lake measures approximately 20 miles long (north-south) and 15 miles wide (east-west).

To date, 285 sites have been identified around the lake, with 175 dateable occupations (Figure 2; McIntyre 2012). These sites cluster strongly within four areas discussed in this paper, including: 1) northwest shore—18 features from five sites—near the outlet of the Yellowstone River; 2) northeast shore in the Clear Creek Valley, 3 features from two sites; 3) southeast shore near the inlet of the Yellowstone River, 1 feature; and 4) southwest shore, 5 features from four sites. As show in Figure 2, all areas of the lake shores were utilized in the past, with dense clusters of activity on the northwest, northeast, and southwest shores.

While access to the associated creek valleys was important for placement of camps during prehistory, McIntyre (2012) has shown that stream confluences with

![Figure 2. Distribution of Prehistoric Archaeological Sites at Yellowstone Lake (McIntyre 2012).](image)
the lake were of secondary importance to the meadows and riparian habitat that provided abundant resources for hunter-gatherer populations and their prey (Elliot and Hektner 2000). Areas of the lake that lack these open settings are deficient in prehistoric sites, especially the middle portions of both the eastern and western shores (Figure 2).

Several prior studies have been conducted around the lake, as summarized by Livers and Hale (this volume), but in-depth feature studies are rare. On the northwest shore, previous studies identified prehistoric features at 48YE380 near Lake Lodge (summarized in MacDonald and Livers 2011) and at 48YE1 at Fishing Bridge (Cannon et al. 1993), while on the northeast shore, Cannon et al. (1997) investigated the Windy Bison Kill (48YE697; Cannon and Hale, this volume). On the southeast shore, investigations at the Donner Site (48YE252) by Lifeways of Canada (Vivian 2009; Park, this volume) also identified features and associated lithics. Finally, on the southwest shore, Johnson et al. (2004; Johnson and Reeves, this volume) investigated the Osprey Beach Site (48YE409/410) and Cannon et al. (1996; Cannon and Hale, this volume) studied several sites on the northern portion of the West Thumb, including 48YE449 and 48YE652. Two additional sites around the lake have yielded features which were salvaged by Yellowstone, including 48YE246 on Solution Creek and 48YE449 on Arnica Creek, although resulting data have not been publically disseminated (Ann Johnson, personal communication, 2012).

These various studies have provided an outstanding baseline of information regarding use of Yellowstone Lake; however, few of them focused on feature descriptions and analysis of contents. In particular, none of the prior studies conducted XRF source analysis for lithics from features, instead focusing on XRF sourcing of tools and projectile points. Also, prior to the current study, no ethnobotanical data have been publically disseminated from features at Yellowstone Lake.

The current paper provides additional lithic and ethnobotanical data regarding prehistoric features which lend insight into Native American subsistence, land-use, and stone tool use. As we discuss below, Hughes (2010a, 2010b, 2011a, 2011b, 2012a, 2012b) XRF-sourced a total of 489 lithics collected by UM, including 270 from the 27 radiocarbon-dated features. In addition, each prehistoric feature was analyzed for ethnobotanical contents, with a select sample queried for pollen and organic residue (FTIR). The remainder of this paper summarizes the features by type/morphology, age, subsistence remains, and lithic analysis in order to characterize use of the lake in the past by Native American hunter-gatherers.

**Yellowstone Lake Feature Types and Chronology of Use**

The 27 features studied by UM and YNP for the current study can be grouped into two types, surface hearths (n=18) and basin-shaped features (n=9) (Table 2). These types reflect their morphology, location, and use-type. At Yellowstone Lake, UM excavated 18 surface hearths from sub-surface contexts at seven sites (Photograph 1). Surface hearths were excavated from sub-surface contexts, but were constructed and used in prehistory without subsurface excavation; thus, we call them surface hearths. These features have the following traits: 1) no sub-surface depth; 2) built on the ground surface during use; 3) low numbers (<20) of clustered rock and fire-cracked rock (FCR); 4) minimal burned earth and only slight sediment discoloration; 5) minimal charcoal (typically small enough fragments to require accelerator mass spectrometry—AMS—dating); 6) generally circular to semi-circular; and 7) 30-70 cm in diameter. We interpret these ephemeral features to be the remains of small, short-term cooking and heating hearths used only briefly by hunter-gatherers at the lake (ca. 1-2 days at most).

In addition to the 18 surface hearths, UM excavated nine basin-shaped features at six sites (Photograph 2). Basin-shaped features have the following characteristics: 1) 10-30cm depth; 2) basin-shaped with wide, u-shaped, tapering-at-the-rim profiles; 3) 50-100 cm in diameter; 4) circular; 5) distinctive staining from burning/heating; 6) dense concentrations of charcoal, both under and between rocks; and 7) densely packed with cobbles and FCR. These features are interpreted to be either rock-heating pits from which rocks were removed and used in nearby (but unidentified) boiling pits or, alternatively, as longer-term (or higher-intensity) roasting pits or hearths. Given the lack of identified boiling pits associated with any of the features, we prefer the second interpretation, that the basin features are roasting pits or intensive cooking/heating hearths.
yellowstone

As shown in Table 2 and Figure 1, surface and basin features are ubiquitous across the various portions of the lake, with no discernible regional patterning. For example, in the northwest area, 18 features were identified, including 15 surface hearths and three basin features. In the northeast and southeast, all four features are basin-shaped, while there is a fairly even split in the southwest (two basin, three surface). Features seem to have been constructed and used to suit the need of the user, likely related to subsistence activities.

**Feature Age, Morphology, and Function.** Fortunately, each of the 27 features yielded sufficient quantities of charcoal for use in AMS dating. With the widespread abundance of pines at Yellowstone Lake, it is no surprise that pine charcoal was the ubiquitous type submitted for dating in each feature. Charcoal identifications were conducted by splitting samples from features, with one
portion submitted to the ethnobotanist (Gish 2010, 2011; Parker 2009) for identification and the other portion submitted for dating by Beta Analytic, Inc.

Figure 3 shows each of the 27 feature dates in chronological order from most recent (left) to oldest (right). Feature data are also summarized in Table 2. Basin-shaped hearths date exclusively to the Late Archaic to Late Prehistoric period transition, or between approximately 770-1910 uncalibrated radiocarbon years BP (BP). Surface hearths range in age from the recent Late Prehistoric period (ca. 200 BP) to the more ancient Early Archaic period (ca. 6,000 BP).

As shown in Figure 3, 26 of the 27 UM features post-date 3,400 years ago BP, including four Middle Archaic,
12 Late Archaic, and nine Late Prehistoric (Figure 4). The only earlier date is for the Early Archaic—ca. 6,000 BP — feature (Feature 12) at Fishing Bridge Point on the lake’s northwest shore (MacDonald et al. 2011). These feature dates generally resemble site ages for the lake as a whole, as compiled by McIntyre (2012; McIntyre and Sheriff, this volume). The feature ages also compare well with UM’s own projectile point data (n=96) which show remarkably similar age distributions to the features (Figure 4).

![Figure 4. Summary of UM Feature Dates, UM Projectile Point Counts, compared to All Yellowstone Lake Sites (McIntyre 2012).](image)

Clearly, the period from 3,400 to 300 BP was an intensive period for Yellowstone Lake prehistory. As shown in Figure 3, there is a nearly continuous succession of occupations around the lake during this time, with few if any breaks. While the Late Archaic period is dominant—12 features and 33 projectile points—compared to all other periods, substantial occupation continued into the Late Prehistoric period (n=9 features and 33 projectile points), while earlier occupations are scarce. Nevertheless, while few features predate 3,400 BP, diagnostic projectile points are recovered at sites from the Middle and Early Archaic, as well as the Paleoindian, periods around the lake. Certainly, occupations such as Osprey Beach, while lacking prehistoric features, shows active use of the lake by 9,000 BP and thereafter (Johnson et al., this volume). Based on the surveys conducted by Lifeways (2007) and UM discussed herein, we expect that other prehistoric features are present at sites that date to these earlier time periods, but simply remain unidentified due to the limited testing that many of these sites have experienced.

Subsistence and Feature Function

While the features generally contain ethnobotanical remains, charcoal, and lithic debris, none of the features at the lake yielded faunal remains, likely due to the highly-acidic soils which increase rates of decomposition. The lack of faunal remains precludes our ability to identify hunted resources that might have been used in the features. While not exclusively from feature contexts, various lithic artifacts have been subjected to protein-residue analyses from the lake area sites. As discussed elsewhere (MacDonald et al. 2012), deer (n=6 sites), bear (n=5), rabbit (n=4), cat (n=3), bovine/bison (n=3), sheep (n=3), dog (n=2), and rat/guinea/squirrel (n=2) have been identified on lithic artifacts from lake-area sites (by UM and others), certainly confirming the importance of hunting in the subsistence regimes of Native American hunter-gatherers at the lake. For example, a large cutting tool found in association with the Early Archaic hearth at 48YE381 yielded evidence of bovine protein, while a Late Prehistoric point found in the feature of the same age at 48YE1553 yielded evidence of deer protein (MacDonald and Livers 2011).

Thus, while it is clear that hunting was an important

![Figure 5. Summary of Ethnobotanical Remains from UM’s Yellowstone Lake Features (data from Gish 2010, 2011 and Logan and Cummings 2011).](image)
aspect of hunter-gatherer subsistence at the lake, those data are not informative as to feature function. Fortunately, analysis of ethnobotanical contents provide significant data to facilitate interpretation of feature uses (Figure 5). The nine basin features contained significantly greater amounts of ethnobotanical remains, as identified by Gish from pollen and soil samples (2010, 2011; this volume), including goosefoot (cheno-am), sunflower, sagebrush, grasses, pine, ash, aspen/willow, and dwarf mistletoe. The surface features contained significantly less identifiable macrobotanical remains, including pine and aspen/willow charcoal, as well as wild buckwheat, with the latter the only identified plant remains likely used in subsistence in the surface features.

In addition to the ethnobotanical analysis of feature soil samples, organic-residue analysis (Fourier Transform Infrared Spectroscopy, or FTIR) was conducted on FCR from four of the basin features by Paleoresearch (Logan and Cummings 2011). These results indicate the possible processing of balsamroot, wild onion, prickly pear cactus, sunflower, pine (nuts?), and grasses within four of the basin features.

Based on the FTIR and ethnobotanical analyses, the surface and basin features served different purposes. Surface features generally contain small amounts of pine wood fuel for fires, with edible plant remains largely absent. In contrast, basin features contain both wood charcoal for fuel, as well as plant remains likely used in subsistence, including balsamroot, wild onion, sunflower, goosefoot, pine (nuts?), and grasses.

**Lithic Analysis of Feature Artifacts**

Lithic analysis of artifacts recovered from feature contexts is informative as to specific activities associated with features. We compare lithic types among the features to ascertain aspects of camp life and lithic manufacture. We focus upon lithic material use between the various features, lake areas, and over time to see how material use and settlement patterns vary by region and period of use.

As noted above, Hughes conducted EDXRF analysis of 489 lithic artifacts collected by UM at the lake, including 270 found in association with the 27 features (Figure 6). Feature lithics are generally flaking debris from stone tool manufacture. Here, we provide those data, as well as other material indices, to account for lithic raw material use around the lake.

These data are informative as to prehistoric Native American settlement patterns at Yellowstone Lake over time and space. We discuss results of analysis in each of the four lake areas, beginning in the northwest and proceeding clockwise around the lake to the northeast, southeast, and southwest areas.

As shown in Figure 7 below (also see Table 1), the northwest lake shore was the major focus of UM activity due to its high density of archaeological sites and potential impacts from modern use. UM recovered 15,265 lithics from sites on the northwest shore, while 6,281 lithics were recovered on the east shore. The lithic data from these northern shores show intensive use compared to the south shore (n=585 lithics), the reasons for which are discussed extensively elsewhere (MacDonald et al. 2012). To summarize those findings, it is clear that access to lithic sources on the north shore facilitated active lithic production, while limited access to lithic resources promoted curation and stone conservation for hunter-gatherers on the south shore.

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**Figure 6.** XRF Analysis (N) by Yellowstone Lake Area.

**Figure 7.** Lithic Density (n/m²) by Lake Area, UM Yellowstone Lake Studies (2009-2011).
Proximity to Obsidian Cliff on the north shore drove this increased stone tool production and use, as did the proximity to two of the main travel routes used in prehistory, the Yellowstone River and Clear Creek.

Northwest Shore Features and Lithic Use

The northwest shore was the focus of intensive prehistoric use, resulting in abundant lithic data by which to characterize settlement patterns and stone tool use. Overall, the 18 northwest shore features and associated artifacts from the five sites show intensive use of obsidian compared to chert, a trend that is consistent over time (Figure 8). Among the obsidian and chert artifacts, Obsidian Cliff and Crescent Hill varieties dominate northwest shore assemblages, respectively. Both of these sources are located approximately 20 miles north of the northwest shore sites. As with the Gardiner Basin to the north (Adams et al. 2011; MacDonald and Maas 2011), Obsidian Cliff was preferred due to its high quality, abundance, and knappable morphology compared to Crescent Hill chert.

Figure 8. Lithic Raw Material Use, Prehistoric Features, Northwest Shore Sites excavated by UM, 2009-2010.

Generalized lithic raw material data indicate a heightened reliance on obsidian during use of all features on the northwest shore, with Late Prehistoric (87.2%) and Early Archaic (87.8%) Native Americans preferring it more so than their Middle and Late Archaic counterparts. Other materials—including Crescent Hill Chert, untyped chert, chalcedony, petrified wood, quartz, and quartzite—comprise between 12.2 and 18.9% of the dated feature artifacts from northwest shore features, with more use of those other materials during the Middle and Late Archaic Periods. In general, lithic raw material use patterns are very similar between all occupations, but especially so between the Middle and Late Archaic, a pattern also observed by Park (2010, 2011) for Yellowstone sites.

Just as obsidian use increased over time (with a peak in the Late Prehistoric Period), use of Obsidian Cliff as a primary source increased as well, as reflected below in Table 3 and Figure 9. These data are for 176 XRF-sourced lithics from the dated features at UM’s northwest shore.

Obsidian Cliff use peaked during the Late Prehistoric Period, comprising approximately 96% of the sourced artifacts from features (Figure 9, top). Lithics from western sources, including Cashman Dacite and Bear Gulch Obsidian, decreased over time. These western sources comprise only 4.4% of the Late Prehistoric volcanic assemblage, compared to 7.8% during the Late Archaic. Eastern and southern sources occur only in the dated Middle Archaic features; otherwise, they are absent in features dated to the Early Archaic, Late Archaic, and Late Prehistoric Periods. As a result, western sources are overwhelmingly reflected in non-Obsidian Cliff volcanic counts from dated feature contexts at sites on the northwest shore of Yellowstone Lake.

Eastern Shore Lithic Raw Material Use

As with the northwest shore, the eastern shore of the lake—in particular, the northeast and southeast shores—also experienced active use in prehistory. UM excavated four prehistoric features at three sites on the east shore, as well as recovering 6,281 lithics from 52 sites. The four features date to the transitional Late Archaic-Late Prehistoric period, between 1220 and 1500 conventional radiocarbon years B.P. Table 4 provides the results of XRF analysis of lithics from the three sites with features on the east shore. Sites 48YE2075 are on the northeast shore, while 48YE1499 is on the southeast shore. The northeast and southeast shores are separated by nearly 20 miles of shoreline.

In terms of overall lithic material use on the eastern shore, chert comprises 40.3 percent (n=2,532) of eastern shore lithics, while Obsidian Cliff obsidian (33.2%; n=2,082) and Park Point obsidian (26.5%; n=1,667) are
also well-represented (Livers and MacDonald 2012). While these are hand-identifications, they were randomly XRF-checked, with a 99% accuracy rate in hand-distinguishing Obsidian Cliff obsidian from Park Point at sites on the eastern shore of Yellowstone Lake. We have found no other portions of the lake where hand-identification of obsidian is reliable, given the wide variety of obsidians available in the north, west, and southern parts of the lake. However, on the east shore, Obsidian Cliff and Park Point obsidians appear to have been almost exclusively the only two obsidian materials used during prehistory, especially in the Clear Creek drainage. Refer to Chapter 3 of this volume for more information on Park Point obsidian.

UM submitted a total of 136 lithics for XRF sourcing for eastern shore sites, including 32 from the three sites with features, as shown in Table 4. Of the 25 sourced lithics from the Late Archaic features on the northeast lake shore, 15 are from the local Park Point obsidian source (McIntyre et al., this volume), while ten are from Obsidian Cliff. No other sources of obsidian are represented in the Late Archaic northeast shore features, indicating a very restricted range of material use.

On the southeastern lake shore, the lone feature is a Late Prehistoric surface hearth from 48YE1499. Only seven volcanic lithics were recovered in association with the feature, but they show considerably more diversity than northeast lake shore results. Two Obsidian Cliff and two unknown dacite lithics indicate northern origins, as does the single Bear Gulch obsidian flake. One Teton Pass and one unknown source were also identified at 48YE1499. These lithics do not provide a fair representation of regional use due to the low overall amounts of obsidian in the southeastern shore assemblages. As we’ve shown elsewhere (MacDonald et al. 2012), Obsidian Cliff comprises only 6 percent of the

<table>
<thead>
<tr>
<th>Age</th>
<th>Bear Gulch</th>
<th>Cashman</th>
<th>Crescent H</th>
<th>Unk. dacite</th>
<th>Obsidian Cliff</th>
<th>Teton Pass</th>
<th>Total</th>
</tr>
</thead>
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<tr>
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<td>Middle Archaic</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>32</td>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>47</td>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>Late Prehistoric</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>65</td>
<td>0</td>
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<td>Total</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>164</td>
<td>1</td>
<td>176</td>
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</table>

Figure 9. Comparative Use of Obsidian Cliff and Volcanics from Other Regional Sources for XRF-Sourced Lithics, UM Radiocarbon Dated Northwest Shore Features.

southeastern lithic assemblages as a whole, compared to 46 percent for northeast shore and 70 percent on the northwest shore. Thus, on the southeastern shore, the XRF results are actually misleading in terms of point of
origin for materials used by Native Americans, since obsidian accounts for such a small overall percentage.

Southwest Shore Lithic Material Use

UM conducted an archaeological investigation of 83 sites along the south shore of Yellowstone Lake in 2010-2011, yielding 585 prehistoric artifacts, while excavating five prehistoric burn features at four sites. As discussed above, lithic densities on the south shore are very low, with only approximately 20 lithics per square meter recovered compared to 188 on the north shore. Southwest shore features range in age from 1330-2290 BP. Based on the five radiocarbon-dated features, as well diagnostic projectile points, the predominant period of use was the Late Archaic and Late Prehistoric periods. However, artifacts from the Late Paleoindian, Early Archaic, and Middle Archaic were also collected at south shore sites. Each of the 2011 south shore features is a small (40-75cm in diameter) heating and or cooking hearth that used pine and occasionally other woods as fuel for short-term camp fires. We characterize the two features from 48YE1660 as basin features and the remaining three features as surface hearths.

In contrast to the east shore, obsidian is the dominant material in the southwest shore features, accounting for 61.6 percent (n=53) versus 38.4 percent for chert (n=33) and other materials (Table 5). However, there is significant variability in lithic material use between the three Late Archaic features and the two Late Prehistoric features. The Late Prehistoric features from 48YE2190 and 48YE1384 yielded 12 obsidian/dacite artifacts and 19 chert/other artifacts versus only 13 chert and 41 obsidian for the three Late Archaic features from 48YE1383 and 48YE1660. These differences in lithic raw material use between the Late Archaic (>1500 BP) and Late Prehistoric features (<1500 BP) on the southwest shore are significant (χ²=11.62; df=1; p=.001). Southwest shore features also show very different trends in material use from the northwest shore features which showed an increasing preference for obsidian over time.

These differences between Late Archaic and Late Prehistoric features denote possible chronological

<table>
<thead>
<tr>
<th>Site</th>
<th>Ob. Cliff</th>
<th>Park Point/Lava Crk</th>
<th>Bear Gulch</th>
<th>Teton Pass</th>
<th>Lava Creek</th>
<th>Unk.</th>
<th>Un-known</th>
<th>Total</th>
<th>%</th>
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<tr>
<td>48YE2075</td>
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<td>0</td>
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<td>48YE1499</td>
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<td>1</td>
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<td>0</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>21.9</td>
</tr>
<tr>
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<td>15</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>32</td>
<td>100.</td>
</tr>
<tr>
<td>%</td>
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<td>46.9</td>
<td>3.1</td>
<td>3.1</td>
<td>3.1</td>
<td>6.2</td>
<td>3.1</td>
<td>100.</td>
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Table 4. Summary of XRF Analysis Results, Eastern Shore Features.

<table>
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<tr>
<th>Site/Feature</th>
<th>Age</th>
<th>obsidian/dacite</th>
<th>obs%</th>
<th>Chert/other</th>
<th>other %</th>
<th>total</th>
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<td>1383</td>
<td>2290</td>
<td>11</td>
<td>91.7</td>
<td>1</td>
<td>8.3</td>
<td>12</td>
</tr>
<tr>
<td>1660/F.1</td>
<td>1850</td>
<td>11</td>
<td>78.5</td>
<td>3</td>
<td>21.5</td>
<td>14</td>
</tr>
<tr>
<td>1660/F.3</td>
<td>1690</td>
<td>19</td>
<td>67.9</td>
<td>9</td>
<td>32.1</td>
<td>28</td>
</tr>
<tr>
<td>2190</td>
<td>1410</td>
<td>7</td>
<td>43.8</td>
<td>9</td>
<td>56.2</td>
<td>16</td>
</tr>
<tr>
<td>1384</td>
<td>1330</td>
<td>5</td>
<td>33.3</td>
<td>10</td>
<td>66.7</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>61.6</td>
<td>33</td>
<td>38.4</td>
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<td>86</td>
</tr>
</tbody>
</table>

Table 5. Summary of Lithics from 2011 Features, Southwest Shore.
variation in material use between individuals on the southwest shore (Table 6). EDXRF results supply additional information by which to evaluate material use between volcanic sources over time. In total, UM sourced 62 lithics found in association with the five dated features from the southwest shore sites. These sourced materials from the five features include 56 flakes, three bifaces, two unifaces, and one core. Of the 62 sourced lithics from the features, 45 (73%) are from Obsidian Cliff, nine (15%) are from southern sources, five are from Park Point (east; 8%), while three (5%) are from western sources.

For the two sites that post-date 1500 BP (2190/1384), 18 lithics were sourced from the features, with 10 from Obsidian Cliff, five from southern sources, one from a western source, and two from the east. For the three Late Archaic features, 35 are from Obsidian Cliff, four are from southern sources, two are from the west, and two are from the east. While Obsidian Cliff is the dominant material for both periods, these differences in Late Archaic and Late Prehistoric use of Obsidian Cliff versus the other regional igneous materials are significant. In the Late Prehistoric, Obsidian Cliff is reduced and there is more use of southern sources compared to the Late Archaic ($x^2=3.69; df=1; p=.05$). Overall, considering use of all lithic materials at the sites, Obsidian Cliff represents 34.3 percent of the southwest shore lithic assemblages. Again, as with lithic materials as a whole (including cherts), southwest shore lithics show increasing use of cherts and southern sources over time, with less use of Obsidian Cliff. This is a reverse trend to that observed in the northwest shore features.

**Northern versus Southern Lithic Use**

Comparison of flake counts, weights, and types between sites on the north and south shore sites indicates substantial differences in the organization of lithic technology. Toolkits indicate high material curation with little evidence of material procurement at South Shore sites. The overall lithic artifact count (ca. 20/sq.m) on the south shore is significantly less than the north shore (ca. 188/sq.m.). Mean flake weights for the two areas are also significantly different, with south shore flakes weighing 0.86g on average compared to 1.89g for north shore flakes. These flake data support the hypothesis that south shore hunter-gatherers used fewer lithics and produced smaller flakes, likely to conserve material in the face of the toolstone-depleted environment. The morphology of the material on the south shore also likely contributed to the small size of lithic artifacts. Most available local materials are very small (less than palm-sized) chert cobbles in the glacial beach gravels.

Production of tools from these local chert materials on the south shore of Yellowstone Lake ultimately yields small flakes when compared to those produced during Obsidian Cliff obsidian tool production (as is predominant on the northwest shore).

Another difference between the northwest and southwest shores is the greater percentage 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 ($x^2=2.145$;  

<table>
<thead>
<tr>
<th>Site/Feature</th>
<th>Age</th>
<th>O.C. Cliff</th>
<th>Southern Sources</th>
<th>Western Sources</th>
<th>Eastern Sources</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1383</td>
<td>2290</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>1660/1</td>
<td>1850</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1660/3</td>
<td>1690</td>
<td>16</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>2190</td>
<td>1410</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>1384</td>
<td>1330</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total (n)</td>
<td>45</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>62</td>
</tr>
<tr>
<td>Total %</td>
<td>72.6</td>
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<td>4.8</td>
<td>8.1</td>
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</tr>
</tbody>
</table>

*Southern sources include Crescent H, Teton Pass, Packsaddle Creek, etc.; Western sources include dacite and Bear Gulch obsidian; Eastern sources include Park Point and Lava Creek.*
df=1; p=.143), the overall ratio of biface-reduction flakes to shaping flakes is 0.93 on the southwest shore (more shaping flakes) compared to 1.23 on the northwest shore (with more biface-reduction flakes). These 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.

Finally, it is also clear that significantly greater numbers of biface-reduction and shaping flakes were produced at northwest shore sites (n=3,781) versus southwest shore sites (n=118), despite experiencing similar volumes 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.

**Conclusion**

Analysis of feature contents provides insights into the use of Yellowstone Lake in prehistory. The 27 features excavated by UM yielded numerous lithics and ethnobotanical remains from the Early Archaic through Late Prehistoric periods. Overall trends in features indicate a heightened use of the lake between approximately 3,400 and 300 BP. While sites are present around the entire lake, the northwest and northeast shores experienced especially intensive use, likely due to the proximity of both shores to Obsidian Cliff and to active travel routes, including the Yellowstone River and Clear Creek. Both surface and basin features are present at sites on all lake shores, with use likely associated with subsistence procurement. The basin features, in particular, are linked to plant procurement and processing (and probably game as well), while the surface features are likely associated with heating and short-term cooking/food processing.

Sites on the northwest shore show significant amounts of stone tool manufacture, while sites on the south shore indicate curation and preservation of stone tool kits in the face of lithic raw material deficiency. The extremely different lithic material use patterns between South Shore—few flakes from the high curation of material—versus the North Shore—lots of flakes produced from tool manufacture—supports the hypothesis that boats were not used by hunter-gatherers for transportation around the lake shore (MacDonald et al. 2012). Instead, pedestrian hunter-gatherers transported stone to the various lake shores. On the south shore, those hunter-gatherers curated and preserved stone, while on the north shore, they conducted extensive lithic production.

In addition to geographic trends in material use, chronological variation in material use is observed by comparing feature contents on the north and south shores of Yellowstone Lake. On the north shore, overall use of Obsidian Cliff obsidian increased over time, peaking in the Late Prehistoric period in which it represents greater than 95 percent of obsidian from features. In contrast, on the south shore, feature data indicate increased use of chert and southern obsidians over time at the expense of Obsidian Cliff obsidian. Obsidian Cliff obsidian represented 80 percent (n=35/44) of Late Archaic volcanic material feature contents on the south shore, compared to only 56 percent (n=10/18) for the Late Prehistoric period. These trends may indicate increased territorialization during the Late Prehistoric period, with northern-oriented hunter-gatherers staking a preferred claim for Obsidian Cliff. In turn, southern-oriented hunter-gatherers gradually decreased use of that material in preference for southern cherts and obsidians.

Yellowstone Lake was clearly a destination resort during prehistory for Native American hunter-gatherers. They began to visit the lake more than 9,000 BP and escalated that use quite intensively between 3,400 and 300 BP. As shown here, there are significant differences in the use of the various lake shores based on geography. In addition, chronological variation is observed through careful analysis of artifacts recovered from feature contexts at Yellowstone Lake. Future research should aim to better understand Paleoindian, Early Archaic, and Middle Archaic lake-area use to compliment the abundant data available from the Late Archaic and Late Prehistoric periods.

**Acknowledgements**

This research was funded by grants to the University of Montana from Yellowstone National Park and the National Park Service. Former YNP Archeologist Ann Johnson was instrumental in securing funding for the lake studies prior to her retirement. Thanks to National Park Service employees Elaine Hale (Yellowstone), Tobin Roop (Yellowstone), and Pei-Lin Yu (Rocky Mountain...
CESU) for providing assistance during the project. Thanks to all of the University of Montana staff and students for their help on the Yellowstone Lake project and to the Department of Anthropology, University of Montana. This paper would not have been possible without the analytical skills of Jennifer Gish (Pollen/ethnobotany), PaleoResearch, Inc. (FTIR analysis), Richard Hughes (XRF analysis), and Robert Yohe (Immunological Analysis).

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preparation for Yellowstone National Park by the University of Montana.


