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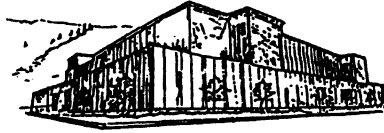
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**A CULTURE HISTORY OF THE YELLOWSTONE RIVER AND
YELLOWSTONE LAKE, YELLOWSTONE NATIONAL PARK,
WYOMING AND MONTANA**

By Elaine Skinner Hale

B.S. Montana State University 1971

Presented in partial fulfillment of the requirements

For the degree of

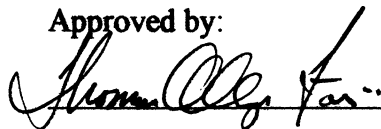
Master of Arts in Anthropology

Cultural Heritage Track


The University of Montana

July 2003

Approved by:



Chairperson



Dean, Graduate School

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A Culture History of the Yellowstone River and Yellowstone Lake, Yellowstone National Park, Wyoming and Montana

Chair: Thomas A. Foor 

This document provides the culture history context for the precontact archeological sites located in the geographic region of the Yellowstone River and Yellowstone Lake, in Yellowstone National Park.

The chronological framework begins with the earliest known human use of the Yellowstone River corridor and the shores of Yellowstone Lake, and ends before the first 15th Century Europeans arrived in North America. The cultural chronology incorporates both climatic and technological change, providing insight to changing migration, settlement, and resource use patterns of the park's earliest inhabitants. For the last 10,000 years indigenous people have adapted their lifeways with technological advances that enabled them to survive Yellowstone's changing climates and, at times, dramatic conditions. The geography, environments, and physical landscapes encountered by the park's first visitors are important aspects in understanding and interpreting their use of the area. Precontact cultures seasonally migrated through the park therefore regional comparisons of precontact archeological sites are necessary to understand the significance of Yellowstone's sites.

The culture history discussed in this document will provide the basis, or historic context, for the development of a framework to facilitate the nomination to the National Register of Historic Places of the significant precontact archeological sites within the study area. As such, the culture history of the Yellowstone River and Yellowstone Lake area becomes a public document in hopes that the information will facilitate an understanding of the need for continued archeological research and protection of the non-renewable resources that constitute our common heritage.

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I. INTRODUCTION

This document is devoted to precontact archeological sites along the banks of the Yellowstone River and on the shores of Yellowstone Lake in Yellowstone National Park (YNP). The archeological artifacts, features, and sites are the remains of the park's earliest indigenous residents, and they provide us with insight and knowledge that we use to interpret the human activities of the past. The study area encompasses a physiographic area that provided geographic landmarks, a natural transportation corridor, and a rich array of plant, animal, and geologic resources that modern park visitors still use. The cultural history (historic context) is organized chronologically around environmental and technological changes that required and inspired adaptive human responses.

Some contemporary native people believe that the use of terms such as "archaic" and "prehistoric" are offensive and devalue the quality of their ancestors' lifeways (Hofman 1997; Swindler, et al. 1997). With respect for those concerns, contemporary archeologists have adopted a geologic timeframe, and use "precontact" to indicate time prior to the arrival of Europeans (around 500 years ago.) Unfortunately, much of the previous scientific and academic study of archeology has been organized around and explained using these terms. However, relating the chronological scheme of this document with regional chronologies requires limited use of these descriptive words.

I believe the precontact archeological sites and resources within the study area are best understood on a regional basis, -- the information these sites hold is regionally significant in identifying broad trends of precontact use of the landscape, subsistence

patterns, cultural development, adaptations, and the peopling of North America. Information contained in the park's sites enlightens our perspective and provides unique and detailed information about how early people used Yellowstone's landscapes and resources. I will provide the archeological context necessary to evaluate the National Register significance of the precontact archeological sites within the study area. My format also allows flexibility for incorporating new information as additional precontact sites in the study area are identified and investigated.

Individual sites can give evidence of different uses over time. For instance, excavation of a site might reveal that the earliest occupants used the location as a hunting camp. The next visitors may have been mainly interested in breaking large chunks of obsidian down to usable tools, and the next might have left tipi rings and stone-lined boiling pits because they were harvesting and processing food for winter. Each occupation provides specific information about the lifeways and activities of those particular past park visitors.

It is hoped that this work will provide a useful context that will enhance general public knowledge and understanding about the nature, magnitude, and importance of the precontact cultural resources in Yellowstone National Park. It also offers a framework of culture history, facilitating the National Register nomination of significant precontact archeological sites providing added protection to these non-renewable resources. Many of these sites are currently threatened or have been impacted by erosion, development, and looting. Efforts are needed to insure their

preservation for the enlightenment, continued scientific research, and enjoyment of future generations.

II. GEOGRAPHIC SETTING

GEOLOGY

The landscape of Yellowstone National Park has been formed, destroyed, altered, and reshaped numerous times throughout geologic time. The forces that shaped the landscape are relevant to the late Pleistocene, early Holocene, and modern environmental contexts within which archeological sites are found therefore it is useful to briefly describe these past formation processes. The resulting landforms provided the setting and the soils supported plant growth that attracted and nourished the animals that migrated into the Yellowstone area, including the earliest human visitors to the park.

IN THE BEGINNING

As the surface of North America was forming, erosion flattened the land. Large shallow seas and swamps developed, resulting in sedimentary deposits of limestones, sandstones, and shales. These deposits resulted in fine-grained cryptocrystalline rocks such as cherts, chalcedony, and jasper that formed the basis of the chipped stone tool technology used by the inhabitants of this continent for the first 12,000 years.

The oldest geologic materials in Yellowstone are Precambrian (approximately 2.7 billion years old) gneisses and schists; rocks that cooled from molten magma; and metamorphic rocks that began as igneous and sedimentary rocks that were heated and squeezed at great temperatures and pressures miles below the earth's surface. Long periods of up-lift and erosion brought these rocks to the surface, and dark magma oozed up to fill the cracks (Fritz 1985). Outcrops of these rocks are exposed

in the Black Canyon of the Yellowstone, along the Yellowstone River canyon just north of YNP, and on the Beartooth Plateau east of the park's Northeast Entrance (Rodman, et al. 1996).

Between 100 and 50 million years ago, collisions between the North American continental plate and the Pacific oceanic floor (called the Laramide orogeny) forced the Rocky Mountains to rise in a linear chain of mountains up to 10,000 feet high (Fritz 1985).

FORMED BY FIRE AND ICE

The origin of these volcanic eruptions is not well-understood but it has been suggested, in the case of Yellowstone, that a plume of superheated, partially-molten rock rose from the earth's mantle to the surface where the heat of the plume melts away the crust causing volcanic eruptions. The crust of the earth under Yellowstone is thin, with molten rock within a mile of the surface (Varley and Schullery 1998) perhaps providing a weak spot for the rising mantle plume to escape. Geologists currently believe that the North American tectonic plate's slow southwestern movement over a stationary thermal mantle plume created a series of volcanic eruptions, the first of which occurred in the area where the borders of Oregon, California, and Nevada converge. As with Yellowstone, these eruptions provided a source of obsidian for the early inhabitants of the Columbia Plateau and Great Basin (Jones, et al. 2003). The "hot spot" theory has received much attention in association with the reoccurring rising and lowering of the Yellowstone Caldera magma chamber, known as "heavy breathing"(Good and Pierce 1996; Pierce, et al. 1996). The movement of the tectonic plate over the mantle plume is also credited with the

uplift that raised the elevation of much of northwest Wyoming, southwest Montana, and southern Idaho (Good and Pierce 1996). Obsidian, dacite (a glassy basalt), and basalt are products of the volcanic activity, and archeological evidence indicates they were highly-valued materials from which tools were crafted.

Concurrent with Yellowstone's volcanic history were cyclical alternating periods of glaciation and glacial melting about every 100,000 years. Glacial periods develop when the elliptical orbit of the earth takes it farthest from the sun, and when mountain uplift creates barriers to global weather patterns (Good and Pierce 1996). Additionally, volcanoes release ash and sulfate particles into the atmosphere that can cause a slight cooling of the earth. Extreme cold weather is not needed to make glaciers, just more snow accumulation in the winter than melts in the summer. Mountain glaciers begin when the weight of accumulated snow compacts it into ice that starts to flow downhill, picking up rock and carving steep-walled valleys as it moves (Fritz 1985). There were at least 10 glacial periods in the GYA, the last two being the Bull Lake Glaciation about 150,000 years ago, and the Pinedale Glaciation developing about 70,000 years ago, the latter reaching full glacial size about 30,000 years ago, with an icecap stagnating over Yellowstone and deglaciation beginning around 15,000 years ago (Pierce 1979).

VOLCANISM

In addition to creating a good portion of the landscape, the andesitic volcanism of the Eocene Absaroka volcanic fields, and the later rhyolite ash-flow eruptions forming the Yellowstone Plateau volcanic field, provided distinctly different parent material for soils with different mineral nutrient content and water holding capacity,

both factors of primary importance to soil development and plant growth (Rodman, et al. 1996). After the retreat of the glaciers, hearty strains of pine and fir trees were able to establish in areas underlain with andesitic bedrock, whereas the infertile rhyolitic soils remained treeless for much longer (Whitlock 1993). The plants growing on the andesitic soils attracted hungry animals, including people, whereas the barren rhyolitic soils provided an open view to the unique landscape of the thermal fields and collapsed calderas.

Volcanic eruptions known as the Eocene Absaroka Volcanics started around 50 million years ago and lasted until about 40 million years ago, and buried the region in thick deposits of andesite lava, basalt flows, ash, mud and debris. At this same time, volcanoes were erupting in central Idaho, southwestern Montana, and northwestern Wyoming, as well as Yellowstone. The deposits from the Absaroka Volcanics are thousands of feet thick on the east and northeast margins of YNP and comprise the second most common geologic material in the park. These mud and debris flows buried forests and formed the petrified forests common throughout the park (Rodman, et al. 1996). Today fossil trees and leaves from this era are eroding out of the banks of the Yellowstone River in numerous places. Fossil wood formed from Absaroka Volcanics was used for the production of stone tools and quarry sites are known to exist in several fossil forest areas in YNP. When the eruptions stopped, a period of roughly 40 million years of mountain building and erosion followed (Good and Pierce 1996).

About 2 million years ago there were at least three large, explosive rhyolite eruptions that formed the Yellowstone Plateau volcanic field. Each started with lava

that oozed to the surface followed by a large climatic explosion and welded-ash flows that drained the magma chamber, causing it to collapse and form a large caldera. In the final stage of the cycle, lava oozed out of the collapsed caldera, partially filling it in.

The first cycle of eruption began between 2.2 and 2.1 million years ago, depositing over 600 cubic miles of rhyolitic magma in an ash flow sheet known as the Huckleberry Ridge Tuff. Collapse of the roof of the Huckleberry Ridge magma chamber created a caldera 75 km (46.5 miles) long (Christiansen 2001). This violent eruption of rhyolite magma, superheated steam, and gases was about 2,500 times larger than the volume of Mount St. Helens (Fritz 1985). The second cycle erupted 1.3 million years ago and was much smaller, located within the northwest area of the first cycle. The rhyolite ash flow is called the Mesa Falls Tuff. The third cycle terminated about 600,000 years ago with the voluminous and violent ash-flow eruptions of the Lava Creek Tuff. The subsequent collapse of the magma chamber created the Yellowstone Caldera (Christiansen 2001). The Yellowstone Caldera encompassed all of what would become Yellowstone Lake except for the two southern extensions, Southeast and South arms (Good and Pierce 1996). A more recent, and in comparison, minor, eruption about 160,000 years ago formed the West Thumb Caldera, creating the West Thumb of Yellowstone Lake (Taylor, et al. 1989).

As Robert Christiansen has noted,

Although the highly active hydrothermal system of Yellowstone National Park is the only current manifestation, volcanism probably has not yet ended. (Christiansen, 2001, p. G2)

GLACIATION

The glaciers that covered Yellowstone carved the scenic mountain valleys, creating the landforms through which the Yellowstone River flows, providing a corridor for travel and a riverine environment that supported the flora and fauna precontact people used to sustain them as they passed through the area. The glacial melt water filled the collapsed caldera creating Yellowstone Lake, a monumental marker in the landscape that has attracted people for the last 12,000 years.

Quaternary-age glaciation occurred widely throughout North America and Europe with ice covering large portions of Canada and extended down into the northern portions of the United States. Although occurring at the same time, the Yellowstone Plateau glacial icecap was separate from the North American ice shield and covered almost the entire area of Yellowstone with a relatively flat mantle of ice (Bradford, et al. 1999; Pierce 1979). The Yellowstone Plateau and adjacent mountain ranges formed the largest North American glaciated areas south of the Cordilleran and Laurentide ice sheets (Frison and Mainfort 1996).

During the last glacial period in Yellowstone, the Pinedale Glaciation consisted of five interconnected icecaps along with several tributary glaciers. The direction of flow of the main outlet glacier was confined to a northward movement by rhyolite flows deposited in the western part of the park. By measuring the decay of radioactive potassium (K-Ar), the flow was dated to between 70,000 to 120,000 years ago (Pierce 1979). The main glacier covered over 3,400 square kilometers (1,326 square miles), averaged more than 700 meters (2,296 feet) in thickness, and was estimated to be 1,200 meters (4,000 ft.) thick over Yellowstone Lake. Obsidian hydration methods (measuring the amount of moisture absorbed by obsidian) were

used to date the terminal moraines (end of the advance) of the Pinedale glaciation at 30,000 years old. The glacier then stagnated and remained a large glacier for 10,000 to 15,000 years, covering most of YNP until the ice began to melt around 15,000 to 20,000 years ago (Pierce 1979; Richmond 1977).

As the global temperature began to warm, the icecap began to melt with the melt waters creating glacial lakes and melt water streams that flowed along the margins of the glacier. A large glacial lake ancestral to the present Yellowstone Lake developed at an altitude of 2,548 meters (8,360 ft.) and enveloped the Hayden and Pelican Valleys. The course of the Yellowstone River was cut during the melting of the Bull Lake glaciation, and is evident by a sequence of terraces, the highest of which is about 94 meters (308 feet) above the present levels of Yellowstone Lake, but at the lowest ice contact level of the ancestral glacial Yellowstone Lake (Richmond 1977).

As the icecap retreated, large boulders dropped, melt water removed glacial till and debris, and the steep-walled canyons carved by the glacier became unstable without the ice support, causing numerous large landslides. During the Pinedale Glaciation recession, ice in different areas melted at different rates, creating ice dams and forming large glacial lakes such as the one that formed in Hayden Valley. In the Grand Canyon of the Yellowstone River, melting of the ice was rapid because of extensive local hydrothermal activity. Rapid melting of the ice in this canyon (about 13,500 years ago) caused a sudden and catastrophic glacial outburst flood that drained the Hayden glacial lake. Similarly, hydrothermal areas below the Lower Falls of the Yellowstone River, and attendant hydrothermal explosions, caused the catastrophic lowering of Yellowstone Lake flooding the Yellowstone River and

causing it to undercut its walls and deepen the canyon (Richmond 1977). The river terraces provide evidence of several floods that occurred along the Yellowstone River with waters of 60 meters (197 feet) and 45 meters (148 feet) deep (Pierce 1979).

HYDROTHERMAL EXPLOSIONS

Hydrothermal explosions occur when there is a release of confining pressure that triggers an explosion caused by the expansion of water to steam (Heasler, personal comm. 2003). They may have had temporary local effects on vegetation, animal migration, and human use and interpretation of the area. The melting of glacial ice and lowering of water levels reduced the confining pressure on several hydrothermal areas, triggering explosions, sometimes in clusters. Carbon-14 dates indicate the hydrothermal explosion that created Mary Bay, on the northeast end of Yellowstone Lake, occurred between 13,000 and 14,000 years ago, leaving a remnant crater a mile (1.6 kilometers) long and 160 feet (49 meters) deep. The glacial meltwater lake in Pelican Valley also drained rapidly as a result of a hydrothermal explosion (Richmond 1977). Explosion deposits form the ridge of Turbid Lake, just north of Yellowstone Lake, and are radiocarbon dated to around 8,000 years before present. Similar, smaller explosions occurred along the shores of Yellowstone Lake 5,500 and 3,500 years ago, forming Indian Pond and Fern Lake (Bradford, et al. 1999; Richmond 1977). As recently as 1989 Porkchop geyser, in the Norris Geyser Basin (Figure 1), collapsed in a hydrothermal explosion (Fournier, et al. 1994).

TOPOGRAPHY

Yellowstone National Park

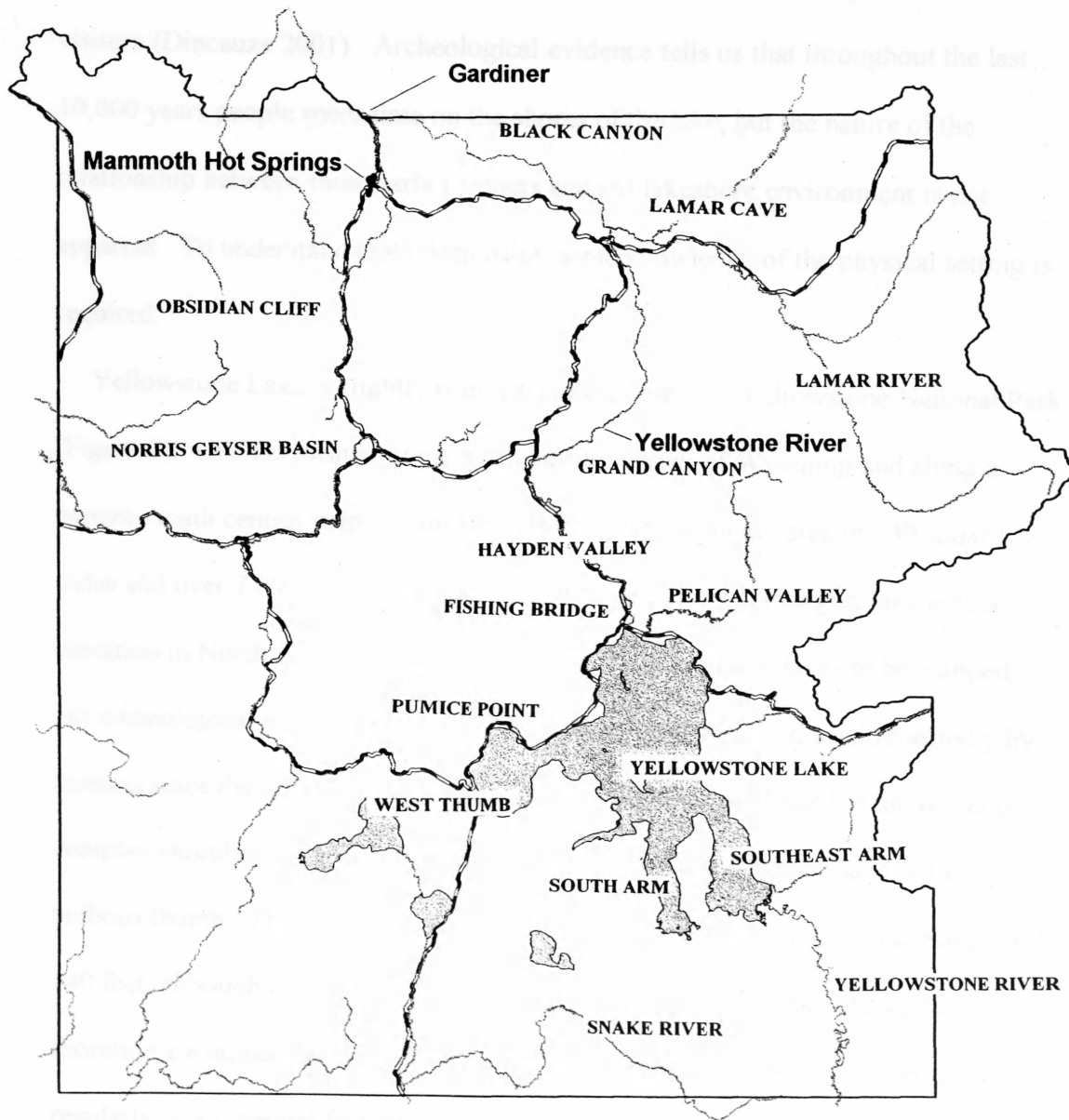


Figure 1. Some Yellowstone National Park Locations Discussed In The Text

YELLOWSTONE LAKE

The physical elements of the setting and the relationship humans create with the landscape are important aspects in the study of the lifeways of the parks earliest visitors (Dincauze 2001). Archeological evidence tells us that throughout the last 10,000 years people spent time on the shores of the lake, but the nature of the relationship between these early campers and the lakeshore environment is not apparent. To understand that relationship some knowledge of the physical setting is required.

Yellowstone Lake is slightly southeast of the center of Yellowstone National Park (Figure 2), which is located in the northwestern corner of Wyoming and along a narrow, south central strip of Montana. With an approximate area of 139 square miles and over 7,000 feet in altitude, Yellowstone Lake is the largest lake at this elevation in North America. Also, it was one of the last large lakes to be mapped, but archeological evidence indicates it was discovered early and used repeatedly by humans since the retreat of the last glacial ice. Yellowstone Lake has an irregular, complex shoreline, with its shape often likened to a three-fingered hand with a bulbous thumb. The lake has a maximum depth of 400 feet and an average depth of 140 feet, although over a third of the lake is less than 90 feet deep. Along the shoreline are numerous thermal areas, and underneath its waters geysers erupt regularly, with thermal features scattered along the lake bottom (Varley and Schullery 1998).

As previously noted, Yellowstone Lake represents the remnants of a massive caldera that collapsed approximately 600,000 years ago, and subsequently, portions

of the lake were filled with successive rhyolite flows. The West Thumb of the Lake resulted from a volcanic explosion; a hydrothermal explosion created Mary Bay. During the Early Holocene period, the lake level was within 10 meters (32 feet) of the present lake level. Early visitors may have experienced a lakeshore environment

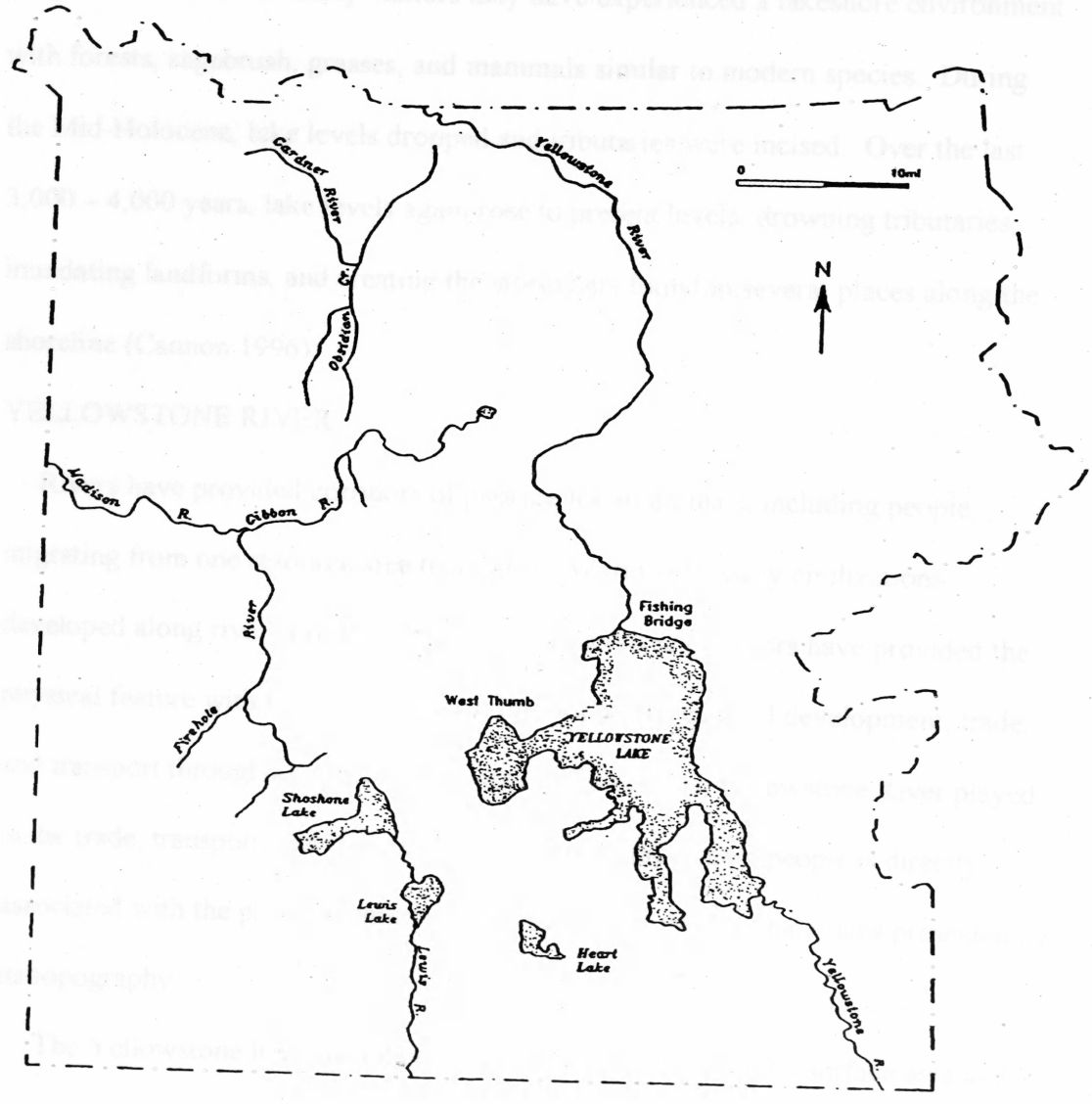


Figure 2. Major Rivers And Lakes Within Yellowstone National Park

of the lake were filled with successive rhyolite flows. The West Thumb of the Lake resulted from a volcanic explosion; a hydrothermal explosion created Mary Bay. During the Early Holocene period, the lake level was within 10 meters (32 feet) of the present lake level. Early visitors may have experienced a lakeshore environment with forests, sagebrush, grasses, and mammals similar to modern species. During the Mid-Holocene, lake levels dropped and tributaries were incised. Over the last 3,000 – 4,000 years, lake levels again rose to present levels, drowning tributaries, inundating landforms, and creating the storm bars found in several places along the shoreline (Cannon 1996).

YELLOWSTONE RIVER

Rivers have provided corridors of passage for all animals, including people, migrating from one resource area to another. Worldwide, early civilizations developed along river corridors. North American river corridors have provided the physical feature within the environment that supported cultural development, trade, and transport throughout precontact history. The role the Yellowstone River played in the trade, transport, and cultural development of precontact people is directly associated with the physical environment of the river and the challenges presented by its topography.

The Yellowstone River and its tributaries drain 60% of YNP's surface area and, as a major tributary of the Missouri River, remains the last great undammed river in the lower 48 states (Varley and Schullery 1998). Early trappers named the River, using a Hidatsa term for "yellow stone" that referred not to the colorful Grand Canyon of the Yellowstone, but instead to the weathered bluffs of sandstone along

the River's easternmost portions, outside of YNP (Haines 1977). The Yellowstone River has three distinct and uniquely different sections: the first from the headwaters to the Southeast Arm of the lake; the second from Fishing Bridge through Hayden Valley; and the third, the 36-mile section through the Grand and Black Canyons of the Yellowstone, to where it exits the park at Gardiner, Montana.

The headwaters of the Yellowstone River begin outside the park boundary to the southeast in the Bridger-Teton Wilderness area of the Absaroka Mountains of Wyoming. Twelve (12) air miles, approximately twenty-four (24) river miles long, this is the wildest and least known section of river. Although the poorest fish habitat, these headwaters provided a migration path for fish to re-establish in Yellowstone waters after the retreat of glacial ice (Varley and Schullery 1998) and likely provided a pathway for early human entry into the park as well. The river enters and flows through Yellowstone Lake, exiting the lake on its northbound passage at Fishing Bridge.

The second section of the Yellowstone River flows across the flat central plateau of the park through Hayden Valley, a broad, beautiful grassland known to be one of the best wildlife areas of the park. Created by the catastrophic flood draining the glacial lake at the end of the last ice-bound era, this now serene landscape, abundant with natural resources along the river corridor, is also rich in archeological sites.

The third and longest section finds the river falling 109 feet at its Upper Falls and 308 feet at the Lower Falls, then proceeding on a wild and colorful 20-mile course through the Grand Canyon of the Yellowstone. It gradually turns north, joining with its largest park tributary, the Lamar River, and once again enters a narrow and scenic

passage, the Black Canyon of the Yellowstone, emerging at the town of Gardiner, Montana, where it leaves YNP and enters south-central Montana (Varley and Schullery 1998).

III. HISTORY OF ARCHEOLOGICAL RESEARCH

The following section will provide a brief history of archeological research in YNP including the Yellowstone River corridor and the landforms around Yellowstone Lake. Problems associated with the earliest collections are discussed, followed by an overview of current archeological research.

The first Euro-Americans known to have passed through the park were 18th and 19th century fur traders and explorers, some of whom kept journals documenting their encounters with native people, providing the earliest ethnographic record of postcontact (after Europeans arrived in North America) use of the area. Maps of the region from the early 1800s indicate the presence of a lake, initially named Eustis Lake, with a river flowing out of it in a northwesterly direction, although the name of the river is not indicated, nor is the headwaters of the Yellowstone River identified (Haines 1974).

By the 1860s, Yellowstone Lake and the Yellowstone River appear on maps, and after the establishment of YNP, the first Superintendent, Philetus W. Norris, advised his staff that civilized nations were researching evidence of prehistoric peoples, therefore in their daily routine of work they should carefully collect all “arrow, spear, or lance heads, stone axes and knives, or other weapons, utensils or ornaments... and turn [them] over daily to the officer in charge for transmittal to the National Museum in Washington” (Norris 1882). Earlier, in an 1878 communication, Norris claimed “...Indian tools and weapons have been found by all recent tourists and explorers...in all those mountain valleys...of a different and much superior kind of obsidian” (Norris 1878). Norris located Obsidian Cliff that year, and in 1879

accompanied by William H. Holmes, geologically documented the obsidian source and ancient quarry. Artifacts accessioned into the National Museum of Natural History from the early collections in YNP contain limited site location information, although collections at the outlet of the Lake and its South Arm are indicated.

Artifacts associated with the lakeshore are described as stemmed and spear points (possibly indicating Terminal Pleistocene occupations) arrow points (indicating Late Holocene occupation), knives or bifaces, a net sinker, and a lamp, the only artifact of that type recovered from YNP. Also at the National Museum, collected in YNP during the late 1800s, but with no location information, are numerous stemmed and spear points, knives, blades, arrow points, drills, scrapers, soapstone vessel fragments, celts and axes, horn spoons, cores, disks, and flakes (Smithsonian Institute 1999). It is hard to assess how the archeological record for YNP has been altered by the early and continued collection of artifacts by tourists and park staff, but the rich array of tool types documented during this early effort to conserve evidence of past cultures indicates what future archeological investigations might find.

From the 1880s to the late 1950s, YNP had no archeological program of systematic site documentation. Artifacts were occasionally brought to the museum, although it is known that staff and visitors removed artifacts from the park for personal collections. Waterline construction activities on the north shore of the lake inadvertently disturbed a human burial in 1941, and in 1956, construction activity in another part of the same developed area again unearthed human skeletal remains. The Chief Park Naturalist wrote a brief description of the burials, gravesite, and

associated artifacts and the remains were placed in the park museum (Condon 1948). In 1956, a park naturalist began documenting archeological sites along a trail, named the Bannock Trail by the 1878 Hayden survey party, which followed an older trail. This precontact trail system crosses the Yellowstone River in several locations in the northern portions of the park, near Gardiner and Tower Falls.

The Anthropology Department at Montana State University, located at Missoula, Montana, conducted the first large-scale inventory and documentation of archeological sites in YNP during the summers of 1958 and 1959. They recorded a total of 224 sites, although some of the documentation relied on YNP Bannock Trail notes and several sites were not actually relocated at that time. The documentation included 43 precontact sites located along the Yellowstone River and 38 sites on the shores of Yellowstone Lake. The 1950s standards for site documentation provided far less information than is the current practice, and subsurface investigations were conducted at just one site on the lakeshore, but still, the survey efforts provided valuable information and insight into past occupation of the park.

A study of the archeological artifacts in the park museum collection preceded the fieldwork and guided the MSU-Missoula archeologists to previously known sites (Taylor, et al. 1964). The resulting surface collections and site documentation in selected areas along the Yellowstone River corridor yielded diagnostic projectile points from the Paleoindian period (Hell Gap, Agate Basin, Cody, Scottsbluff, lanceolate, rounded base, and finely crafted points with parallel oblique flaking); a few side notched projectile points indicating Early Holocene occupation; numerous sites with McKean Complex and Pelican Lake projectile point types indicating

Middle Holocene use of the area; and smaller arrow points from Late Holocene occupations. Also documented along the River corridor were sites with tipi rings, smooth-sided hide working stones, disc shaped milling stones, and numerous knives, choppers, and scrapers. Investigations at lakeshore sites provided similar evidence of occupation during the four precontact periods. In addition, Lake sites yielded corner-tanged blades, Paleoindian Eden points, Early Holocene Cascade points, and Late Holocene pottery sherds (Taylor, et al. 1964). The excavation of a lakeshore pottery site provided not only the first record of pottery in YNP, but it also was the first controlled, systematic archeological site excavation in the park.

Additional archeological inventories were conducted in the 1960s in the Gallatin River Valley northwest of YNP (Napton 1965), the upper Yellowstone River valley north of YNP (Arthur 1966), and documentation of high altitude sites northeast of the park boundary (Haines 1964) provided an expanding picture of long and varied precontact use of the park.

Starting in the late 1950s, continuing on through the 1960s Yellowstone underwent extensive repairs to the infrastructure and construction of tourist facilities, known as the Mission 66 program. The work was completed before the passage of the National Historic Preservation Act and prior to the now common practice of assessing the impacts of development on cultural properties. Unfortunately, numerous park developments along the River corridor and around the Lake were adversely affected, if not totally destroyed precontact archeological sites.

The 1970s and '80s began an era of management-oriented archeological inventory and monitoring of construction projects such as water, sewer, and utility lines, road

and building construction, campground relocation, and projects as minor as the relocation of pit toilets. The 1979 emergency salvage excavation of a precontact site impacted by the repair of a utility line near the south rim drive of the Grand Canyon of the Yellowstone was the first large-scale excavation of a precontact site on the Yellowstone River. The salvage work revealed a well stratified precontact site with evidence of numerous occupations, and provided 10 radiocarbon dates, along with obsidian hydration dates (Marceau and Reeve 1984). Monitoring of powerline construction along the river just north of Yellowstone Lake exposed a large area scattered with obsidian cobbles, indicating a lithic workshop area in close proximity to precontact campsites. Paleoclimate studies reconstructing the precontact environments in the park were on-going in the 1970s and 1980s as well as work in geochemical identification of obsidian source materials and geomorphic studies of Yellowstone.

The lightning-caused forest fires of 1988 required post-fire cleanup and landscape rehabilitation, and with a higher percentage of ground visibility, archeological sites were more easily identified. Visitor impact to sites exposed near the trails along the Yellowstone River resulted in investigations that provided analysis of faunal remains, diagnostic projectile points, macrobotanical analysis, and radiocarbon dates indicating stratified occupations from 7,000 to 600 years ago (Cannon 1997).

Recent archeological research has expanded the knowledge of precontact activities in that area.

In the early 1990s, YNP embarked upon a 20-year program to reconstruct the park's roads. Preparation for this undertaking required the development of a

precontact archeological treatment plan for sites along the road corridors where construction impacts were anticipated (Center 1993). The identification and documentation of precontact archeological sites within the road corridor prior to road reconstruction has been an ongoing process and has provided significant information adding to the archeological record of the Yellowstone River and Yellowstone Lake area.

For example, the North Entrance Road runs along the Yellowstone River, crossing over the river as it enters the park from the north. The Grand Loop Road runs adjacent to the Yellowstone River south of the Grand Canyon of the Yellowstone through Hayden Valley to the outlet of Yellowstone Lake, and continues south along the western shore of Yellowstone Lake to West Thumb, where it leaves the lakeshore, heading west to Old Faithful. Beginning at the Yellowstone River's outlet from the lake, the East Entrance Road runs along the north shore of Yellowstone Lake for almost 20 miles before it turns east, heading towards Cody, Wyoming. Altogether, road reconstruction cultural compliance requirements have provided recent archeological inventory and subsurface investigation of precontact sites along approximately 50 miles of river corridor and lakeshore, greatly increasing our understanding of the culture history of YNP. Following the methodology and research design put forth in the precontact archeological treatment plan for the roads (Center 1993), a program of archeological inventory and excavation has been accomplished using the combined expertise of the Midwest Archeological Center of the National Park Service, the Office of the Wyoming State Archeologist, and the Museum of the Rockies at Montana State University.

For the first time in YNP history, archeological research funds were acquired in 1995 to initiate an archeological inventory of the Yellowstone River Corridor. The field survey identified significant sites along the riverbank that were being eroded into the river due to cyclical high water events (Shortt and Davis 1998). Efforts to evaluate and salvage the stratified sites have begun and are ongoing, pending funds to support this important archeological research and the complex environmental assessments of effect that are now required prior to the recovery of precontact archeological information through salvage excavations.

NPS funds have been requested to complete an inventory of the shores of Yellowstone Lake. This work is important and timely, as the undulations of the magma chamber under the lake are altering the water level of the lake, and erosion is currently exposing and submerging precontact sites. Private funds have recently been made available to support environmental and historic preservation compliance and salvage excavation of a 9,500-year old Cody Complex site recently exposed and impacted by lakeshore erosion (Shortt and Davis 2002). During recent lakeshore inventory and excavation conducted by the Anthropology Department of Wichita State University, it became apparent that a site of similar age in the vicinity was being systematically looted. Nomination to the National Register of Historic Places of significant precontact sites along the river corridor and lakeshore would provide greater legal protection as well as important public information for all Americans regarding the cultural development and human adaptive responses to our changing environment.

SIGNIFICANT ARCHEOLOGICAL INVESTIGATIONS ALONG THE YELLOWSTONE RIVER AND AROUND YELLOWSTONE LAKE

Over the years, numerous, small-scale archeological inventory and monitoring activities have been conducted in the study area, with no significant precontact resources being identified. A chronological listing, and reference to the small project reports, can be found in the Cultural Sites Inventory, Branch of Cultural Resources, Yellowstone National Park, Mammoth, Wyoming. They are not listed here.

<u>Year</u>	<u>Principal Investigator</u>	<u>Type of Investigation</u>	<u>Report (Citation)</u>	<u>Location of work</u>
1878 – 1882	Supt. Norris Wm. Hayden Col. Brackett	surface collections	(Smithsonian Institute 1999)	Parkwide
Impacts: Tourist collecting, park development, road construction				
Data: Diagnostic Projectile Points (PP), diversity of artifacts				
1948	D. Condon (YNP)	Record Inadvertent discovery-burial	Journal Article (Condon 1948)	Lake
Impacts: Building and utility development, road construction, unauthorized collecting (UC)				
Data: Diagnostic PP, skeletal analysis, description of burial site				
1958- 1959	D. Taylor C. Malouf (MSU-Missoula)	Surface inventory	Yes (Taylor, et al. 1964)	Parkwide
Impacts: Park development, road construction, UC, bioturbation, riverbank and lakeshore erosion, thermal activity				
Data: Diagnostic PP, diversity of artifacts, regional comparisons				
1960	G. Arthur (MSU-Missoula)	Survey and excavation	Yes (Arthur 1966)	River
Impacts: Development of town (Gardiner) and NPS, road and railroad construction domestic activities (gardening), UC, farming, riverbank erosion				
Data: Diagnostic PP, identification of various site types, soil profile, rock art description, burial description				
1979	Marceau & Reeves (MWAC)	Salvage excavation	Yes (draft) (Marceau and Reeve 1984)	River
Impacts: Utility line construction and repair, riverbank erosion				
Data: Statistical analysis of diagnostic artifacts, tool types, use, and lithic debris; tool use wear analysis, diagnostic PP, macrofloral analysis, pollen analysis, radiocarbon dates				

<u>Year</u>	<u>Principal Investigator</u>	<u>Type of Investigation</u>	<u>Report (Citation)</u>	<u>Location of Work</u>
1980	A. Samuelson (MWAC)	Inventory	Yes (Samuelson 1983)	Lake
Impacts: Tourist facility development, Lakeshore erosion, UC				
Data: PP and artifact analysis, lithic analysis				
1982	G. Wright, et al, (MWAC)	Synthesis	Journal article (Wright, et al. 1982)	Lake
Impacts: not identified				
Data: Radiocarbon dates, obsidian hydration analysis, skeletal analysis (Gill 1974), faunal analysis, PP and artifact analysis				
1989	K. Cannon (MWAC)	Salvage excavation	Yes (Cannon 1997)	River & Lake
Impacts: Riverbank erosion, looting and pothunting, trampling (fishing spot), lake wave-action erosion, utility line construction				
Data: Diagnostic PP, lithic analysis, radiocarbon dates, obsidian sourcing, pollen analysis, macrofloral analysis, detailed faunal (and fish) analysis				
1989	K. Cannon (MWAC)	Surface inventory	Yes (Cannon 1990)	Lake
Impacts: Road, utilities, visitor services construction; bioturbation, lakeshore erosion, trampling, looting				
Data: Diagnostic PP				
1992- 1993	K. Cannon (MWAC)	Surface collection & excavation	Yes (Cannon, et al. 1994)	Lake
Impacts: Road, utilities, visitor services construction and repair, bioturbation, looting, trampling, and proposed road construction staging and stockpile				
Data: Diagnostic PP, debitage analysis, blood residue analysis, pollen and phytolith analysis, obsidian sourcing, radiocarbon dates				
1992	Willey & Key Cal. St. U (MWAC)	Skeletal Analysis	Yes (Willey and Key 1992)	Lake
Impacts: Polymer coating of skeletal elements				
Data: Multivariate statistical analysis of crania, physical inventory and analysis of all skeletal elements, teeth and joint surfaces, measurement and metric analysis of skulls and postcranial elements				
1992	K. Cannon (MWAC)	Inventory & NR excavation	Yes (Cannon 1996)	Lake
Impacts: Road construction, lakeshore erosion				

<u>Year</u>	<u>Principal Investigator</u>	<u>Type of Investigation</u>	<u>Report (citation)</u>	<u>Location of work</u>
Data: Diagnostic PP, obsidian source analysis, debitage study, lithic material analysis, mechanical soil analysis, blood residue analysis, macrobotanical analysis, pollen & phytolith analysis, ceramic analysis				
1995	W. Allen (U.S. FS)	Inventory & excavation	Yes (Allen 1995)	River
Impacts: road and railroad construction, farming, wind erosion, looting				
1990- 1994	K. Cannon (MWAC)	Data Recovery	Yes (Cannon, et al. 1997)	Lake
Impacts: Road Construction, picnic area and comfort station construction, thermal activity, lakeshore erosion, UC, bioturbation				
Data: Diagnostic PP, radiocarbon dates, obsidian sourcing, faunal analysis, blood residue analysis, pollen analysis, macrobotanical analysis, temperature probes to calibrate obsidian hydration dates				
1995	S. Stupka-Burda (MWAC)	Inventory site documentation	Yes (Stupka-Burda 1995)	Lake
Impacts: Campground development, UC				
Data: Site documentation, diagnostic PP				
1995	M. Shortt (MOR)	Inadv disc site documentation	Yes (Shortt 1996)	Lake
Impacts: lakeshore erosion, fishing trails				
Data: Recommendations from affiliated Native American tribes				
1995	P. Sanders (OWSA)	Inventory	Yes (Sanders, et al. 1996)	River
Impacts: Road construction, tourist facility construction (Canyon area), bioturbation				
Data: Diagnostic PP, obsidian sourcing				
1996	M. Shortt (MOR)	Salvage excavation	Pending	River 24YE32/48YE765
Impacts: Riverbank erosion, backcountry campsite and trails, UC				
Data: Radiocarbon dates, pottery analysis				
1996- 2002	M. Shortt (MOR)	Inventory & salvage excav.	Pending	River 24YE353
Impacts: Riverbank erosion, trampling, UC				
Data: Radiocarbon dates, pollen analysis, macrofloral analysis				
1996	M. Shortt (MOR)	Surface inventory	Yes (Shortt and Davis 1998)	River
Impacts: Riverbank erosion, backcountry campsites and trails, UC				

Year	Principal Investigator	Type of Investigation	Report (Citation)	Location of work
	Data: Diagnostic PP, blood residue analysis, obsidian source analysis, lithic analysis			
1996	P. Sanders (OWSA)	Inventory & Shovel tests	Yes (Sanders and Wedel 1997)	Lake
	Impacts: Lakeshore erosion, road and campground construction, bioturbation, utilities, UC,			
	Data: Diagnostic Projectile Points, obsidian source analysis			
1998	M. Shortt (MOR)	Surface inventory	Pending (west side-FB to Gr. Cyn)	River
1998	P. Sanders (OWSA)	Inventory & shovel tests	Yes (Sanders 1999)	River
	Impacts: Road construction, picnic areas, riverbank erosion, bioturbation, drainage			
	Data: Diagnostic PP, tool manufacture/use/discard, debitage analysis, obsidian sourcing, lithic analysis			
1998	M. Shortt (MOR)	Surface invent. & shovel tests	Yes (Shortt and Davis 1999)	River
	Impacts: Road construction, picnic areas, trails, UC, riverbank erosion, bioturbation			
	Data: Diagnostic PP, obsidian source analysis			
1999	P. Sanders (OWSA)	NR test excavation	Yes (Sanders 2000b)	River
	Impacts: Road and pullout construction, picnic area and trails, UC, bioturbation, riverbank erosion, thermal activity			
	Data: Diagnostic PP, tool manufacture/use/discard, debitage analysis, lithic analysis, radiocarbon dates, obsidian sourcing, obsidian hydration, macrofloral analysis.			
1999	P. Sanders (OWSA)	NR test excavation	Yes (Sanders 2000a)	River
	Impacts: Rodent burrows, slope wash, riverbank erosion, landslide, community and tourist development (town of Gardiner, and YNP), road and railroad construction, UC, pothunting			
	Data: Diagnostic PP, debitage analysis, geological investigations, radiocarbon dates, obsidian sourcing, obsidian hydration, macrofloral analysis			
2000	M. Shortt (MOR)	Inventory	Yes (Shortt, et al. 2001)	Lake
	Impacts: Lakeshore erosion, looting and pothunting			
	Data: Diagnostic PP, radiocarbon dates, obsidian sourcing, macrofloral and pollen analysis			

Year	Principal Investigator	Type of Investigation	Report (Citation)	Location of work
2000	M. Shortt (MOR)	NR test excavation	Yes (Shortt and Davis 2002)	Lake
Impacts: Lakeshore erosion, looting and pothunting				
Data: Diagnostic PP, artifact analysis, geologic stratigraphic analysis, radiocarbon dates, obsidian sourcing, blood residue analysis				
2000	P. Sanders (OWSA)	NR test excavation	Yes (Sanders 2001a)	River
Impacts: Road construction, picnic areas and fishing trails, bioturbation, sheetwash, riverbank erosion, thermal activity				
Data: Diagnostic PP, tool manufacture/use/discard analysis, debitage study, experimental lithic reduction (obsidian) study, radiocarbon dates, obsidian sourcing, macrofloral analysis				

IV. A FEW WORDS ABOUT THEORY

We face the challenge of science itself – how to keep our feet on the “empirical” ground and our heads in the “theoretical” sky.
(Binford 1981)

Archeology is the retrieval and study of material remains (artifacts and features) that provide evidence of previous peoples’ use of the landscape. Its basic goals are to place past events in a chronological sequence, to reconstruct past lifeways, and to understand how and why past cultures change through time (Fagan 2001; Kehoe 1998). In Yellowstone, the study of stone tools and the geologic matrix in which they are found provides archeologists with clues about past people and their lives, providing a framework from which their history can be revealed. It is with empathy and respect for those people who long ago occupied Yellowstone, and the hope for understanding the complexities of their lives, that scientific archeological research is conducted in an effort to connect this land and our lives with the past (Anderson, et al. 2003 in draft).

Scientific methodology from a variety of disciplines is used to locate and investigate surface and buried artifacts that can provide meaning to past human behavior and identify the cultural processes through which people adapted, and ultimately survived in Yellowstone’s unique and changing environment. We focus on the attributes and evidence archeological remains provide attempting to comprehend the motives of the people who used and left the artifacts, and to understand the significance, value, or symbolic meaning those material goods held for the ancient toolmakers and users.

Prior to conducting field research a review of information gained from past archeological work in the area provides insight into what we might expect to find and the most effective methods to retrieve information. Conversely, we hope archeologists in the future will gain meaningful insight from our work. Although archeological theories and methods change through time, most archeological questions and attendant theories originate from review of the archeological record (Odell 2001; Thomas 1983). Archeological theories are developed to explain how the archeological record got to be the way it is. To be most effective, archeologists must work within a comprehensive synthesis to analyze data by displaying their observations against different frames of reference in search of patterns (Binford 2001).

Patterns in distribution of sites, evidence of seasonality, and evidence of plant, animal and lithic resource use help us formulate models of the archeological record, but too often these models become the goal of the archeological study. A broader base of information, including paleoecology, forager theory, and hunter-gatherer studies, needs to be integrated so that excavated materials can be evaluated in various ways at both local and regional levels (Hofman 1997). Careful analysis of multiple lines of evidence and multiple potential explanations for patterns in archeological remains is what makes archeologists competent scientists, not adherence to a particular theoretical perspective (Bamforth 2002). Understanding cultural change through time is multidimensional in nature and requires viewing the hunter-gatherer way of life as a series of complex patterns of interaction that

demonstrate flexibility in coping with environmental change and are potentially independent aspects of human adaptations (Bamforth 1997; Larson 1997b).

Various archeological theories are useful in providing a framework for excavation and interpretation of Yellowstone's archeologically recovered remains. Settlement archeology investigates the length of time and seasons during which a specific group of people occupied a particular area, and how they used the resources in that area. Settlement patterns identify variability in site use and function and incorporate regional analyses and spatial data to get a total picture of how and when certain people used multiple ecological zones to acquire resources important for their survival (Chapman 2000; Thomas 1983).

Ecological theory provides a framework for the study of the relationship between humans and the plants and animals found in their physical environment. Identification of resources used for subsistence and environmental reconstruction provides valuable information about how environmental change contributed to change in human adaptive strategies and consequently, changes in cultural systems. Major advances in the study of prehistoric sediments, pollens and phytoliths, insects, and rodent middens, along with microscopic use-wear analysis, blood residue identification, taphonomic studies, and isotopic analysis of skeletal remains, have refined methodologies and advanced our knowledge of past environments. These types of study are readily applicable to a regional framework of field research (Jochim 2000). Problems with the ecological approach have included the overuse of broad applications of environmental change such as the "deleterious effects of the Altithermal" (Frison, Toom, et al. 1996); the inappropriate application of proxy data

and the incongruence between regional and local scales of environmental reconstruction (Dincauze 2001); and the bias of reconstructions using cost-benefit models to explain past human behavior (Jochim 2000).

Behavioral theory links human survival through time with the ability to adapt to environmental change through changing technology. Studies that link attributes of artifacts to their function and analysis of activity areas indicate adaptive technological response to changing conditions (Schiffer 1995). Artifacts are the backbone of archeological study and increased refinement of knowledge about their manufacture and use within both ecological and cultural settings fits well with the afore mentioned models of research and improves our ability to provide plausible interpretations for the remains of past cultures.

Using Binford's forager-collector model for hunter-gatherer settlement systems, it appears that the small bands seasonally using Yellowstone's landscape and resources fit the general forager model (Binford 1980). Archeological evidence in YNP shows high residential mobility with little accumulation of debris -a forager trait- and lack of significant food storage features (storage of resources being a prime indicator of collector strategy.) The forager-collector model is a continuum, with some elements of collector strategy being present but not so obvious as storage features. Resources were collected in the field and processed for later storage without leaving evidence of storage at the site of procurement. It is often difficult to ascertain, from the lithic tools recovered at a site, whether a band of people was moving through the area or if the remains are the result of a special purpose group, such as a hunting party. New approaches in gender studies provide added insight regarding the nature and

variation of gender roles for past peoples (Kornfeld 1991) and will contribute to better interpretation of special use areas. A degree of variability is apparent in the precontact use of the Yellowstone area, with indications that lithic, plant, and animal resources may have been cured, dried, curated, and prepared for transport out of the area for later use, thus indicating elements of collector strategy.

Although archeology as a discipline has advanced far beyond simple descriptions of artifacts and comparisons of projectile point forms, the understanding of early human use of the general Yellowstone area still relies on a solid culture-history base. Culture-history refers to the development of general chronology schemes for relatively dating archeological remains within developmental cultural sequences (Mignon 1993). Poor preservation of material remains due to the volcanic acid soils, hydrothermal influences, thin soil development in the montaine regions, freeze-thaw, bioturbation, and over 100 years of unauthorized visitor collection has resulted in chipped stone tools constituting the most prevalent archeological remains in YNP. Chronological sequences developed through comparative change in projectile point forms, correlated with radiocarbon dates and compared with other local and regional chronologies, provides the basis for identifying cultural use and cultural change in YNP and the surrounding regions (Conner 1998; Frison 1991; Mulloy 1958).

Identifying and understanding the relationship between the various named traditions, stages, complexes, periods, phases, and sub-phases within any region can be difficult and confusing (Frison and Mainfort 1996; Moss and Erlandson 1996). For that reason a broad-spectrum, generalized geologic chronology has been created within which we can present the historic context for human use of this area.

The historic context begins with the earliest use of the area, prior to 10,000 years ago, and continues until European contact in North America, around 500 years ago. Many mobile bands of people from various cultural phases and traditions passed through the Greater Yellowstone Area during those 10,000 years. Given the paucity of material remains other than chipped stone tools and a scant bit of botanical remains that comprise the current archeological record for YNP, it is not readily feasible to connect precontact cultural remains with current Native American tribes.

Precontact archeology is described in terms of similarities and differences in artifact attributes, site features, and other physical remains. Ethnic or tribal affiliations are delineated by politics, ideology, and symbolism and therefore, in precontact archeology, there is seldom a one-to-one correspondence, especially when potentially distinctive technologies are not present, such as the case in Yellowstone. Also, due to the diachronic mobility, numerous relocations, and many migrations of all peoples from prehistoric times to the present there is no way of relating artifacts, sites, and landscape use to one tribe to the exclusion of others (Davis, et al. 1995; Frison, Toom, et al. 1996; Hanson 1999; Jelderks 2002). It is assumed that all peoples could have passed through Yellowstone, and that the landscape and thermal features of Yellowstone would have left a distinct impression, as it still does on people today.

V. RELATIONSHIP TO PRECONTACT ARCHEOLOGY OF THE SURROUNDING AREA

Yellowstone National Park is nestled in the Rocky Mountains on the boundary of several physiographic provinces and multiple culture areas. To the east lie the shortgrass prairies of the Great Plains; to the north the Canadian Rockies and the Northern Great Plains; to the south the Central Rockies extend into the Front Range of the Colorado Plateau; the Great Basin quickly emerges to the southwest; and west of the mountains lie the Columbia River drainage and the resultant Plateau culture area. Similar climate regimes and landforms of all the bordering geographic regions and influences of their efflorescent cultures can be found in the Yellowstone area. Yellowstone is most often considered a part of the Northern Plains within the Great Plains physiographic province that encompasses a 300,000 square mile area (Frison and Mainfort 1996). Additionally, a small area of Wyoming (part of which is in YNP) is drained by the Snake River, a major tributary of the Columbia River. Frison describes the Northwestern Plains area as incorporating the foothills and mountains at the western edge of the Plains (Frison 2001). Other discussions of the Great Plains draw the boundaries clearly to the east of YNP (Wood 1998). What is apparent, though, is that Terminal Pleistocene through Late Holocene archeological sites in YNP indicate significant spatial, temporal, and cultural affiliations to the Northwestern Great Plains (Frison 1991; Larson 1997b; Reeves in preparation; Wright 1985).

Recognized in the early 1960s and recently discussed in the Jackson Lake archeological studies (Conner 1998), it is hard to separate native use of the

mountainous areas from that of adjacent regions because it is evident that the same people used both areas. Settlement and subsistence patterns emerging from recent archeological work in the Northern Rockies indicate that from the Paleoindian period to the present, these mountains attracted peoples from the Plains, Great Basin, and Plateau areas on a seasonal basis (Stanford and Day 1992).

Studying the Rocky Mountain region presents a number of challenges to archeologists and anthropologists. High altitude ecosystems contain patches of seasonally compressed resources – game animals that seasonally migrate in and out of mountain zones; berries ripen and roots and tubers mature, becoming edible only at certain times of the year. Sporadic use of seasonally available mountain resources involved travel from lowland wintering grounds into resource rich mountain areas. These resource patches are juxtapositioned in high mountain valleys isolated by mountain ranges and linked by rivers and streams. Access to and use of the resources pose transportation and mobility problems, the solution to which encourages multiple adaptive responses.

Current archeological knowledge of these high mountain areas is limited, having received less attention than the large villages and mounds of the Middle Missouri and Central Plains. Also, one must consider the difficulty of working in high altitude mountainous areas. Contributing to our general lack of knowledge about cultural use of mountainous areas is the reality that most of the current research is the result of mitigation efforts for Federal development projects, very few of which occur in the mountains (Madsen and Metcalf 2000).

The “intermountain region” has at times been considered a culture area of its own with the biennial Rocky Mountain Anthropological conference organized to explore common regional archeological problems. The idea of a Northwestern Plains sub-culture (Ewers 1968), the Western Macrotradition hypothesis (Husted 1968), and the Foothill-Mountain tradition posed by Frison (1991) suggested that people using the foothills and mountain ecological zones employed a different subsistence strategy than contemporaneous Plains groups. It has been suggested that projectile points from Foothill-Mountain sites tend to display regional variation, and subsistence strategies are varied, with plant resources more important and hunting focused on a broader array of game and smaller animals (Reed and Metcalf 1999).

Conner (1998) suggests that mountainous areas are used in three basic ways: 1) sporadic, task-specific, single resource procurement or travel to resources, 2) seasonal movement of family groups or bands from the lowlands to the mountain regions, or 3) year-round exploitation of mountainous environments by permanent populations. Sporadic use of mountainous areas by lowland groups to acquire specific resources occurs throughout time. This seasonal use is marked by the presence of warm weather camps, with the remainder of the settlement system in varying proximity to the mountains. Conner (1998) believes that pit houses, winter shelters, evidence of food storage, and accumulations of debris from using a wide variety of resources in the same area over an extended period of time should archeologically characterize year-round use. Poor soil development and lack of deposition in mountainous areas such as Yellowstone may mask evidence of some cold-weather sites, and may also serve to render artifacts resulting from repeated

occupations an undifferentiated mix. Additionally, the sites used by people traveling through an area are often ephemeral.

The archeological record supports the assertion that throughout precontact times YNP was seasonally and perhaps cyclically inhabited by small mobile bands of people using the wide array of resources in a variety of ways at different times. In the past 125 years of investigations, no precontact village sites, concentrations of domestic stone circles, pit houses, cave occupation sites, fortifications, trash middens, or food storage features have been identified in YNP. Artifact preservation in YNP is inhibited by acid soils, but poor preservation cannot explain the lack of large-scale habitation sites. Evidence of seasonality, although sparse, does not strongly support year-around use of the area. It is also assumed that throughout the precontact period a wide array of peoples from various locations passed through the area now known as YNP. Similarities in chipped stone tools found in YNP to those of other culture areas (the Great Plains, Great Basin, and to a lesser extent, the Plateau) have been noted in Yellowstone's archeological record and infer a wide regional use of the area.

The significance of Yellowstone's archeological record is best understood when compared to regional patterns of use. Yellowstone's earliest human visitors were mobile bands of hunter-gatherers who used their environment in a variety of ways to provide for their subsistence and ensure their survival. Regional settlement studies (Baumler, et al. 1996; Conner 1998; Frison and Mainfort 1996; McCracken, et al. 1978; Stanford and Day 1992; Wright 1985) have shown that aboriginal peoples distributed their activities across the landscape. To date, archeological evidence in

YNP indicates that precontact peoples used the area seasonally and moved to other, probably lower, elevations for the winter. Some of the same people using YNP in the late spring, summer, and fall likely created the archeological remains in southwestern Montana, northeastern Idaho, and northwestern Wyoming (Sanders 2001b). Therefore, placing YNP within regional chronologies is appropriate. To date no single YNP site has been excavated that provides sufficient information to clearly identify subsistence and settlement patterns in YNP, although combined with regional information about site distributions and activities within environmental zones, we can achieve a more accurate understanding of early native lifeways.

TO THE EAST AND SOUTH (WYOMING)

Most of YNP lies within the boundaries of the State of Wyoming (Figure 3), and much of Yellowstone's precontact archeology is similar in artifact types and site functions with archeological sites in Wyoming. Conditions for better site and artifact preservation in some areas of Wyoming provide a more detailed picture of early lifeways and resource use with which to compare YNP archeological data from the same time period. It has been suggested that, similar to other Paleoindian sites in North America, the earliest use of the Yellowstone area may have begun when Paleoindian hunters followed seasonal migrations of big game into the area.

Although projectile points diagnostic to the Terminal Pleistocene Paleoindian period have not been found in association with Pleistocene fauna in YNP, Wyoming sites provide such evidence (Frison 1991; Frison and Todd 1986; Kelly and Todd 1988). Previous excavations in the Big Horn Basin (Husted 1969; McCracken, et al. 1978),

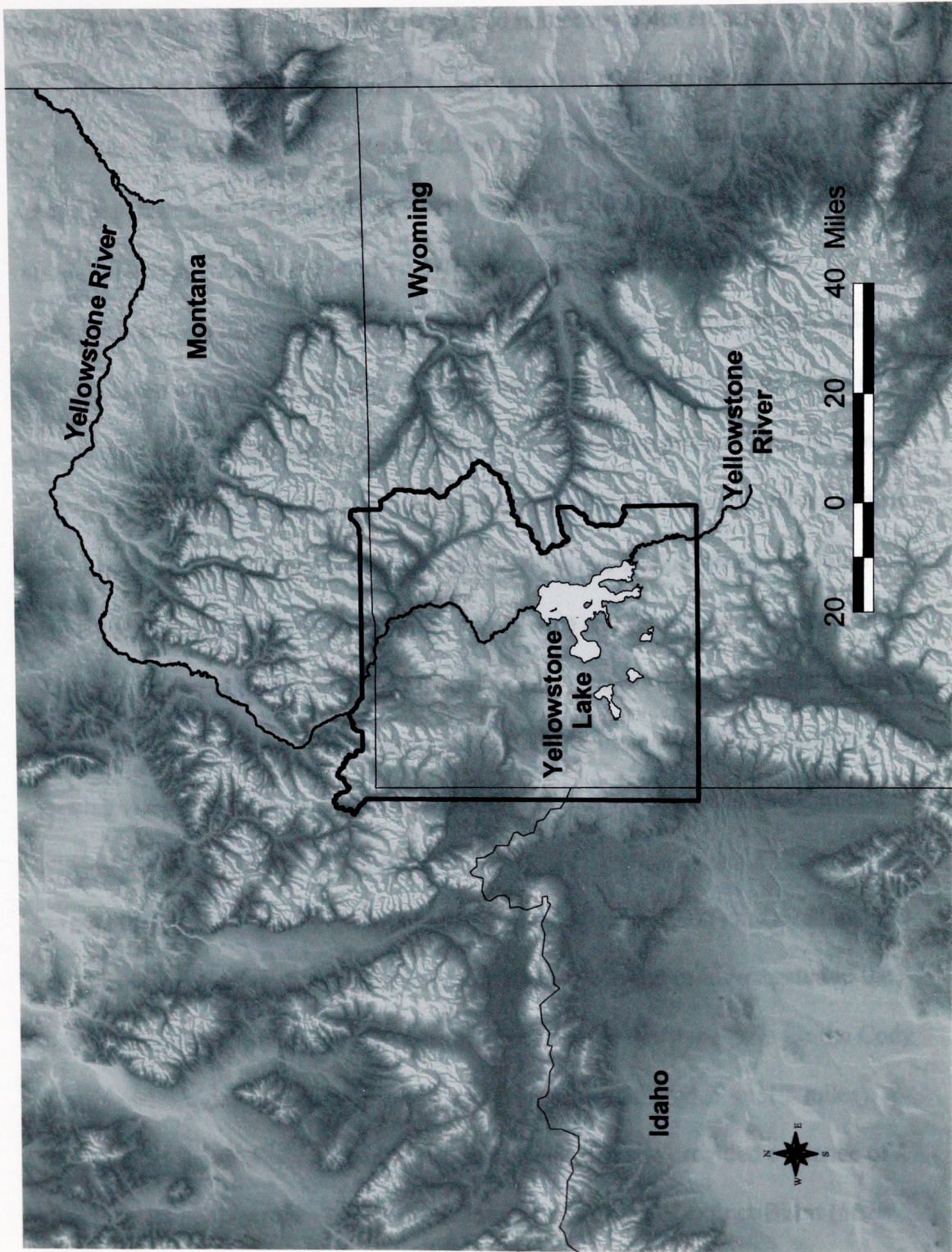


Figure 3. Yellowstone National Park In A Regional Setting

Grand Teton National Park (Conner 1998), and numerous other areas of Wyoming infer movements of people and use of resources within YNP and Wyoming.

Mummy Cave, located 40 km (about 25 miles) from the East Entrance of YNP, is one of the most important sites in the Northwestern Plains, providing a regional chronology supported by radiocarbon dates associated with a record of the diachronic change in projectile point forms through time. It is a rock shelter with intact cultural stratigraphy yielding rarely preserved material items from 37 distinct intermittent occupations dating from 9,230-370 years before present (McCracken, et al. 1978). Mummy Cave is located on the North Fork of the Shoshone River, whose headwaters are in YNP, and provides evidence of winter habitation and resource use, demonstrating significant variation from subsistence and settlement patterns found in YNP and nearby at the Horner Cody Complex site. Projectile points similar to the early, side-notched points from cultural layer 23 in Mummy Cave, representing a striking change in form from stemmed points, were also recovered at the Carbella site just north of YNP (McCracken, et al. 1978).

The Horner site, discovered by amateur archeologists in 1939; excavated in 1949 by Princeton; then jointly with the Smithsonian in 1952; and re-investigated in the late 1970s by the University of Wyoming, is considered the “type” site for the Cody Complex. Located east of YNP near Cody, Wyoming, situated .5 km (.3 miles) south of the Shoshone River on Pleistocene gravels, the site provided evidence of a late fall/early winter bison kill site with butchered remains of extinct Bison (*bison antiquus*), along with various other smaller animal species. The site yielded a wide range of projectile points, including Eden and Scottsbluff, and Cody knives, dating

from 8,900 – 8,5000 years before present (Bradley 1998). Recent comparison of trace elements found in obsidian tools identified a Paleoindian point base from the Smithsonian Horner collection as producing a chemical imprint similar to that of Obsidian Cliff (Hughes 2002). Additionally, comparison of the dark green chert material used for several Cody knives recently recovered from the shores of Yellowstone Lake with lithic materials from the Horner site may indicate use of lithic material from the same source (personal comm. George Frison and Ann Johnson 2002.)

Radiocarbon dating at the Dead Indian Creek site, located in Sunlight Basin between YNP on the northeast and the Bighorn Basin on the west indicated occupation between 4,400 – 3,800 years ago. Excavations at the site recovered butchered bone indicating extensive use of mule deer in a winter camp with all the variants of McKean projectile points, lanceolate, stemmed Duncan, and notched and serrated Hanna points represented. The excavation also revealed evidence of a pit house similar to those described elsewhere in Wyoming (Frison and Walker 1984; Larson 1997a). Radiocarbon dates from Bugas-Holding, another winter season occupation site in Sunlight Basin, indicate occupation around 500 years ago (Rapson 1990). The site yielded faunal remains of butchered bighorn sheep, bison, and canid (although not specifically identified as dog, coyote, wolf, or hybrid), and ceramics, with over 51,000 cultural items recovered.

The Helen Lookingbill site, a high altitude open camp in the Absaroka Mountains south-east of YNP, appears to be a summer occupation hunting camp with cultural materials ranging from the Paleoindian to the Late Holocene, indicating a long

sequence of seasonal use. The site contains an important array of lithic tools, including what may be one of the oldest examples of a projectile point thought to be a Haskett point (Frison, Schwab, et al. 1996). Haskett points are large lanceolate points similar in form to Agate Basin and Hell Gap points (Ireland 1983). Additionally, the Lookingbill site provided a large sample of Early Plains, side-notched projectile points (Larson 1997a), Late Paleoindian tool types such as graters and spurred end scrapers retained into the Early Archaic (Frison 1983); and tools that display a noticeable decline in the quality of lithic technology towards the end of the Archaic period (Frison, Schwab, et al. 1996). The Lookingbill site also produced many distinctive yet unnamed “fishtail” points, dated to 8,000 years ago and similar to fishtail points found in the lowest occupation levels at Mummy Cave. Fishtail points have been recently recovered in locations along the Yellowstone River (Sanders 2000b, 2001a). The site also provides a well-developed array of simple grinding tools (Frison 1991) likely indicating increased reliance on plant foods.

Located in a cluster on both sides of the Wyoming-Montana border east of YNP, the Bighorn Canyon cave sites provide radiocarbon dates of occupation ranging from 8,600 to 1,000 years ago. The limited number of projectile points included some with parallel oblique and transverse flaking and rounded bases, similar to projectile points found in the Paleoindian levels of the Myers-Hindman site in Montana (Frison 1991), as well as surface finds in YNP (Taylor, et al. 1964). A good sample of grinding tools (Husted 1969) was recovered from the cave sites indicating probable habitation rather than a special use site.

South of YNP, the Jackson Lake sites (including the Lawrence site), although inundated by the 1906 construction of a dam on the outlet of the lake to raise the water level, provide significant information towards understanding native use of lakeshore habitats through time. Dam repairs, coupled with drought between 1984 and 1988, allowed archeologists to survey the shores, recording 109 new sites and testing or mitigating 23 sites (Conner 1998). Data retrieved from archeological investigations provide evidence of a sequence of seasonal use, beginning with sparse evidence of Clovis occupations. The use of the Jackson Hole area increased during the Late Paleoindian time, with 25 Cody knives collected privately and by NPS archeologists from the Lawrence lakeshore site. A Cody knife from a site on Emma Matilda Lake, north of Jackson Lake, was analyzed, producing a chemical print similar to Obsidian Cliff (Wright 1975). Although the Early Archaic is not well represented in the Jackson Lake area, the Middle period McKean complex is archeologically visible both in terms of diagnostic projectile points and plant processing technologies. Late Archaic cultures are well represented on the Snake River delta on the north end of Jackson Lake, with projectile points that resemble the Elko and the Pelican Lake complexes. Similar to YNP, bison kill sites characteristic of Paleoindian, Middle Archaic McKean, and Late Archaic complexes are not present in Jackson Hole (Conner 1998).

Recent archeological work associated with several Federal Highway Administration road projects provides archeological evidence that sites south of Grand Teton, located on the Wilson-Fall Creek Road, were occupied from terminal Pleistocene throughout the entire Holocene epoch. Campsites include large lithic

procurement areas where local obsidians were quarried and reduced, with large quantities of biface reduction debris. The multi-component sites provide evidence of some short-term use, although lithic assemblages indicate longer occupations with buried fire-cracked rock concentrations. Geochemical analysis of obsidian tools indicate Yellowstone National Park sources, Idaho sources, and a heavy reliance on local obsidians (Cannon, et al. 2001). Archeological inventory and site testing along the Cody-to-East Entrance Road, past Mummy Cave, have documented numerous sites that may be able to contribute to a regional view of settlement and subsistence patterns (Eakin 1993).

The greater Yellowstone ecosystem includes the adjacent mountains and basins of Wyoming and the Jackson Hole/Grand Teton area. Current archeological evidence indicates that humans occupied portions of the region during spring, summer, fall, and winter, and throughout all of the time periods identified for the Northwestern Plains, spanning close to 11,000 years (Miller and Sanders 2000).

TO THE NORTH AND WEST (MONTANA)

To the north and west of YNP is a rich array of precontact archeological sites providing evidence of human use from the Clovis period (approximately 11,700 – 10,500 years ago) to the ethnographic present. The Anzick site, about 130 km (80 miles) due north of YNP, was discovered in 1968 and is the first, and to date only, Clovis burial found in North America. The site was disturbed by construction activity, with subsequent archeological investigations not well documented. The site contained human skeletal remains, bone foreshafts, and flaked stone artifacts, including eight fluted Clovis points, 70 bifaces, end and side scrapers, and flake

tools, all coated with red ochre. Bone fragments were radiocarbon dated using accelerated mass spectrometry (AMS) to 10,680 years before present. The flaked stone tools are made of chalcedony (39), moss-agate (30), and porcellanite (1), and appear to have been produced from raw material from at least three separate source areas in Montana and Wyoming (Bonnichsen and Jones 1998). The Clovis assemblage did not include obsidian. Pleistocene mammal bones are presently eroding out of the creek bank (Larry Lahren, personal comm. 2000), and another human burial was recovered from a nearby creek-side location dated over 8,000 years ago (Taylor 1969; Wilke, et al. 1991), and what appears to be a bison jump in the vicinity indicate human use of the area through time.

The Mill Iron site in eastern Montana is an excellent example of a Goshen Paleoindian bison kill, and is radiocarbon dated between Clovis and Folsom to occupations more than 11,000 year ago. Projectile points recovered from this site are technologically very similar to Folsom points although they lack the distinctive dorsal fluting, and closely resemble Plainview points (Frison 1996). Recent excavations on the shores of Yellowstone Lake recovered a Plainview-like projectile point under a Cody Complex occupation layer (Davis, personal comm. 2001). Other Goshen/Plainview occupations have been identified at the Hell Gap site south of YNP (Frison 1996).

Excavations at Pictograph Cave revealed occupations from Late Paleoindian to historic times, providing the foundations for the first cultural chronology of the Northwestern Plains. Located near the Yellowstone River 242 km (150 miles) east of YNP, the extensive array of material remains from the dry rock shelters and

surrounding Empty Gulch area were excavated by Works Progress Administration employees in the late 1930s and 1940s. The stratified sequences from Pictograph and Ghost Caves were compared with other stratified and unstratified sites in the region to develop a regional analysis of sequential cultural horizons markers (Mulloy 1958). The projectile point attributes, and other elements of material culture that constituted the broad horizon markers indicating cultural change identified in the 1950s are still appropriate to current cultural chronology (Frison 1991; Frison and Mainfort 1996).

The Myers-Hindman site, located a few miles east of Livingston, Montana, and 85 km (53 miles) north of YNP, is a stratified site with seven occupations, beginning 9,000 years ago through 700 years before present, in a well dated context (Lahren 1976). The site contains projectile points similar in style and technology to Bighorn Canyon (Frison 1991) east of YNP. The Scottsbluff component contained butchered remains of bison, deer, elk, bighorn sheep and canids. A McKean component dated between 3,100 and 3,500 years ago contains McKean lanceolate, Duncan, and Hanna points, along with a wide array of faunal remains from large and small game (Frison, Schwab, et al. 1996). The site provides radiocarbon dates for changes in projectile point style and form, provides evidence of year-round occupation, and shows occupation through the warm dry period known as the Altithermal.

Three important Paleoindian sites are located in Montana's southern mountain ranges northwest of YNP. Barton Gulch, located about 80 km (50 miles) from the West Entrance of YNP, has dated Paleoindian occupations starting 9,400 years ago, with diagnostic small-to-medium lanceolate projectile points and larger lanceolate,

indented-based Metzall points. The spring-to-fall campsite provided an array of butchered deer, cottontail, and porcupine bones. Abundant oven features indicated processing of plant food including prickly pear cactus, goosefoot, sunflowers, pine, and chokecherries. Numerous flaked stone tools, including performs, perforators, and shaft abraders suggest re-tooling. Eyed needles and awls of bone were also recovered from the earliest occupation levels (Davis 1998). The MacHaffie site, located on Prickly Pear Creek in the Elkhorn Mountains of Montana 280 km (175 miles) from YNP provides dated occupations from the Paleoindian (Folsom and Scottsbluff) period, Middle and Late Plains Archaic (Bitterroot and Pelican Lake) period, to the Late Prehistoric period. The site is close to chert outcrops, and faunal remains indicate use of bison, deer, wolf, and rabbit (Davis 1997). About 30 km (19 miles) east of the MacHaffie site, the Indian Creek site contains evidence of 28 occupations in deeply stratified cultural deposits, the earliest of which is a Folsom component radiocarbon dated to around 10,980 years before present (Davis and Greiser 1992). The site, occupied from spring to autumn intermittently over 8,000 years, demonstrates broad based resource utilization with bison, deer, pronghorn, marmot, rabbit, prairie dog, and vole present. Most important, although sparsely represented, obsidian from earliest occupations of the site was sourced to Obsidian Cliff (Davis, et al. 1995). Between the MacHaffie site and YNP, where the Madison, Gallatin, and Jefferson Rivers join to form the Missouri, is the Schmidt Quarry site. Between 3,300 and 1,600 years ago, Pelican Lake peoples quarried into the limestone deposits to get silicified chert (Frison, Schwab, et al. 1996).

The 1992-93 Flying D Ranch Archeological project provided a multidisciplinary approach to the study and interpretation of early peoples' use of the high altitude areas adjacent to YNP. The study encompassed a 130,000-acre area 60 miles (97 km) northwest of YNP, and focused on plant and lithic resources, and travel routes. Project goals included development of a regional paleoenvironmental model, documentation of biotic resources, inventory of prehistoric archeological sites, of which 168 sites were documented, and investigation into the significance of lithic resources in prehistoric use of the area. The results indicate long term, extensive, and intensive use of upland areas in hunter-gatherer adaptations through time (Baumler, et al. 1996).

The 1966 archeological inventory of the upper Yellowstone River drainage directly north of YNP identified broad precontact settlement patterns and documented several important sites. Archeological evidence for a variety of landscape and resource uses included open occupation sites; clusters of domestic stone circles; numerous bison drives and jumps; stone alignments; pictographs; and cave burial sites, all seven of which had been disturbed to some degree by looters. Of the two bison jump sites investigated, the Emigrant site consisted of two distinct drive line and jump areas, and was previously documented in 1932 by Barnum Brown, at which time the site had been impacted by collectors. The Conlin jump site and associated cluster of domestic stone circles was impacted by gold dredging operations (Arthur 1966), similar to the Barton Gulch and Indian Creek sites. These bison jump sites are examples of numerous similar features in the adjacent Gallatin, Madison, and Jefferson River drainages, the Madison Bison Jump and the Antonson

site having been well documented. Neither bison drives and jumps, clusters of domestic stone circles, cave burials, nor pictographs have been documented in YNP.

The Carbella site, located at the confluence of Rock Creek and the Yellowstone River 32 km (20 miles) north of YNP, provided significant evidence of long-term use as a base camp/processing area. Paleoindian lanceolate points with parallel oblique flaking patterns were recovered from the site. Excavations revealed an extensive McKean complex with lanceolate, Duncan, and Hanna points all well represented. Besant and Pelican Lake points, as well as later, triangular side-notched arrow points, were also recovered during excavation of the site. Bifacial blades, side and end scrapers, perforators, and edge ground tanning stones recovered from this site indicate domestic activities. Faunal remains from the site consisted of deer, elk, antelope, and bison (Arthur 1966). A few miles south of Carbella, the Rigler Bluffs site, an open occupation site with a stone lined hearth feature, provided radiocarbon dates of 4,900-5,000 years before present (Frison 1991). An exotic species of Pacific Yew wood, no longer present east of the continental divide, was identified from charcoal recovered from the site (Haines 1966). Chipped stone artifacts from Rigler Bluffs include obsidian Hanna points and a thumb scraper. The Eagle Creek site, on the north side of the Yellowstone River adjacent to YNP, appears to have been an extensive stratified campsite. Residents of Gardiner have long used it as a source of garden topsoil, causing severe impacts. However, excavations revealed a stone lined hearth feature and McKean complex projectile points. The upper component of the four stratified occupation zones yielded a radiocarbon date of 1,260 years before

present, with sherds of pottery resembling Intermountain ware existing near the surface (Arthur 1966).

In the 1960s, a project researching high altitude aboriginal occupations north of YNP identified 23 sites above 9,000 feet known by private collectors, dude ranchers, U.S. Forest Service, and State Fish and Game personnel. Diagnostic chipped stone tools from the Paleoindian period (later authenticated by Marie Wormington, Denver Museum of Natural History), McKean complex, and Pelican Lake points provided evidence of early and extended use of the mountainous areas surrounding YNP (Haines 1964).

LOOKING WEST TO IDAHO

The headwaters of the Snake River provided a transportation corridor for the southern regions of Yellowstone National Park. Due west of the park, the Snake River drainage and Snake River Plain of Idaho have a history of human use, with archeological remains dating from Paleoindian times to recent times. The area is considered to be part of both the Great Basin and Columbia Plateau culture areas. As Butler states in the archeological overview of the area in *The Handbook of North American Indians*;

The cultural Great Basin extends beyond the physiographic Great Basin and portions of other physiographic provinces, such as the Columbia Plateau and the Rocky Mountains. The Upper Snake and Salmon River region serves as a natural corridor linking the northwestern Plains with the Intermontane area, a geographic position clearly reflected in the region's shifting cultural affiliations with the adjoining areas through time (Butler 1986).

The southeastern margins of the Columbia Plateau culture area extend to Island Park and the Henry's Fork drainage of the Snake River, directly adjacent to YNP (Roll

and Hackenberger 1998). Precontact sites include archeological remains of cultures using river corridor settlement patterns and a diverse subsistence base, often indistinguishable from other cultures using only chipped stone artifact comparisons. In this and other regions associated with YNP, a wide range of large to medium sized corner-notched or corner-removed projectile points mark the terminal Late Middle Period (around 5,000 years ago), as evidenced by the Elko series in the Great Basin, Pelican Lake on the Northwestern Plains, and variably named corner-notched points from Southern Idaho and the Plateau area (Roll and Hackenberger 1998). Butler (1986) associated the Snake River drainage as a unique area within the Intermontane area, connected as much to the northwestern Plains as to the Great Basin.

Regionally significant sites west of YNP include Owl (Wasden) Cave, where Folsom points were recovered in association with Pleistocene megafauna with radiocarbon dates nearly 11,000 years old. Occupation of the cave continued through the Pleistocene-Holocene transition, evidenced by seasonally patterned, planned communal kills of *Bison antiquus* (Butler 1986). It has been suggested that bones of the extinct species in Owl Caves be re-radiocarbon tested using new techniques isolating individual amino acids to acquire more precise dating (Hofman and Graham 1998).

Veratic Cave, on the Birch Creek drainage in the north portion of the Snake River Plain, contains evidence of occupations from the Late Paleoindian Plano period to Archaic Bitterroot phase occupations, with large side-notched projectile point types. On the western side of Idaho along the Snake River drainage beginning around 4,300 years ago, semi-subterranean pit houses were being built. Pit houses dating around

2,000 years old in the same area appear to be used seasonally, and are associated with Elko eared projectile points, small game, and river mussel subsistence practices.

Although researchers have found no evidence of pit houses on the Upper Snake River area (Butler 1986), researchers have identified several probable late period house pit sites in the Challis and Salmon, Idaho area. It has been suggested that these were principal winter occupations, with people using the valleys to the east for seasonal (spring to fall) hunting and gathering camps (Swanson, et al. 1969). Identification of Yellowstone obsidian in these sites suggests late period peoples were entering the Yellowstone Plateau using the Upper Snake River drainage (Swanson 1972).

The precontact history of YNP is best understood when related to other sites within the region and evidence of cultural development compared with regional trends. Thus far, the archeological record for YNP provides no indication that a single or unique culture developed in place throughout time in YNP. Instead, precontact use of Yellowstone is associated with broad patterns of regional cultural development. Regionally, there are a number of significant sites with archeological evidence of year-round occupation and use from Paleoindian through Late Prehistoric times, although the record of use is most often intermittent.

VI. CULTURE HISTORY

The precontact chronology of the Yellowstone River corridor and Yellowstone Lake presented here (Figure 4) is not unique to that area, may be applied to the general Yellowstone region, and is similarly demonstrated in other high altitude areas of the Northwestern Plains. As previously discussed in “Geographic Setting,” prior to 12,000-years ago the area was covered with a thick mantle of ice that began melting as the climate began warming around 14,000-years ago. While recent advances in geochronologic dating methods provide fine-tuned chronologies applicable to specific areas and resource uses, a very broad scheme is used here reflecting ecological and technological changes that marked evolving adaptations on a wide regional scale. Many of the adaptive strategies are time-transgressive, such as the increasing use of plant foods, and technological change (such as the advent of the bow and arrow or pottery) not easily isolated to a specific date.

PERIOD I. TERMINAL PLEISTOCENE PALEOINDIAN (12,000 to 8,001 years before present [BP])

CLIMATE

The modern climate in Yellowstone is severe, with the mean annual temperatures less than 1 degree Celsius and deep snowfall that covers the ground at least half the year. At the end of the glacial period in Yellowstone the climate was about 5-6 degrees Celsius cooler than the modern climate. Three things were of particular importance during the glacial-to-modern transition: 1) the direct effect of the massive ice sheets on temperature, 2) the latitude of the jet stream (around the sizeable continental ice sheet), and 3) the amplitude of solar radiation, which was greater between 12,000 to 6,000 years before present due to the tilt of the Earth’s axis and

CULTURAL CHRONOLOGY AND ENVIRONMENT

Years/BP	Climate	Flora/Fauna	Cultural Complexes
PERIOD 1 - TERMINAL PLEISTOCENE PALEOINDIAN			
12,000 - 8,000	5-6 degrees colder Glaciers melting River & Lake high Wet-Younger Dryas	Mammoth, large bison, camels, deer, mountain sheep	Spear points, small mobile bands, highly crafted tools
11,700 -10,900			Clovis
11,000 -10,500			Folsom
10,500 -10,000			Agate Basin
10,000 - 9,500			Hell Gap
9,500 - 8,500			Cody
9,500 - 8,000			Terminal Paleoindian
PERIOD 2 - EARLY HOLOCENE			
8,001 - 5,000	hotter, dryer Altithermal (3,000-4,000 yr. hot spell)	Megafauna extinct bears, trout Limited plants on rhyolite soils	Large spear and atlatl points, first grinding tools & stone filled hearths
7,600 - 5,000			Large S-N & C-N pts
7,500 - 4,500			Pahaska, Blackwater, & Hawken
8,000 - 5,000			Bitterroot(Elko-eared)
PERIOD 3 - MIDDLE HOLOCENE			
5,001 - 1,500	Moister & cooler Increased seasonal variations	Modern species of plants and animals	Dart points, diversified food sources, stone circles, roasting pits
5,000 - 3,000			Oxbow
5,000 - 1,500			McKean
3,000 - 1,500			Pelican Lake
PERIOD 4 - LATE HOLOCENE			
1,501 - 500	Modern Climate	Contemporary plants & animals	Bow and arrow, pottery, slab-lined roasting pits
1,800 - 800			Avonlea
1,200 - 500			Rose Springs/Uinta
1,200 - 500			Old Women's

Figure 4. Cultural Chronology and Environment

the occurrence of perihelion in summer (Whitlock 1993). Precipitation is strongly related to altitude and prevailing winds (Pierce 1979).

The Pinedale Glaciation is a large icecap that likely depleted the region of vegetation. Pollen records from pond sites near the Yellowstone River, combined with radiocarbon dates and dates derived from volcanic ash (tephrochronology), suggest that tundra-like communities were present from the earliest stages of ice retreat around 12,800 years ago (Whitlock and Bartlein 1991). Whitlock (1993) provides an in-depth study of Yellowstone's post-glacial climate and resultant vegetation. Pollen records indicate that deglaciation of the region occurred between 12,000 and 14,000 years ago. The distribution and subsequent changes in vegetation were a response to large-scale changes in the region's climate.

FLORA AND FAUNA

Alpine meadow communities appeared in areas with andesitic or nonvolcanic soils soon after the glaciers melted. By 11,000 years ago, spruce, pine, and fir species were established in the middle and high elevations, and increased their proportions between 10,000 and 9,000 years ago.

As the glacial ice retreated, conifer forests and tundra grassland communities with stunted sagebrush (*Artemisia*) and dwarf willows (*Salix*) began to colonize Yellowstone as pollens migrated from the nearby communities just south of the ice lobes (Whitlock 1993). Fossil pollen records, along with radiocarbon dates and tephra (volcanic ash) dates, indicate that the earliest alpine meadow communities to re-establish in Yellowstone included bog birch (*Betula glandulosa*) and common

juniper (*Juniperus communis*). Between 11,500 and 10,500 years BP (the same time archeological evidence places the first humans on the scene) the first fir (*Abies*), spruce (*Picea*), and whitebark pine (*Pinus albicaulis*) were becoming re-established on the andesitic and nonvolcanic soils. The rhyolitic soils would remain treeless and barren for much longer. Pollens from this period also indicate a high percentage of sagebrush (*Artemisia*), with smaller percentages of grasses (*Gramineae*) and sedges (*Cyperaceae*). Also appearing at this time are trace amounts of herb pollens.

Between 10,000 and 9,500 years BP, lodgepole pine (*Pinus contorta*) began to grow, and between 9,500 and 5,000 year BP, Douglas-fir (*Pseudotsuga menziesii*), cottonwood (*Populus trichocarpa*), poplar (*Populus balsamifera*), and quaking aspen (*Populus tremuloides*) created mixed forests.

Pollen samples taken from Cygnet Lake Fen, near the Yellowstone River, Buckbean Fen on the Southeast Arm of Yellowstone Lake, and Cub Creek Pond, just east of Yellowstone Lake, provide a record of the establishment of shrubs, herbs, and aquatic grasses. Grasses, sedges, and sagebrush established plant populations as the glaciers retreated, and remain represented into the modern record. The pollen record of shrubs in the rose family (*Rosaceae*) and buffaloberry (*Shepherdia canadensis*), and herbs including valerian (*Valeriana*), cattail (*Typha latifolia*), burreed (*Sparganium angustifolium*), dock (*Rumex*), pondweed (*Potamogeton*), bistort (*Polygonum bistortoides*), buckwheat (*Eriogonum*), and members of the mustard family (*Cruciferae*) are represented intermittently throughout the record (Whitlock 1993). This suggests that human reliance on plant food was also intermittent throughout the last 11,000 years.

Trout that had colonized the Snake River and Jackson Lake during Yellowstone's glacial period began to move upstream, into the headwaters of the Yellowstone River, likely via Two Ocean Creek into ancestral Yellowstone Lake, and on down the Yellowstone River. Due to the repeated lava flows, Yellowstone has over 200 waterfalls that pose barriers to fish migration, inhibiting rapid re-colonization of the greater Yellowstone area. Native species of fish are trout (*Oncorhynchus clarki*), arctic grayling (*Thymallus arctus*), mountain whitefish (*Prosopium williamsoni*), suckers (*Catostomus*), mottled sculpin (*Cottus bairdi*), redbelt shiner (*Richardsonius balteatus*), Utah chub (*Gila atraria*), and dace (*Rhinichthys*). Trout and dace were the first species to migrate into postglacial Yellowstone (Varley and Schullery 1998).

Following the re-established plant communities, Pleistocene animals inhabiting the areas south of the continental ice sheet migrated into the Yellowstone area. Remains of various species have been found in Montana and Wyoming, and evidence of all except horse and muskox have been found in archeological contexts. The Pleistocene species include mammoth (*Mammuthus*), camel (*Camelops*), mountain deer (*Navahoceros fricki*), mountain sheep (*Ovis canadensis*), bison (*Bison antiquus* and *Bison occidentalis*), flatheaded peccary (*Platygonus compressus*), muskox (*Symbos*), and horse (*Equus*) (Walker 1990). Pleistocene animals such as dire wolves, elk, and cats are also thought to have occupied the area. Humans, grizzly and black bears (*Ursus arctos horribilis* and *Ursus americanus*) migrated into the area about the same time, and beaver arrived in Yellowstone about 10,000 years ago (Good and Pierce 1996). Other species of archeological interest migrating into

the Yellowstone area include elk (*Cervus canadensis*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), mountain lion (*Felis concolor*), wolf (*Canis lupus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), beaver (*Castor canadensis*), weasel (*Mustela*), wolverine (*Galeo luscus*), marmot (*Marmota flaviventris*), rabbit (*Sylvilagus*), squirrel (*Spermophilus*), and various members of the Order Rodentia (rodents).

TERMINAL PLEISTOCENE ENVIRONMENT AND CULTURAL CHRONOLOGY

The earliest visitors arrived in Yellowstone during a dynamic and dramatic time of environmental and ecological change. Until around 8,000 years ago, the glaciers were retreating, but still present in the high mountain valleys, glacial melt was swelling streams and rivers, raising lake levels (Pierce 1979); hydrothermal areas were reacting, sometimes violently, to the release of the ice pressure (Richmond 1977); grasses were re-colonizing the area and attracting Pleistocene fauna; and fish were making their way upstream from Jackson Lake, over the continental divide, down to Yellowstone Lake and points north (Varley and Schullery 1998). The modern forests were not yet fully established, especially in the rhyolitic volcanic soils (Whitlock 1993) leaving the viewshed open with the thermal areas more visible than they are today. As a result of the recent glacial outwash floods, the Yellowstone River was down-cutting, creating some sheltered areas along the turbulent waters, the colorful canyons in full display, waterfalls presenting substantial impediments to travel along the river corridors. Given the number of Paleoindian sites currently known on the shores and terraces, Yellowstone Lake must have been as appealing then as it is now.

Yellowstone presents a unique set of circumstances, but regionally, Paleoindian peoples encountered similar environmental conditions consisting of plant communities that have no parallels today, glacial ice and associated water bodies, and a range of fauna that included species such as now extinct mammoth, horse, camel, and bison (Kay 1998; Wright 1985). The postglacial environment of the Northern Plains is not well understood due to the lack of organic material surviving from that time. Deflation and desiccation of sedimentary records, degraded pollens, and environmental changes that are both time-transgressive and unique to an area provide challenges to paleoenvironmental reconstructions (Frison and Mainfort 1996). For instance, the extent to which local implications of the Younger Dryas, a global cooling 11,500 to 10,750 years ago, affected people living in the Northern Plains and the Yellowstone region is still largely unknown (Kay 1998).

In Yellowstone Park and most of the Northern Plains, very little is known about site structure, dwellings, group organization, inter-group relationships, mobility and subsistence patterns, and mortuary practices (Hofman and Graham 1998). The elements of Paleoindian life that are widely accepted is that they were small, mobile bands leaving evidence of short-term habitation, and although they were considered big game hunters, they were oriented to a broad spectrum of hunting and gathering (Butler 1986; Chatters and Pokotylo 1998; Frison 2001; Frison, Toom, et al. 1996; Stanford and Day 1992).

The dynamic environmental and ecological change that resulted in the extinction of some species and the change of habitats caused significant change in how early people used the high altitude areas of the Northwestern Plains, with some strategies

never to be used again (Hofman and Graham 1998). The Terminal Pleistocene Paleoindian period in Yellowstone (about 12,000 to 8,000 years ago) was ushered in by the retreat of the glaciers and increased average annual temperature; environmental changes causing habitat changes requiring adaptive change in human use of the area.

CLOVIS COMPLEX

Although earlier human occupation of the region is possible, the earliest known occupation in the Yellowstone region is the Clovis culture, radiocarbon dated from 11,500 to 10,900 years ago. It was initially thought that Clovis people subsisted almost entirely on Pleistocene megafauna, but continent-wide studies indicate use of a wide array of small animals and plant species also (Frison, Toom, et al. 1996). Evidence of Clovis occupation in Yellowstone has yet to be found, but significant Clovis sites are located regionally all around the park. For example, directly north there are the Anzick Clovis burial site (Lahren and Bonnicksen 1974; Taylor 1969) and a Clovis point found during the post office excavation less than 1/10 of a mile north of the park boundary (Janetski 2002). The Jackson Lake and Astoria Hot Springs Clovis sites are directly south of YNP (Conner 1998) and to the west in Idaho, there are the Simon Clovis Cache (Butler 1963), and the Fenn Cache (Frison 1991) sites from Wyoming. These strongly suggest that Clovis people passed through and possibly lived in the area.

FOLSOM COMPLEX

A similar circumstance is true of the Folsom cultural complex, with an obsidian point found in the Bridger-Teton forest south of Yellowstone sourced to Obsidian

Cliff (Cannon, et al. 1997). Folsom occupations date at approximately 10,800 to 10,300 years before present, and the culture is characterized by big game hunting, especially bison kill sites, although excavations at the Indian Creek (Davis and Greiser 1992) and MacHaffie (Davis 1997) sites in Montana indicate a much broader subsistence base. Other regional Folsom sites are the Wasden, Idaho site known as Owl Cave (Hofman and Graham 1998), where fluted Folsom points were found in association with mammoth, camel, and prehistoric bison; and the Agate Basin, Hell Gap, and Carter/Kerr-McGee sites in Wyoming (Frison, Toom, et al. 1996).

Associated with the Folsom complex are the technologically similar but unfluted Goshen, Midland, and Plainview points. The Mill Iron site in eastern Montana provides evidence of Goshen occupations 11,000 years ago (Frison 1996), and a Goshen component was recovered below the Folsom level at the Hell Gap site in eastern Wyoming (Irwin-Williams, et al. 1973). Technologically, Plainview and Midland points are inseparable from Goshen, and all are technologically and chronologically related to Folsom points (Frison, Toom, et al. 1996; Hofman and Graham 1998).

A Midland component is recognized at the Hanson site just east of YNP, and a Plainview obsidian point, geochemically similar to stone from Obsidian Cliff, was recently recovered during archeological excavations on the shores of Yellowstone Lake (Hughes 2003a, b). Although the evidence is limited at present, there is evidence that Folsom complex peoples were familiar with the landscape and resources of YNP.

AGATE BASIN COMPLEX

Agate Basin cultural complex occupations have been radiocarbon dated to 10,500 to around 10,000 years before present at the Brewster and Agate Basin sites in Wyoming and the Frazier site in Colorado. They are characterized by distinctive long, narrow, finely crafted, straight-based lanceolate projectile points with thick lenticular cross sections (Frison 1991). Sites with excavated Agate Basin components are located in Montana and Wyoming (Frison, Toom, et al. 1996). Cascade points, found in the Eastern Plateau extending into Montana, have morphological similarities to Agate Basin points (McLeod and Melton 1986), and due to their generalized lanceolate shape and wide range of intra-type variation indicate similarities with early period bifaces (Roll and Hackenberger 1998).

Archeological investigations of YNP in 1958 - 1959 identified two Agate Basin points in the Mammoth Museum (Taylor, et al. 1964), one collected from Alum Creek, a drainage of the Yellowstone River, another collected in the Fishing Bridge area at the outlet of Yellowstone Lake. Pedestrian inventory recovered two Agate Basin-like points from Yellowstone Lake shore sites at Fishing Bridge and Pumice Point (Taylor, et al. 1964). All of the Agate Basin projectile points collected in YNP were surface finds with no subsequent excavation, therefore little more than their presence in YNP is known about these ancient visitors.

HELL GAP COMPLEX

Hell Gap points, included with Agate Basin points in the Plano Complex of unfluted lanceolate Paleoindian points, are described as distinctively shouldered with a broad point that tapers to a straight or slightly concave base with medial flaking patterns that result in a lenticular cross section (Hofman and Graham 1998). The

points were commonly reworked, and radiocarbon dates at Wyoming sites indicate occupation from 10,000 to 9,500 years ago (Frison 1991).

The 1958-59 survey recovered four Hell Gap points from the surface; three 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).

The Indian Creek (west-central Montana) lithic tool material analyzed as geochemically similar to Obsidian Cliff (Davis and Greiser 1992) provides additional evidence of Hell Gap cultural occupation of Yellowstone. Again, only limited information is known about these early peoples' use of Yellowstone, since no excavation was conducted to investigate the nature of these occupations.

CODY COMPLEX

Excavation of Cody Complex occupations along the shores of Yellowstone Lake offers the first opportunity to gain substantive information about Paleoindian use of YNP. Prior to subsurface investigations, the 1958-59 inventory recovered a Cody knife from the south shore of the West Thumb portion of Yellowstone Lake. 1989 excavations on the Fishing Bridge peninsula (Reeve 1989) recovered a Cody Complex lanceolate (Scottsbluff) projectile point.

In anticipation of road reconstruction, the Midwest Archeological Center (MWAC) of the National Park Service conducted surface collections and subsurface testing of the Fishing Bridge area in 1992. Three Cody Complex tools were recovered, including a Cody knife and portions of two stemmed projectile points.

Blood residue analysis on one of the points suggested 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 Cody knives, and diagnostic portions of Eden and Scottsbluff projectile points. Subsequent testing identified a possible older Plainview occupation below the Cody level. Obsidian analysis of the Cody complex tools revealed chemical components similar to Obsidian Cliff and other sources in YNP; and similar to obsidian from Bear Gulch, Idaho. Blood residue analysis provided evidence of rabbit, dog, deer, and sheep. Shortt and Davis (2002) classified the stone artifacts as shaft abraders, perforators, a hide abrader, core, biface knives, gravers, hammerstone, and choppers. These tools suggested production of hunting tools and domestic activities in the open-air camp, radiocarbon dated to 9,360 years before present. This site, along with several other Paleoindian sites in the vicinity, are currently being eroded by wave action and rising lake levels due to buildup of the volcanic magma chamber under the lake. Underwater survey of the submerged shoreline, conducted by Wichita State University, produced numerous water-worn paleoindian artifacts (Shortt and Davis 2002).

TERMINAL PALEOINDIAN

Several diagnostic types of projectile points provide evidence of Terminal Paleoindian occupations in Yellowstone, commonly termed regionally as the Foothill-Mountain Late Paleoindian Tradition (Frison 1991; Hofman and Graham 1998). Round-based and split-base points (also referred to as “fishtail”), similar to those found at Medicine Lodge Creek (Frison 1991), the Lookingbill site (Frison,

Toom, et al. 1996), Mummy Cave (McCracken, et al. 1978), and on the ground surface east of YNP were recovered from YNP by Norris (1882); along the Yellowstone River (Taylor, et al. 1964); and in 1999 along the Yellowstone River (Sanders 2000b).

Pryor Stemmed, Lovell Constricted, and other parallel oblique flaked lanceolate points suggesting Paleoindian use of higher elevation sites (Frison 1991; Husted 1969; Lahren 1976; McCracken, et al. 1978) are also present on the banks of the Yellowstone River and along the shores of Yellowstone Lake (Cannon, et al. 1994; Sanders 2000b; Shortt and Davis 1998, 2002; Taylor, et al. 1964).

PERIOD II. EARLY HOLOCENE (8,000 to 5,001 years before present)

CLIMATE, FLORA, AND FAUNA

The early to mid-Holocene was a dynamic period of climate change characterized by rapid transitions between dry and moist intervals (Frison and Mainfort 1996; Varley and Schullery 1998). A period of increased aridity and warm weather around 8,000 years ago, indicated by warm weather adapted plants, marked the beginning of a period known regionally as the Altithermal. Pollen sites in YNP suggest maximum dryness after 7,000 years before present, and further evidence of dry conditions between 9,240 and 5,390 years ago is provided in the sedimentary record of Buckbean Fen near the Yellowstone River (Whitlock 1993).

The warm arid conditions brought on by the Altithermal may have started prior to 7,500 years ago with Yellowstone's modern climate developing around 1,500 years ago. Environmental changes altered local ecologies, but existing biotic zones did not disappear during the warmer, drier Altithermal; they simply shifted locations.

Regional variability in climate and unpredictable, year-to-year fluctuations of various magnitude also affected subsistence strategies and necessitated adaptive change for the park's early visitors. Therefore, sweeping generalizations about climatic conditions in the formation of theories about past human lifeways should be avoided (Frison and Mainfort 1996).

Throughout the Early Holocene, Douglas-fir (*Pseudotsuga menziesii*), cottonwood (*Populus trichocarpa*), poplar (*Populus balsamifera*), and quaking aspen (*Populus tremuloides*) began to grow, creating mixed forests. The shrubs, herbs, and grasses re-established in the Terminal Pleistocene increased their distributions and ranges (Whitlock 1993).

Pleistocene mammal species had become extinct and modern species such as elk (*Cervus canadensis*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), mountain lion (*Felis concolor*), wolf (*Canis lupus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), beaver (*Castor canadensis*), weasel (*Mustela*), wolverine (*Galeo luscus*), marmot (*Marmota flaviventris*), rabbit (*Sylvilagus*), squirrel (*Spermophilus*), and various members of the Order Rodentia (rodents) were increasing their numbers (Good and Pierce 1996). The changing climate, with increased seasonal fluctuations in temperature, produced diverse resource availability and subsequently diverse human adaptation to these changes.

EARLY HOLOCENE ENVIRONMENT AND CULTURAL CHRONOLOGY

This time period is characterized by both continuity and change. Archeological evidence from the region indicates broad based subsistence and small group mobility patterns similar to the Terminal Paleoindian period. Diagnostic elements of the

Early Holocene, such as grinding tools and stone filled roasting pits first appear in the Late Paleoindian and increase in frequency during the Early Holocene (Frison, Toom, et al. 1996; Hofman 1997).

Regionally, people seem to increase their dependence on plant foods and small game such as marmots, grouse, and rabbit; they looked more to use local sources to make lithic tools and there is a noticeable decline in the quality of lithic technology, as documented in Mummy Cave (Frison and Mainfort 1996; Larson 1997b). As the climate became more arid, people concentrated their activities around areas with permanent water (as did the other animals.) Pit houses and cave habitation sites suggesting continuity of use, although seasonally intermittent, beginning in the Early Holocene have been found in areas adjacent to YNP but not in Yellowstone (Butler 1986; Frison 1991). People began to use bison jumps about the same time around Yellowstone and on the grasslands (Reeves 1978), but none have been identified in Yellowstone.

Few archeological assemblages date to this period consequently it remains unexplained. Due to the absence of dated archeological sites, it was thought that the population declined in the Early Holocene. But the lack of site visibility may partially reflect a sedimentary history of erosion and deposition during the drier climates (Albanese 1978). For example, sites along waterways are subject to erosion from river down-cutting, wind and waves damage lake shorelines. Upland sites may become deeply buried by landslides following the glacial retreat and slope-wash due to sparse vegetation on rhyolitic soils. Albanese notes the increase in alluvial floodplain sediments and colluvial deposits in the Early Holocene (Albanese 2000).

Larson and others believe mountain resources, such as found in YNP, were widely distributed in sparse patches, and ephemeral use may have left little archeological evidence (Larson 1997b). Another possibility is that early confusion concerning the lack of human occupation of the region in the Early Holocene is due to lack of archeological material in proper context, and more research is needed to better understand this period of unique changes (Frison 1991). The changing, unpredictable environment required flexibility in settlement and subsistence patterns where both foraging and collecting strategies could be pursued from residential bases in surrounding areas (Larson 1997b). There is an increase in the number of dated site assemblages around 6,500 to 5,000 years ago, (Frison, Schwab, et al. 1996). Around 5,000 years ago, the climate returned to more moderate (modern) conditions, and projectile point shape once again changed.

LARGE SIDE-NOTCHED AND CORNER-NOTCHED POINTS

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 large side notched points increased. These are named Pahaska and Blackwater Side-Notched points found at Mummy Cave (Husted and Edgar 2002); Hawken Side-Notched points found in Wyoming at the Lookingbill, Southsider Cave, and Laddie Creek sites (Frison 1991); and named Elko-Bitterroot Side-Notched points to the west (Swanson and Bryan 1964). Early Holocene side-notched projectile points are distinctive, but Early Holocene corner-notched points possess similarities to Middle Holocene corner-notched points. Bamforth (1997) and Larson (1997b) suggest that curation and reworking of projectile points during the Early Holocene altered

initially diagnostic forms. Frison postulates that Early Archaic (Early Holocene) projectile point forms were not recognized because they did not fit with other Early Holocene point types recovered regionally and suggest that point types from level 1 of Pictograph Cave be re-examined (Frison, Schwab, et al. 1996). Reeves (1973) suggests that the paucity of evidence of Early Holocene occupations may be partially due to non-recognition of artifact types in surface collections. A chronological sequence of Early Plains notched point types has been developed (Walker 1992) in hopes of separating Early Plains point types from later Besant forms present on the Canadian Plains. Projectile points from the Early Holocene are diversified, with attributes not clearly defined, leading to misidentification of these early points as Late Holocene (Buchner 1980; Frison, Schwab, et al. 1996; Gryba 1980; Larson 1997b; Reeves 1973; Roll and Hackenberger 1998).

PAHASKA, BLACKWATER, AND HAWKINS SIDE-NOTCHED COMPLEX

Side-notched points, diagnostic to the Early Holocene were recovered in association with radiocarbon dates in Mummy Cave. Husted and Edgar (2002) describe the medium-to-large projectile points with straight-to-concave lateral edges and straight-to-weakly concave bases as Pahaska Side-Notched. These points are similar to points found in numerous Idaho sites named Blackwater Side-Notched. Large side-notched projectile points from the Hawken site in Eastern Wyoming were found in association with radiocarbon dates of 6,400 years before present (Frison 1991) and display similarities in form to Pahaska and Blackwater Side-Notched points. Early Holocene side-notched points occur above Paleoindian components of

Wyoming sites with intact stratigraphy at Medicine Lodge Creek (Frison 1991) and the Lookingbill site (Frison 1983).

In the current archeological record for Yellowstone, Early Holocene sites are sparse, but present and projectile points have been recovered from several sites along the Yellowstone River. Recent road construction compliance archeological testing recovered early archaic side-notched projectile points in buried contexts along the shores of the Yellowstone River in Hayden Valley (Sanders 2000b, 2001a). A research program to inventory the Yellowstone River was initiated in 1996, and identified sites in the Black Canyon of the Yellowstone with diagnostic Paleoindian and Early Holocene projectile points (Shortt and Davis 1998).

Early Holocene sites have been recorded on the north shore of Yellowstone Lake, along the West Thumb area, and on the shoreline of the Southeast Arm. Caused by fluctuations in the volcanic magma chamber under the Lake, the ongoing uplift and backflooding of lakeshore terraces and the outlet of the Lake may have washed out some Early Holocene sites. Therefore it is possible that the Blackwater and Pahaska side-notched points identified in the West Thumb area are from secondary contexts. Analysis of Early Holocene points recovered from buried cultural levels indicate chemical composition suggesting an Obsidian Cliff source, and blood residue analysis suggest sheep (Cannon 1996). Multiple component sites on the shore of Southeast Arm provide evidence of Early Holocene occupation, with diagnostic projectile points as well as obsidian geochemically similar to obsidian from Packsaddle Creek, Idaho (Shortt, et al. 2001). Early Holocene obsidian points from

the West Thumb area indicate human use of a source located at Teton Pass, southwest of YNP (Shortt and Davis 2002).

BITTERROOT COMPLEX

In the southern Plateau region, around 7,800 years ago, large side-notched points named Northern Side-Notched and Bitterroot Side-Notched began to appear (Ames, et al. 1998) marking the terminal Cascade Phase of Paleoindian lanceolates. On the Eastern Plateau, around 8,200 years ago, the Bitterroot Side-Notched and Salmon River Side-Notched point varieties were recognized (Roll and Hackenberger 1998), although their similarity in form with other Early Holocene side-notched points was noted (Reeves 1969). The Bitterroot Complex is also identified on the Snake River Plain of the Northern Great Basin with large side-notched points, some with indented bases, appearing around 8,000 years ago and continue into the Middle Holocene period (Swanson 1972). Other side-notched points from the Early Holocene Basin locales are contemporaneous with Elko Corner-Notched, Elko Eared, and side-notched projectile points appearing in the archeological record around 7,000 years ago (Jennings 1986).

A Bitterroot component was recorded at the Myers-Hindman site along the Yellowstone River valley north of Yellowstone National Park (Lahren 1976). Large side-notched projectile points resembling Bitterroot points have been found in high altitude sites north of Jackson Lake and radiocarbon dated to the Early Holocene period. This area is one of the travel routes into the Yellowstone Plateau and suggests a seasonal use of the area similar to the Paleoindian period (Conner 1998). YNP inventory recovered early side-notched projectile points made of basalt,

chalcedony, and chert from surface areas, some of which were from the lakeshore (Taylor, et al. 1964).

Current investigation of buried sites along the north portions of the Yellowstone River indicate that the older, Early Holocene and Paleoindian components are often deeply buried. Lakeshore and riverbank erosion is exposing and eroding sites buried many thousands of years ago and may provide us an opportunity to re-assess use of Yellowstone's landscape and resources 8,000 to 5,000 years ago.

PERIOD III. MIDDLE HOLOCENE (5,000 years to 1,501 years before present)

CLIMATE, FLORA, AND FAUNA

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 – 4,000 year hot, dry spell, although Yellowstone was still subject to occasional drought cycles (Whitlock and Bartlein 1991). The return to cool, moist conditions facilitated the wider distribution of forest species, and in some portions of YNP the climate became even wetter in the Late Holocene, after 3,000 years ago. Fir (*Abies*), spruce (*Picea*), and whitebark pine (*Pinus albicaulis*) were established on the andesitic and nonvolcanic soils, creating mixed forests; lodgepole pine distributions were increasing on the rhyolitic soils after 5,000 years before present (Whitlock 1993). The shrubs, herbs, and grasses previously described also increased their proportions and distributions.

The list of mammals recovered from Lamar Cave deposits dating back 3,000 years before present include coyote, wolf, fox, lynx, weasel, otter, ermine, bear, elk, mule deer, pronghorn, bison, numerous rodents, and various insects (Hadley 1995).

Identifiable faunal remains recovered from Middle and Late Holocene archeological sites along the Yellowstone River include elk (*Cervus elaphas*), bison (*Bison bison*), bighorn sheep (*Ovis Canadensis*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americanus*), bear (*Ursus sp.*), rabbit (*Sylvilagus sp.*), woodrat (*Neotoma cinerea*), pocket gopher (*Thomomys talpoides*), various rodents of the Family Muridea, and grouse (Family Tetraniodae) (Cannon 1997).

Faunal remains found in archeological context on the shores of Yellowstone Lake are identifiable mainly through analysis of blood residues remaining on stone tools. The application of medical technology to identify blood and tissue protein residue on stone tools can be useful in interpreting how the tools were used, but dubious reactions to certain antibodies (cross-reactivity) and contamination by human handling of artifacts is problematic (Gernaey-Child 2000). 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 or cattle) (Cannon 1996, 1997; Shortt and Davis 2002)

MIDDLE HOLOCENE ENVIRONMENT AND CULTURAL CHRONOLOGY

This period incorporates what is generally known as the Middle Plains and Late Plains Archaic (or Prehistoric) periods. New projectile point styles were emerging on the Northwestern Plains, with the appearance of Oxbow points marking the end of the Early Holocene and the beginning of the Middle Holocene period. The McKean complex later emerges as the cultural manifestation of the period. Rock filled fire

(roasting) pits, sandstone grinding tools, beveled edge side-notched knives, and concentrations of stone circles are cultural hallmarks of the Middle Holocene (Frison 1991). Along the Yellowstone River and the shores of Yellowstone Lake there is a marked increase in archeological evidence of use in the Middle Holocene.

OXBOW COMPLEX

Around 5,000 years ago, the large, side-notched projectile points from the Early Holocene period disappeared or were replaced by distinctive, smaller 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 Holocene periods (Frison, Toom, et al. 1996). The duration through time of the Oxbow complex is not clear and may extend from 6,000 – 3,000 years before present (Dyck and Morlan 2001). Oxbow points occur in the archeological record at the same time as other complexes, such as the McKean complex. They may represent a separate cultural tradition or interaction between people of different cultural complexes. It may also suggest the re-use of Oxbow points by other cultures (Melton 1988). Reeves postulates that the Oxbow cultural complex evolved out of the Mummy Cave Complex in the Northern Plains and in the north into the later Besant bison-hunter tradition that marks the end of the Middle Holocene (Reeves 1983b). It has also been suggested that McKean developed out of the Oxbow Complex (Brumley 1998).

Archeological evidence to date indicates Yellowstone lies in the southern extremities of the Oxbow Complex (Frison, Schwab, et al. 1996). Oxbow style projectile points are well represented in dated contexts just east of YNP at Mummy

Cave and the Dead Indian Creek site (Frison 1991). Oxbow, or Oxbow-like projectile points have been recovered from several sites in the study area. A grey obsidian Oxbow point and a black obsidian Oxbow-like point base was recovered from site eroding on the banks of the Yellowstone River (Marceau and Reeve 1984). A basalt Oxbow point which tested positive for deer anti-sera was recovered from excavations on the north end of Yellowstone Lake (Cannon, et al. 1994).

McKEAN COMPLEX

The McKean complex is identified by the presence of several types of projectile points in artifact assemblages. These are 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 (Kornfeld 1998). Some sites yield one or two of the types, while others, such as the Dead Indian Creek site just east of YNP, produced all the variants (Frison, Toom, et al. 1996).

Variability in use of animal species is apparent (Frison and Walker 1984; Husted 1969; Lahren 1976), and variation in habitation including cave sites (Husted 1969; McCracken, et al. 1978), pit houses (Frison and Walker 1984; Kornfeld and Todd 1985), open habitation sites (Lahren 1976; Sanders 2000a, 2001a; Shortt and Davis 1999), and radiocarbon dated stone circle sites (Kornfeld 1998) is evident. Some sites have bone bed remains, some roasting pits, others both, although fire pits filled with fire cracked rock and stone grinding tools are common in McKean sites (Arthur 1966; Frison 2001; Husted 1969; McCracken, et al. 1978).

Hofman (1997) believes the range of movement, seasonal use of high altitude areas, and increased territory ranges vary widely through seasons and generations. Conner (1998) suggests that because of the somewhat predictable variability of McKean archeological site components and features in the mountain regions, that the McKean complex was composed of small populations focused on redundant scheduled cycles of repeated resource uses. The McKean Complex has been radiocarbon dated just north of YNP at the Rigler Bluffs site at approximately 4,900 years ago (Frison 1991), and around 3,400 years ago at the Myers-Hindman site (Lahren 1976). McKean sites in Grand Teton NP show increased use of Obsidian Cliff lithic material.

Sites along the Yellowstone River and on Yellowstone Lake show a continued increase in human use. Pedestrian inventory of the Black Canyon of the Yellowstone River recovered Duncan, Hanna, and McKean projectile points from the surface at a number of sites. Salvage excavation to recover information from riverbank erosion after several years of flood stage spring runoff waters recovered evidence of early spring occupation of open camps. Inventory and subsequent testing of sites in Hayden Valley indicate numerous multiple occupations of sites with all types of McKean Complex points (Sanders 2000b, 2001a; Shortt and Davis 1999). Salvage excavation in the Chittenden Bridge area of the Yellowstone River provided radiocarbon dates of approximately 2,540 years ago in association with an assemblage containing McKean eared and Hanna point forms (Marceau and Reeve 1984).

Recent excavations along the Yellowstone River at the North Entrance area of the park provided radiocarbon dates from eroding hearths indicating multiple occupations from around 5,000 years before present to 1,500 years ago. Hanna-like projectile points were associated with the assemblage (Sanders 2000a).

McKean complex occupation of lakeshore areas is also well represented, with sites documented along the north, west, West Thumb, and Southeast Arm shores. Obsidian hydration tests of artifacts from sites along the north shore indicate an increase of use intensity between 2,500 and 4,000 years ago, and protein residue and pollen analysis of four flaked sandstone discs indicated plant food processing (Cannon, et al. 1994). Investigations along the lakeshore in the West Thumb area provided radiocarbon dates for occupations from 4,500 to 1,400 years ago with Duncan, Hanna, and McKean type projectile points, as well as obsidian geochemically similar to Obsidian Cliff and Bear Gulch, Idaho (Cannon 1996). Similarly, Hanna and McKean lanceolate-type projectile points recovered from the Southeast Arm share trace element composition of volcanic glass from Obsidian Cliff and Bear Gulch (Shortt, et al. 2001).

Superintendent Norris and Army personnel collected McKean complex projectile points from the surface in the late 1880s, and added several Duncan and Hanna points to the museum collection. Taylor, et al. (1964) recovered Duncan and Hanna type points from both Yellowstone River and Yellowstone Lake settings and also collected a Mallory point from the Alum Creek area of the River. Norris had collected a Mallory point in 1882, but provided no location information. Corner-

tanged knives are also present in the museum collections, and one was recovered at the outlet of Yellowstone Lake (Taylor, et al. 1964).

1940s and 1950s construction of tourist facilities in the lake outlet area uncovered human remains from intentional burials on two separate occasions. Although analysis of the burial site and remains, which were heavily coated with a preservative at the time of discovery, are inconclusive, obsidian hydration dates indicate the remains to be about 3,145-3,195 years old (Wright, et al. 1982). Associated projectile point types suggests a possible later date (Center 1991). Ten thousand years of extensive use of the area in which the burials were located, plus the heavy bioturbation and cryoturbation of the sediments, reduces the chances of stratigraphically intact cultural deposits and therefore, dating the human remains by association is less reliable than direct dating methods.

Study of the complex and diversified use of the Yellowstone River and Lake landscapes and resources is needed to increase our understanding of the McKean culture's pedestrian visitors to Yellowstone.

PELICAN LAKE COMPLEX

Pelican Lake assemblages appear in the Northern Plains around 3,000 years ago and continue until about 1,500 years ago (Foor 1998; Frison 1991, 2001). The widespread cultural horizon appears to replace the McKean Complex (Frison 1991) and when found in multi-component sites containing both McKean and Pelican Lake components, Pelican Lake is always younger (Dyck and Morlan 2001). Likely propelled by dart throwers or atlatls, the relatively large Pelican Lake points are

characterized by open corner notches that form sharp points or barbs (Foor 1998; Frison 1991).

There is noticeable variation in Pelican Lake point size with most points ranging from 30-50 millimeters long (Thomas 1978), and slight variation in blade edges and bases, which vary from slightly convex, straight, to slightly concave (Frison 1991). The archeological record for the Pelican Lake Complex indicates a substantial increase in bison hunting, using techniques of the pound and jump (Foor 1982; Reeves 1990), widespread use of circular shelters outlined by stone, and basin-shaped rock-filled hearths (Dyck and Morlan 2001).

Pelican Lake peoples used multiple habitat zones and a broad spectrum of resources, although bison bones clearly dominate faunal assemblages (Foor 1982; Reeves 1983a). It has been noted in the archeological record that Besant Phase projectile points have been found in association with Pelican Lake assemblages (Dyck and Morlan 2001; Forbis 1998) and that association has been noted in Yellowstone (Cannon 1990; Taylor, et al. 1964). The association of those artifacts with the Besant Phase needs to be re-examined for other more likely associations.

If the increased number of Pelican Lake projectile points accurately indicates frequency of use, then use of the study area continued to increase between 3,000 to 1,500 years ago. Inventory of the Black Canyon and Hayden Valley areas along the Yellowstone River recovered Pelican Lake points from the surface (Sanders 1999; Sanders, et al. 1996; Shortt and Davis 1998, 1999). Subsurface testing of sites within the River corridor recovered Pelican Lake projectile points, although not in radiocarbon dated contexts (Marceau and Reeve 1984; Sanders 2000b, 2001a).

Inventory and subsurface testing along the west shores of Yellowstone Lake recovered Pelican Lake points, some of which share trace element composition with the rock found at Obsidian Cliff (Cannon 1996) while obsidian Pelican Lake points recovered from sites along the south shores of the lake were geochemically similar to rock from Bear Gulch, Idaho, Cougar Creek, Wyoming, Obsidian Cliff, and other YNP obsidian sources (Sanders 2000b, 2001a).

The archeological record in Yellowstone for the Middle Holocene period indicates expanding and diversified use of the landscapes and resources. Regionally, the increased use of bison jumps and other communal hunting activities indicate that these pedestrian foragers were organizationally complex (Francis 1997). Problem oriented research in the areas of seasonality, specific function of features, and lithic resource procurement needs to be conducted to enhance interpretations of the archeological record for this period (Francis 1997; Frison, Toom, et al. 1996; Hofman 1997; Larson 1997b).

PERIOD VI. LATE HOLOCENE (1,500 to 500 years ago)

CLIMATE, FLORA, AND FAUNA

The modern climate of Yellowstone, characterized by short cool summers, mild falls, long rigorous winters, and brief springs, was relatively established in the Late Holocene period. The average annual temperature in Yellowstone is less than 1 degree Celsius with deep snowfall on the ground at least half the year. Around 1,200 years ago the climate became drier, as indicated by an increase of fauna adapted to dryer (xeric) habitat and a decrease of fauna adapted to temperate climate (mesic) conditions. Cooler, wetter conditions, evidenced world-wide as the Little Ice Age,

prevailed from around 500 years ago to 150 years ago, or modern times (Hadley 1995). Although the climate regimes for the Yellowstone region did not change during the Late Holocene, the amplitude of the regimes, determined by atmospheric circulation and solar radiation did vary seasonally and locally (Whitlock, et al. 1995).

Most of the present members of the floral and faunal community were present in various degrees by the Mid-Holocene, although distribution, community composition, and abundance have varied through time (Cannon, et al. 1997). Five broad vegetation zones, based on elevation, are recognized for Yellowstone (Baker 1976). The lowest zone, which occurs in the northern part of the park, is the *Artemisia* (sagebrush) steppe; the next elevation is dominated by *Pseudotsuga menziesii* (Douglas fir), *Pinus flexilis* (limber pine), and *Populus tremuloides* (quaking aspen). The most extensive zone in the park, covering 80% of the forested area, is the *Pinus contorta* (lodgepole pine) forest consisting of *Picea engelmannii* (Engelman spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus communis* (common juniper). From 8,500 feet (2,600 meters) to the tree line *Picea-Abies-Pinus albicaulis* (whitebark pine) forest association is dominant. At the highest elevation, alpine communities dominate, which include members of the Gramineae (Grass family), Cyperaceae (Sedge family), and Juncaceae (Rush family).

Yellowstone's modern fauna were probably established in Mid-Holocene times with fluctuations in population dynamics and migration patterns occurring in response to changing climate patterns, and perhaps, human predation (Cannon, et al. 1997). Mammals important to precontact groups include bison, elk, mule deer, and

bighorn sheep, although large numbers of non-ungulate species were also used (Walker 1975).

LATE HOLOCENE ENVIRONMENT AND CULTURAL CHRONOLOGY

The Late Holocene begins with a change in projectile point types and sizes that resulted from the technological innovation and subsequent widespread adoption of the bow and arrow. Some people believe that change occurred at different times regionally, although the record is incomplete. There is some evidence of both dart and bow and arrow use and Frison (1991) speculates that some corner-notched dart points were reduced in size for use with the bow. Early in the period, projectile points were side-notched – some with base notches, other points corner notched.

Pottery also appeared in the region at around the same time, although the use of pottery was not as pervasive as the change in weapon technology. Intermountain pottery, found throughout Wyoming, Montana, Utah, Idaho, and southern Colorado is considered indigenous to the mountainous regions of the Northwestern Plains (Frison, Toom, et al. 1996). Intermountain pottery was radiocarbon dated to 740 years ago at the Myers-Hindman site (Lahren 1976) north of Yellowstone, but Intermountain pottery dates at Eagle Creek (Arthur 1966) and Mummy Cave (Wedel, et al. 1968) are 200 years later.

The archeological record for the Late Holocene indicates the widespread use of communal bison kills as well as evidence of pronghorn and sheep trapping. Numerous bison drive lines and associated jumps, some with pounds or capture corrals and others without, are located adjacent to YNP to the north and west (Arthur 1966; Davis and Wilson 1978; Frison 1991). To date, there is little evidence of bison

jumps, drives, or pounds located in YNP or Grand Teton (Conner 1998). One possible drive-line feature has been documented on the north boundary of YNP along the Yellowstone River (Allen 1995), and more features may have been lost when fields were cleared for historic Euroamerican farming activities in the area. Sheep and pronghorn drives, traps, and compounds have been recorded east of Yellowstone, in southwestern Wyoming (Frison, Toom, et al. 1996), and to the north, but again, have not yet been documented in YNP. These types of structures are often made of wood, and evidence may have deteriorated over time or been lost to cyclic natural and cultural forest fires.

Large aggregations of domestic stone circles are also evident regionally along river valleys and often close to bison drives. It is widely thought that the stones were used to hold down hide tipi covers (Davis 1983; Frison 1991; Taylor 1970). The historic context for the chronology of domestic stone circles in Wyoming has been developed and provides insight into their widespread and long-term use (Spath 1989). Domestic stone circles are found in various locations in Yellowstone, but only singularly or a few clustered together, and no large aggregations of domestic stone circles have been documented. This suggests that smaller groups of foragers were using the area.

The use of slab-lined food preparation pits for processing both plants and animal food increased during the Late Holocene (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 become more prevalent in archeological sites along the Yellowstone River and on Yellowstone Lake during this time period.

Steatite (commonly known as soapstone) vessels and fragments of vessels associated with this time period were recovered in various locations in YNP, two of which were found along the Yellowstone River just north of the park boundary and another on a trail east of the Grand Canyon of the Yellowstone River near a thermal area (Adams and Daniels 1995; Frison 1982). These vessels appear to have functioned as food cookers or boiling pots. Identification of steatite quarries and the recovery of cooking pots and other steatite artifacts is widespread across the United States from the coasts of California to Massachusetts, Connecticut, Rhode Island, Georgia, and Virginia, with many quarry sites found in Wyoming (Fehyl 1997).

AVONLEA PHASE

The Avonlea Phase has been widely regarded as documentation of the adoption of the bow and arrow, although the bow and arrow may have reached the area earlier, possibly having been introduced to the atlatl-using Pelican Lake people (Davis 1988). It is generally accepted that the first appearances of Avonlea projectile points mark the boundary between the Middle Holocene and the Late Holocene. The earliest dates are around 1,800 years ago lasting until around 800 years ago in southwest Montana (Foor 1988).

On the Northwestern Plains, the Avonlea peoples were semi-nomadic hunters of bison best known for using pounds and traps rather than jumps (Davis and Fisher

1988). Although largely dependent on bison, the highly organized Avonlea phase 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) . Regional manifestations of the Avonlea culture were originally thought to encompass the northwestern portion of the Plains in Canada, eastern Montana and Wyoming (Reeves 1973), although now the Avonlea archeological entity is considered to be more wide-spread and relatively long-lived (Davis and Fisher 1988).

Avonlea arrow points are usually side-notched, although some are up-slanted with notches close to the base, and are known for their fine workmanship and delicate form (Johnson 1998). Other hunter-gatherer groups using small corner notched projectile points found in association with grinding stones and food preparation pits were also present throughout the region during the Late Holocene (Frison 1991).

Evidence of Avonlea and other Late Holocene groups using the Yellowstone River and Lake areas is abundant and demonstrates diversified local resource use. Avonlea and Avonlea-like arrow points have been reported in association with radiocarbon dates at sites along the Yellowstone River near the northern boundary of the park, indicating occupations 1,100-1,250 years before present. The sites also yielded faunal remains of elk, bison, bighorn sheep, rodents and species of fish (Cannon, et al. 1997), and net weight sinkers (Shortt and Davis 1998). Other sites along the northern portion of the Yellowstone river yielded radiocarbon dates of 1,420-1,120 years before present; faunal remains of trout, suckers, grouse, bear, elk, deer, bison, sheep, rodents and squirrels; rock filled hearth remains of juniper seeds,

prickly pear cactus pads, and buckwheat seeds; and small, late period, Avonlea-like corner-notched arrow points (Cannon 1997).

Riverbank inventory in the Black Canyon of the Yellowstone recovered numerous projectile points diagnostic to Avonlea, Rose Springs, and Late Plains side-notched forms (Shortt and Davis 1998). Yellowstone River sites south of the Grand Canyon of the Yellowstone have provided radiocarbon dates and diagnostic projectile points indicating that people using Avonlea arrow points, and other groups, were traveling through and making use of the landscape on a reoccurring seasonal basis. Large quantities of obsidian flake debris are present at some sites (Marceau and Reeve 1984), and obsidian analysis of projectile points diagnostic of the Late Holocene shared trace element composition similar to Obsidian Cliff volcanic glass (Sanders 1999, 2001a; Shortt and Davis 1999).

Rock filled roasting pits, a grinding stone (mano), and grass and sunflower seeds recovered from Late Holocene sites along the river indicate use of plant resources. Diagnostic projectile points indicate hunting of animals, and radiocarbon dates attest to late precontact use of the Yellowstone River corridor in Hayden Valley (Sanders 2000b, 2001a).

Late Holocene occupations of lakeshore areas have been identified at various locations. Radiocarbon dates were attained from sites on the north shore and Avonlea-like projectile points from the area reacted to anti-sera in blood residue analysis, suggesting use of deer (Cannon, et al. 1994). Inventory of the West Thumb area of the lake recovered small, corner-notched arrow points in various locations (Taylor, et al. 1964), and subsequent site testing revealed stone lined

roasting pits with grass and sunflower seeds and blood residue analysis of stone tools indicating use of canid, sheep, and rabbit during the Late Holocene (Cannon 1996). A radiocarbon dated bison bone bed with evidence of butchering at a site on the northeast shore of the lake indicates Late Holocene people were taking individual bison on an opportunistic basis. A radiocarbon age associated with a ground stone slab, and obsidian hydration dates from the northeast shore, also indicate occupation of the lakeshores during the Late Holocene (Cannon, et al. 1997).

ROSE SPRINGS/UINTA COMPLEX

Rose Springs arrow points are commonly associated with Late Holocene archeological sites in the Great Basin. They are thought to have replaced the larger, heavier atlatl and dart points, and are often found in association with pottery and plant processing equipment (Aikens and Madsen 1986; Elston 1986). People from the Fremont Culture occupied the Uinta Basin of northeastern Utah from 1,300 to 1,000 years ago, leaving Rose Springs points and evidence of pottery (Marwitt 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 geochemically similar to Obsidian Cliff volcanic glass (Roll and Hackenberger 1998). Reeves (in preparation) suggests that there may be a connection between the Uinta Fremont Culture people and the Late Holocene Rose Springs-like arrow points found in Yellowstone. Frison (1991) discusses Wyoming Late Holocene site assemblages with small, corner-notched projectile points with

regard to the Rose Springs Complex, but questions the cultural relationship because of the paucity of evidence.

Excavation of a site in the Black Canyon of the Yellowstone River yielded pottery in archeological contexts with small corner-notched points. Radiocarbon dates from the pottery site indicate various occupations from about 3,100-110 years before present. The sheltered site, situated on the banks of the deeply incised river, a result of the glacial outwash floods, provided life-sustaining resources and protection from the elements for many groups throughout time. The ceramics from this site fit within the Intermountain Tradition. Fish remains were recovered from the site, and the fetal remains of bighorn sheep indicate a possible late winter-early spring occupation.

The Black Canyon has a unique depositional environment within YNP, in that the overbank flooding of river terraces has contributed to relatively intact preservation of cultural occupation surfaces and artifacts (Dickerson 2000 in draft). Although bank erosion has destroyed portions of some sites, the soil composition and lack of bioturbation contribute to preservation of cultural materials in datable stratified deposits. Riverbank inventory in the Black Canyon of the Yellowstone recovered projectile points diagnostic to Rose Springs and Late Plains side-notched forms in several locations (Shortt and Davis 1998). A Rose Springs-like corner-notched point was also recovered from a site along the Yellowstone River in Hayden Valley (Sanders 2000b).

A multiple component site on the south shore of the lake produced a projectile point similar to a Rose Spring corner-notched points found in southwestern Wyoming (Shortt, et al. 2001). Serrated obsidian Rose Springs points were

recovered from excavations on the north shores of Yellowstone Lake (Cannon, et al. 1997). Small corner-notched points, possibly representing the Rose Springs Complex, were recovered from excavations in the West Thumb area of the lakeshore in association with Intermountain pottery and radiocarbon dates between 1,350 – 1,500 years before present (Cannon 1996).

Side-notched arrow points have been collected from the surface along the Yellowstone River banks and on the shores of Yellowstone Lake on numerous occasions (Samuelson 1983; Smithsonian Institute 1999; Taylor, et al. 1964), although insufficient information is available to place the points within Avonlea or Rose Springs classificatory schemes. Additionally, the recent inadvertent discovery of human remains eroding out of a sandy bank of the lake indicated an older female without osteological evidence of trauma died around 1,000 years ago. No grave site preparation, grave goods, or associated artifacts were found at the site, and per consultation with the Native American Tribes affiliated with YNP at the time, the tribal recommendation to re-inter the eroding skeletal remains with no further site disturbance was adhered to by YNP staff (Park 1996).

OLD WOMEN'S PHASE

Beginning about 1,000 years ago and extending past the end of the Late Holocene, Late Plains side-notched points, contemporaneous to the Old Woman's Phase, were found in areas of Montana and northern Wyoming (as well as Alberta and Saskatchewan, Canada.) Although the peoples associated with them are generally recognized as specialized bison hunters, faunal remains in many sites show diverse resource adaptations. Projectile point forms are generally small to medium-

sized side-notched points, but corner-notched, tri-notched, and un-notched forms occur and point styles overlap with Avonlea. These projectile points are often found in association with small, unifacially flaked “thumbnail” end scrapers (Frison, Schwab, et al. 1996).

Diagnostic artifacts of the Old Women’s Aggregate, as it is known on the Canadian Plains, are small side-notched arrow points better known as Prairie Side-Notched and Plains Side-Notched. Also noted was the unusually frequent use of petrified wood (Dyck and Morlan 2001). These points are present in the Yellowstone River corridor and on the lakeshores in the same archeological context as Avonlea Complex and Rose Springs/Uinta Complex arrow points. The end of the phase is marked by contact with Euroamericans, trade goods, horses, and guns, and is outside the scope of the precontact context presented here.

Taylor, et al. (1964), Samuelson (1983), and Cannon (1990; 1996) collected both Prairie and Plains Side-Notched and small corner-notched points from various locations on the lakeshore. Yellowstone River sites have also yielded Plains and Prairie Side-Notched points from surface (Shortt and Davis 1998, 1999) and subsurface excavations (Sanders 2000b) and in association with radiocarbon dates (Marceau and Reeve 1984; Sanders 2001a).

Many of the Late Holocene cultural manifestations found in Yellowstone, such as side-notched arrow points, pottery, and wider use of plant and animal resources, are also found in sites along the River north of the park, sites to the south in Grand Teton, and sites to the east and west of the park. But many other archeological hallmarks of the Late Holocene, such as bison drives and jumps, sheep and

pronghorn traps, aggregations of domestic stone circles, winter habitation sites, horticulture evidenced by bison scapula hoes, rock art, medicine wheels, and variations in pottery styles (Frison, Schwab, et al. 1996) have yet to be found in YNP.

Although precontact archeological site visibility is often masked by natural forces, modern development, and sampling and cultural resource management biases, it is apparent that humans were seasonally and consistently making use of the river corridor and lakeshore landscapes and resources for the past 10,000 years.

VII. CONCLUSION

Archeological work conducted since the inception of Yellowstone as a National Park indicates that the Yellowstone River and Yellowstone Lake have provided precontact people with resources and landscapes that sustained their lifeways for the past 10,000 years. Recent archeological investigations indicate that these precontact archeological sites hold significant and important information that can enlighten our interpretation of the daily activities and the seasonal rounds these ancient humans pursued in quest of needed resources.

Yellowstone is situated in the high elevations of the Rocky Mountains between three unique culture regions, the Northwest Plains, the Great Basin, and the Plateau of the Columbia River drainage. People from all three regions, and probably more, have passed through Yellowstone, using the resources and landscapes along the Yellowstone River and Yellowstone Lake. Therefore, to gain an understanding of the significance of the precontact archeological sites within the study area, it is important to compare them against, and analyze them within a regional framework.

The culture history of the Yellowstone River and Yellowstone Lake study area has been divided into four periods that are defined by changes in both climate and technology to reflect human adaptive responses to the changing environment. It is apparent that a significant number of people used the resources in all four of the precontact time periods.

My hope is that this document will provide a useful basis for public understanding of the importance of the precontact archeological sites within Yellowstone, as well as a contextual basis for the evaluation of these archeological sites to the National

Register of Historic Places. To accomplish both purposes, I have written this document as devoid of scientific and government “jargon” as possible. It is hoped that protection from destruction, by the hand of nature or the deeds of man, of these unique and non-renewable resources will be gained through increased understanding of their significance.

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