North Hebgen Multiple Resource Project

Heritage Report

Prepared by:
Halcyon La Point
Forest Archaeologist

And

Mike W. Bergstrom
Zone Archaeologist

for:
Hebgen Lake Ranger District
Custer Gallatin National Forest

Final 02/25/2016
The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the bases of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, or all or part of an individual's income is derived from any public assistance program, or protected genetic information in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases will apply to all programs and/or employment activities.)
Contents

Introduction ................................................................................................................................. 2
  Issue ......................................................................................................................................... 2
  Resource Indicators and Measures ........................................................................................... 2
Regulatory Framework ................................................................................................................ 2
  Custer Gallatin Forest Plan ....................................................................................................... 2
  Federal Law ............................................................................................................................. 2
Methodology ................................................................................................................................ 3
Affected Environment ................................................................................................................. 6
  Existing Condition ................................................................................................................. 16
Environmental Consequences .................................................................................................... 19
  Alternative 1 – No Action ...................................................................................................... 19
  Project Design Features, Mitigation, Monitoring Common to Action Alternatives .............. 19
  Alternative 2 – Proposed Action ............................................................................................ 20
  Conclusion ............................................................................................................................. 23
Alternative 3 (and subsequent alternatives) ................................................................................ 23
Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans and Other
  Disclosures ............................................................................................................................. 24
  Comparison of Alternatives ................................................................................................... 24
References Cited ........................................................................................................................ 25

Tables

Table 1: Previous Heritage Inventories within the North Hebgen Project Area
Table 2: Recorded Cultural Resources within the North Hebgen Project Area
Table 3: Alternative 2 Effects to Cultural Resources
Introduction

This report documents the analysis and review of cultural resources associated with the 73,250 acre North Hebgen Multiple Resource Project (North Hebgen Project). Cultural resources are properties that may be the physical remains of archaeological, historical, and architectural sites and/or places of traditional cultural use. Traditional cultural use refers to a traditional life way that values the connection between the landscape and a groups’ traditional beliefs, religion, or cultural practice. This report describes the analysis area, the methodologies used, the affected environment, and the environmental consequences of implementing the alternatives to heritage resources.

Issue

In terms of cultural resources, the action alternatives are considered undertakings since they could potentially affect historic properties. As such, the decision maker must consider the effects to all historic properties that may be located within the boundary of the area of potential effect (APE).

Resource Indicators and Measures

For cultural resources, the issue indicator is the number of historic properties located within the APE that could be affected by the action alternative. The measure used to analyze the effect is whether there will be an adverse effect to these historic properties, as defined by the National Register of Historic Places (NRHP) regulations (36 CFR 800), that would threaten the historic property’s eligibility for nomination to the NRHP.

Regulatory Framework

Since cultural resources are nonrenewable and easily damaged, laws and regulations exist to help protect them. These include the National Historic Preservation Act (NHPA), the Archeological Resources Protection Act (ARPA), the American Indian Religious Freedom Act (AIRFA), and the Native American Graves Protection and Repatriation Act (NAGPRA). Sacred and culturally important places fall under this purview of the NHPA, AIRFA, and the Sacred Lands Executive Order (Executive Order 13007). Native American graves are protected under NAGPRA.

Custer Gallatin Forest Plan

The goal of cultural resource management as stated in the Custer National Forest Management Plan is “to maintain and enhance historic and prehistoric cultural resource values. Conservation of archaeological and historic sites and information for research, public interpretation, and use by future generations is emphasized.” (USDA-FS 1986: 4). The goal of cultural resource management as stated in the Gallatin National Forest Management Plan is “locate and protect cultural resources to maintain their scientific and historical values” (USDA-FS 1987: II-2). Both Forest Plans provide standards and guidelines for managing cultural resources in order to maintain their scientific, social, and historical value in compliance with all applicable Federal and State laws and are considered for this undertaking.

The North Hebgen Project encompasses Management Areas 1, 5, 7, 13, and 15. There are no additional specific management plan directions for cultural resources for these management areas.

Federal Law

The National Historic Preservation Act (NHPA) and its implementing regulations require Federal Agencies to consider the effects of their undertakings on historic properties. The term historic properties refers to cultural resources that have been determined eligible for the NRHP. 36 CFR 800 outlines the set of procedures established by the NHPA that Federal Agencies must follow before implementing an action that may affect historic properties. American Indians and Alaskan Natives are recognized as people with distinct cultures and traditional values. They have a special and unique legal and political relationship with the
Government of the United States as defined by history, treaties, statutes, executive orders, court decisions and the U.S. Constitution. The 1992 amendments to the NHPA specify that properties of traditional religious and cultural importance, referred to as traditional cultural properties (TCPs), may be determined eligible for inclusion on the NRHP. Effects to “cultural resources of traditional religious and cultural importance” must be considered under the NHPA. In carrying out the responsibilities under Section 106 of the NHPA, the Forest Service is required to consult with any tribe that attaches religious and cultural significance to such properties when any federal undertaking may affect them {16 USC 470a(d)(6)(A)}. The North Hebgen Project Area lies within traditional Crow and Shoshone-Bannock Indian territories, as defined by the Ft. Laramie Treaties, and the Ft. Bridger Treaties.

The CGNF designed the *Wildland Urban Interface and Large Scale Hazardous Fuels Reduction Site Identification Strategy (SIS)* to address the effects that large scale, landscape level hazardous fuel reduction projects may have on cultural resources and identify measures to reduce or eliminate those effects. The SIS was approved as part of the programmatic agreement between the USDA-Forest Service-Northern Region, the Advisory Council on Historic Preservation and the Montana State Historic Preservation Officer (MT SHPO). The SIS protocol is followed for this project in compliance with the NHPA.

**Methodology**

The CGNF operates under a site identification protocol called the “Wildland Urban Interface and Large Scale Hazardous Fuels Reduction Site Identification Strategy (SIS)” which is part of the Montana Programmatic Agreement. This SIS protocol allows for proactive archaeological site treatment to reduce hazard fuels making the cultural resource more “fire resistant” rather than avoiding sites and leaving untreated “islands” within project areas. The SIS is conducted in six stages including 1. Prefield research and sample design; 2. Field inventories; 3. Protection of fire sensitive sites; 4. Implementation; 5. Monitor, and 6. Documentation (see Appendix A). This document addresses stages 1 and 2.

The North Hebgen Project Area encompasses 73,250 acres but only approximately 8,200 acres are proposed for treatment. All proposed treatment units within the North Hebgen Project Area that involve ground disturbing activities—such as commercial harvesting with machinery and by hand; piling, burning, chopping and/or masticating natural and active fuels; and or prescribed burning—were reviewed. Inventories for the presence of cultural resources were conducted utilizing pedestrian transects and/or cursory examinations depending upon the character of the area (i.e. steepness of slope, vegetation cover, previously disturbed areas, or previously inventoried areas) and in terms of the probability (high, moderate, or low) of cultural resources being present.

Forty-eight cultural resource investigations or surveys, dating back to 1961, have been conducted within the North Hebgen Project Area. These investigations or surveys represent approximately 2700.5 acres (32.9 % of the North Hebgen Project Area) and thirty-seven cultural sites have been recorded (a density of approximately one site/221 acres). Of the 8200.0 acres proposed for treatment within the North Hebgen Project Area approximately 756.5 acres (9.2 %) have been previously inventoried and ten sites (one site/820.0 acres) have been recorded. These surveys are described in Table 1.

Timber harvest records within the North Hebgen Project Area date back to the 1960s with large block areas focused in the Tepee Creek area and in the Rainbow Point Road area east of Horse Butte. Considerable disturbance—such as skid trails, log landings, burn piles, and old timber roads—was observed in these previous timber harvest areas.

Surveys conducted in 2015 focused on medium and high probability areas for the presence of cultural resources and on areas where cultural site leads had been reported. Previously disturbed areas, such as old timber sale areas, and low probability areas for the presence of cultural resource were sample surveyed or
A cursory examined. Approximately 1311.0 acres were surveyed utilizing the criteria described above. Ground surface visibility was poor across the majority of the survey area due to dense vegetation and accumulated woody or forest debris. Seven site leads from local residents resulted in new site recordings. In all, nine new cultural resources were recorded in 2015.

In addition to the additional survey work, monitoring of all sites within the proposed treatment units and along roads to the used for the project was conducted.

Approximately twenty-five miles of proposed temporary road construction will be inventoried when staked and prior to construction.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Name</th>
<th>Program Support</th>
<th>Acres</th>
<th>Previously Recorded Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>(Stuart Conner 1961)</td>
<td>NA</td>
<td>unknown</td>
<td>24GA0101</td>
</tr>
<tr>
<td>1973</td>
<td>Statewide Archaeological Survey, University of Montana, site form for 24GA1006 (Lasch 1973)</td>
<td>Heritage</td>
<td>unknown</td>
<td>24GA1006 (lithics, stone circle)</td>
</tr>
<tr>
<td>1973</td>
<td>An Inventory and Impact Evaluation of Archaeological and Historic Resources Located on and Adjacent to Properties Near Hebgen Lake to be Developed by Ski Yellowstone, Inc.: A Summary Report (Davis 1973)</td>
<td>NA</td>
<td>unknown</td>
<td>24GA0696 (lithics), 24GA0697 (lithics), 24GA0698 (bone, lithics), 24GA1131 (Bannock Trail, lithics), 24GA1132 (FCR, lithics), 24GA1135 (chert source), 24GA1136 (chert source), 24GA1006 (lithics, stone circle)</td>
</tr>
<tr>
<td>1976</td>
<td>Surface Reconnaissance, Investigation and Evaluation of Cultural Resources on Proposed Impact Tracts of Forest Service Land in the Big Timber, Gallatin, Hebgen Lake and Livingston Ranger Districts (Lahren 1976)</td>
<td>Special Use (Cemetery)</td>
<td>80.0</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>(Bailey 1980a)</td>
<td></td>
<td></td>
<td>24GA0493 (lithics)</td>
</tr>
<tr>
<td>80-GA-07-19</td>
<td>Grassy Pasture Water Development Project (Bailey 1980b)</td>
<td>Range</td>
<td>320.0</td>
<td>24GA0494 (lithics)</td>
</tr>
<tr>
<td>*80-GA-07-20</td>
<td>Hebgen Lake District Gravel Pit (Bailey 1980c)</td>
<td>Minerals</td>
<td>115.0</td>
<td>None</td>
</tr>
<tr>
<td>*80-GA-07-22</td>
<td>Micklewright Access Exchange Project (Bailey 1980d)</td>
<td>Lands</td>
<td>1.2</td>
<td>None</td>
</tr>
<tr>
<td>*81-GA-07-38</td>
<td>Parade Rest Ranch Land Exchange Project (Bailey 1981a)</td>
<td>Lands</td>
<td>10.0</td>
<td>None</td>
</tr>
<tr>
<td>*81-GA-07-40</td>
<td>Edwards Peninsula Wildlife Burn Project (Bailey 1981b)</td>
<td>Wildlife</td>
<td>40.0</td>
<td>None</td>
</tr>
<tr>
<td>81-GA-07-41</td>
<td>Cougar Creek Willow Burn Project (Bailey 1981c)</td>
<td>Wildlife</td>
<td>80.0</td>
<td>None</td>
</tr>
<tr>
<td>82-GA-07-26</td>
<td>Horse Butte Timber Sale (Samuelson 1982)</td>
<td>Timber</td>
<td>0.0</td>
<td>Monitor of 24GA1006 (lithics, stone circles)</td>
</tr>
<tr>
<td>*83-GA-07-15</td>
<td>Madison/Oxbow Pothole Blasting (Samuelson 1983a)</td>
<td>Wildlife</td>
<td>20.0</td>
<td>None</td>
</tr>
<tr>
<td>Project Code</td>
<td>Project Description</td>
<td>Type</td>
<td>Cost</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>-------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>*83-GA-07-17</td>
<td>East Pasture and Grayling Pasture Sagebrush Control Project (Samuelson 1983b)</td>
<td>Range</td>
<td>90.0</td>
<td>None</td>
</tr>
<tr>
<td>*83-GA-07-18</td>
<td>Duck Creek Pothole Blasting (Samuelson 1983c)</td>
<td>Wildlife</td>
<td>180.0</td>
<td>None</td>
</tr>
<tr>
<td>*87-GA-07-02</td>
<td>The Scarp Area Dump Site (Christensen and Ryan 1987a)</td>
<td>Recreation</td>
<td>15.0</td>
<td>None</td>
</tr>
<tr>
<td>*87-GA-07-04</td>
<td>Kirkwood End of Road Facility (Christensen and Ryan 1987b)</td>
<td>Engineering</td>
<td>5.0</td>
<td>None</td>
</tr>
<tr>
<td>*87-GA-07-05</td>
<td>Cabin Creek Trail New Construction (Christensen and Ryan 1987c)</td>
<td>Recreation</td>
<td>5.0</td>
<td>None</td>
</tr>
<tr>
<td>*87-GA-07-08</td>
<td>Cabin Creek Guard Station Recordation and Evaluation (Ryan 1987)</td>
<td>Heritage</td>
<td>1.0</td>
<td>24GA0479 (guard station)</td>
</tr>
<tr>
<td>*89-GA-07-01</td>
<td>Whit’s Lake Road Rehabilitation (Allen 1989)</td>
<td>Engineering</td>
<td>27.3</td>
<td>24GA0115 (FCR, lithics)</td>
</tr>
<tr>
<td>*89-GA-07-03</td>
<td>Kirkwood End-Of-Road Trailhead Facility (Allen 1990a)</td>
<td>Engineering</td>
<td>30.0</td>
<td>None</td>
</tr>
<tr>
<td>*89-GA-07-04</td>
<td>Cabin Creek Scarp Trailhead Refurbishing (Allen 1990b)</td>
<td>Engineering</td>
<td>15.0</td>
<td>None</td>
</tr>
<tr>
<td>*89-GA-07-05</td>
<td>Madison and Cougar Creek Snomo Bridges (Allen 1990c)</td>
<td>Engineering</td>
<td>4.0</td>
<td>None</td>
</tr>
<tr>
<td>89-GA-07-07</td>
<td>Teepee Post and Pole Sale (Allen 1990d)</td>
<td>Timber</td>
<td>40.0</td>
<td>None</td>
</tr>
<tr>
<td>89-GA-07-10</td>
<td>Burnt Turkey Salvage Timber Sale (Allen 1990e)</td>
<td>Timber</td>
<td>455.0</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>Missouri-Madison Hydroelectric Project, Report on Intensive Pedestrian Survey for Cultural Resources and Recommendations for Testing (Deaver 1990). This was a shoreline fluctuation zone survey.</td>
<td>Special Use Permit</td>
<td>542.0</td>
<td>24GA0101 (bone, FCR, lithics), 24GA0493 (lithics), 24GA0848 (Hebgen Hydro Camp) 24GA0849 (lithics), 24GA0850 (FCR, lithics), 24GA0852 (lithics), 24GA0853 (lithics), 24GA0854 (lithics &amp; historic), 24GA0855 (lithics), 24GA0860 (lithics), 24GA0861 (FCR, lithics), 24GA0862 (lithics), 24GA0863 (FCR, lithics), 24GA0864 (cabin), 24GA1132 (FCR, lithics)</td>
</tr>
<tr>
<td>*93-GA-07-03</td>
<td>Horse Butte Corral (Jackman 1993a)</td>
<td>Range</td>
<td>0.5</td>
<td>None</td>
</tr>
<tr>
<td>93-GA-07-06</td>
<td>Rainbow/Whiskey Road Management Plan (Jackman 1993b). Survey of FS Road 6697.</td>
<td>Engineering</td>
<td>12.0</td>
<td>None</td>
</tr>
<tr>
<td>*94-GA-07-02</td>
<td>Graying Willow Regeneration Project (Griffin 1994a)</td>
<td>Fire</td>
<td>3.0</td>
<td>None</td>
</tr>
<tr>
<td>94-GA-07-03</td>
<td>Horse Butte Aspen Regeneration Project (Griffin 1994b)</td>
<td>Fire</td>
<td>100.0</td>
<td>obsidian flake W of sawmill pond</td>
</tr>
<tr>
<td>94-GA-07-04</td>
<td>Horse Butte Telecommunications Tower (Griffin 1995a)</td>
<td>Engineering</td>
<td>25.0</td>
<td>24GA0114 (lithics), 24GA1006 (lithics, stone circle), 24GA1767 (fire lookout tower)</td>
</tr>
<tr>
<td>95-GA-07-03</td>
<td>Tepee/Cabin Creek Trail Reconstruction (Griffin 1994c)</td>
<td>Recreation</td>
<td>100.0</td>
<td>24GA0397 (lithics), 24GA0398 (lithics), 24GA1344 (historic trail)</td>
</tr>
<tr>
<td>*95-GA-07-07</td>
<td>Cabin Creek Fishing Access (Griffin 1995b)</td>
<td>Engineering</td>
<td>10.0</td>
<td>None</td>
</tr>
<tr>
<td>*95-GA-07-10</td>
<td>Red Creek Ranch Land Exchange (Griffin 1995c)</td>
<td>Lands</td>
<td>10.0</td>
<td>None</td>
</tr>
<tr>
<td>96-GA-07-02</td>
<td>Madison River Crossing (Allen 1997)</td>
<td>Bison corral</td>
<td>20.0</td>
<td>None</td>
</tr>
</tbody>
</table>
Affected Environment

The North Hebgen Project Area is situated within the upper Madison River drainage surrounded by the Madison Mountain Range of southwestern Montana. The small community of West Yellowstone is located less than four miles to the south. Yellowstone National Park borders the North Hebgen Project Area to the east while the shorelines of Hebgen Lake, the Grayling Arm of Hebgen Lake, and the Madison Arm of Hebgen Lake mark the southwest border of the North Hebgen Project Area. The Lee Metcalf Wilderness borders the far northeast portion of the North Hebgen Project Area. Elevations range from 6470 feet to 10,653 feet.

Several named tributaries—including Cabin Creek, Cougar Creek, Duck Creek, Grayling Creek, Red Canyon Creek, and Watkins Creek—along with numerous unnamed streams flow into the Madison River drainage, specifically into the impound waters of Hebgen Lake, and then course toward the west into Earthquake Lake and on toward the north into the Madison River.

The upper Madison River drainage, encompassing the North Hebgen Project Area, is located near the junction of three major cultural areas—the Northwestern Plains, the Columbia Plateau, and the Great Basin (Dickerson, 2009: 12). As a result, the various groups occupying this area brought with them different settlement, subsistence, and resource procurement systems in order to adapt to a unique foothills-mountains environment. The communal hunting strategies that were fine-tuned on the Plains did not function well in a foothills-mountains setting. Increasingly specialized, or broader-based, subsistence strategies were developed in the foothills-mountains which brought unique tool styles and forms (Davis and Greiser 1992: 276; Dickerson 2009: 13; Frison 1992: 337).
Efforts to define a foothills-mountains cultural chronology—unique from that of the Northwestern Plains, the Columbia Plateau, and the Great Basin cultural chronologies—has led to the development of several local cultural chronologies. Davis presented a three-division cultural chronology based upon outlines by Mulloy and Reeves. These three divisions were further separated into thirteen sub categories (Davis 1973: 14-15). Dickerson, in his manuscript detailing mitigation efforts conducted along the shoreline of Hebgen Lake, presented a three-period cultural chronology that is divided into a series of regional phases/complexes and local sub-phases/traditions (Dickerson 2009: 12-19). Although this framework is based primarily on projectile point typology, it focuses heavily on data from excavated sites in Yellowstone Park. Davis, in his manuscript on investigations at Obsidian Cliff in Yellowstone National Park, presents a cultural chronology based on multiple sources including earlier works by Bender and Wright, Davis, Frison, Greiser, Mulloy, Reeves, Wright, and Wright and Chaya (Davis et al. 1995: 8-9). This cultural chronology, which closely resembles his 1973 chronology, will be utilized in the discussion below.

Precontact Period

Early Prehistoric (Paleoindian) Period

The Early Prehistoric (Paleoindian) Period dates from approximately 11,500 years before present (YBP) to 7,500 YBP. This period is characterized by a human population composed of small groups that were heavily dependent on hunting of now extinct fauna such as giant bison and mammoth but who also exploited smaller game animals in their subsistence endeavors (Davis and Greiser 1992: 265-266). Large lanceolate shaped and stemmed projectile points, hafted to thrusting or throwing spears, characterize this early period but details on complete artifact assemblages are currently fragmentary. Several complexes are common to this period including: Clovis, Goshen, Folsom/Midland, Agate Basin/Cody, Alder, Hardinger, Pryor Stemmed/Lovell Constricted, and Lusk. While many of these complex names are associated with classic projectile points, also included are such names as Hell Gap, Haskett, Windust, Cascade, Alberta, Scottsbluff, and Eden.

No extensive Paleoindian deposits have been identified in the North Hebgen Project Area; however, a possible incomplete Clovis projectile point along with three Agate Basin and one Eden projectile points were observed in three private artifact collections gathered from areas along the deflated shores of the Grayling Arm of Hebgen Lake prior to 1973 (Davis 1973: 15-18, Figures 8, 12, 14). A complete obsidian Haskett projectile point was collected from along Grayling Creek by Bud Morris (previous owner of the Parade Rest Guest Ranch) and was loaned to the Museum of the Rockies in Bozeman for study (Davis et al. 1995: iv). In 1986 the proximal end of a chert Folsom projectile point was recovered on the disturbed surface of a plateau south of West Yellowstone near Whiskey Springs (Johnson 1986; Roll 2015).

In 1990 two incomplete cryptocrystalline silicate Alberta projectile points (one from site 24GA0862 and one an Isolated Find SD-G), and a complete chert Eden projectile point (from site 24GA0493; Dickerson 2009: 50-51 describes this projectile point as an Osprey Beach Sub-phase artifact), were recovered during a shoreline survey of Hebgen Lake (Deaver 1990: 31-33). An incomplete Osprey Beach Sub-phase artifact (Alberta projectile point) was recovered from 24GA0493 in 2006 (Dickerson 2009: 50-51). A complete Scottsbluff projectile point was recovered on the surface of the deflated shoreline at 24GA0861 (Deaver and Peterson 1992: 5.22-5.23). All of these artifacts are located within the North Hebgen Project Area.

Over fifteen miles to the south of the North Hebgen Project Area is site 24GA0416. An incomplete obsidian Hell Gap projectile point was recovered from a cut bank exposure approximately 83 centimeters below the surface (Dickerson 2009: 65).
These isolated discoveries of Paleoindian projectile points show that the area was occupied for at least the last 10,000 years. As Davis noted in 1973, during his work encompassed by the present North Hebgen Project Area, “Early Period evidence is typically sparse but there is evidence of 60 percent of the culture complex recognized for this Period.” (Davis 1973: 18). The scarcity of intact deposits suggests that the early sites may have been removed by deflation and erosion during the early Altithermal Climatic Episode (post-Paleoindian) Period.

The Middle Prehistoric (Archaic) Period ranges from approximately 7,500 to 1700 YBP and coincides with the warming trend referred to as the Altithermal Climatic Episode, a possible cultural hiatus on the Great Plains that saw human population movement to refugia peripheral to the Great Plains (Frison 1991). The earlier emphasis on big game hunting gave way to a more diversified economy. One of the most innovative adaptations of this period was the introduction of the atlatl or spear thrower. This device largely replaced the thrusting or throwing spear that had been used for several thousands of years and resulted in the shift toward smaller, more slender spear shafts and a shift from large lanceolate-shaped projectile points to smaller projectile points that often exhibited stemmed bases or side/corner-notches. This period also saw a cultural adaptation or shift with the disappearance of the large mega fauna, which characterized the Paleoindian Period, to the use of modern flora and fauna. Five complexes/phases—Mummy Cave Complex, Oxbow Complex, McKean Complex, Hanna Phase, Pelican Lake Phase—are included in the Middle Prehistoric (Archaic) Period.

The Mummy Cave Complex (7,500 to 5,500 YBP) is typically represented as a side-notched projectile point known as a Bitterroot. One incomplete and two complete Bitterroot projectile points were observed in two private artifact collections gathered from areas along the deflated shores of the Grayling Arm of Hebgen Lake within the North Hebgen Project Area (Davis 1973: 16-17, Figures 8, 14). The Oxbow Complex (5,500 to 4,500 YBP) is typically represented as a side-notched projectile point with a pronounced basal indentation. A complete Oxbow projectile point was observed in a private artifact collection gathered from an area along the deflated shores of the Grayling Arm of Hebgen Lake within the North Hebgen Project Area (Davis 1973: 17, Figure 14). An incomplete ignimbrite Oxbow projectile point was recovered across the Madison Arm of Hebgen Lake (less than two miles south of the North Hebgen Project Area at site 24GA0857) in 1990 (Deaver 1990: 32). In 1992 an incomplete obsidian Oxbow projectile point was recovered on the deflated shoreline surface at 24GA0860 (Deaver and Peterson 1992: 5.21). In 2006 Dickerson recovered an incomplete chert Corwin Springs sub-phase artifact (i.e. Oxbow projectile point) from 24GA0493 (Dickerson 2009: 51).

The McKean Complex (4,500 to 3,500 YBP) roughly corresponds with the Sub-Boreal climatic episode that was cool and moist, reflecting modern conditions. Four complete or nearly complete McKean projectile points were observed in private artifact collections (Davis 1973: 16-17, Figures 8, 12, 14), and a complete McKean projectile point was recovered in 1990 during a shoreline survey of Hebgen Lake (Deaver 1990: 34). A classic incomplete chert McKean projectile point (Dickerson describes this as a Hayden Valley artifact) was recovered in 2006 (Dickerson 2009: 51).

The Hanna Phase (3,500 to 3,000 YBP) is typically represented by a stemmed projectile point with distinct shoulders and a slightly expanding stem (Frison 1991: 91). Two complete, and three incomplete, Hanna projectile points were observed in private artifact collections (Davis 1973: 16-17, Figures 8, 14). All of these projectile points were collected from within the North Hebgen Project Area.

Over fifteen miles to the south of the North Hebgen Project Area is site 24GA0416. A complete obsidian Hanna projectile point was recovered in 2006 (Dickerson 2009: 65).
The Pelican Lake Phase (3,000 to 1,700 YBP) is characterized by several different point styles including Pelican Lake and a larger number of small, bulky dart points that are unnamed variations of the basic corner or side-notched dart point design. Besant projectile points are often viewed as a transitional form overlapping the Middle Prehistoric Period and the Late Prehistoric Period. A shift to a cooler/wetter climate during this period appears to have brought about an increase in human populations (Dickerson 2009: 17).

Davis observed at least six incomplete Pelican Lake projectile points in private artifact collections (Davis 1973: 16-17, Figures 8, 12, 14) located within the North Hebgen Project Area. Two incomplete Pelican Lake projectile points—one within and one just outside the North Hebgen Project Area, were recovered in 1990 during a shoreline survey of Hebgen Lake (Deaver 1990: 34). At least two incomplete Pelican Lake projectile points, made from chert and obsidian, were recovered from the surface at site 24GA0857 located across the Madison Arm of Hebgen Lake (less than two miles south of the North Hebgen Project Area). Dickerson describes an incomplete corner-notched projectile point made from glassy basalt that was recovered from 24GA0493 (located within the North Hebgen Project Area) in 2006 (Dickerson 2009: 52). This artifact closely resembles a Pelican Lake projectile point.

Over fifteen miles to the south of the North Hebgen Project Area is site 24GA0416. At least one incomplete chert projectile point, and possibly two incomplete obsidian projectile points, was recovered in 2006 (Dickerson 2009: 66-67). These artifacts closely resemble Pelican Lake projectile points.

The Late Prehistoric Period (1,700 to 200 YBP) is recognized as a shift in hunting techniques that involves the introduction of the bow and arrow and the presence of true “arrowhead” type projectile points of much smaller size than projectile points of earlier periods. A variety of small projectile point types—including corner-notched, side-notched and tri-notched—appear and are known as Besant, Avonlea, and Prairie/Plains side-notched. All side-notched and corner-notched arrow points from this period, with the exception of Besant and Avonlea, are grouped under Old Woman’s typology (Deaver 1990: 36). Communal bison hunting, although evident in earlier time periods, appears as a dominant and highly refined activity during this period but is usually associated with plains settings.

An incomplete Besant projectile point was observed in a private artifact collection (Davis 1973: 17, Figure 12) located within the North Hebgen Project Area.

In 1973 Davis defined the time range for Old Woman’s projectile points as falling between A.D. 750 to A.D. 1800 (1200 to 150 YBP). He observed one complete and four incomplete projectile points in private artifact collections (Davis 1973: 15-17, Figures 12, 14) located within the North Hebgen Project Area. Davis also recovered two additional complete chert Old Woman’s projectile points in 1973 (from site 24GA0326, see Davis 1973: 17, Figure 13). Over twenty years later, Davis refined his range of Old Woman’s projectile points as falling between 800 to 200 YBP (Davis et al. 1995: 9).

In 1992 a complete Late Plains side-notched projectile point, made of glassy volcanic material, was recovered from the surface at 24GA0101 (Deaver and Peterson 1992: 5.1) located within the North Hebgen Project Area. Two incomplete corner-notched volcanic glass artifacts were recovered by Dickerson in 2006 and were described as typical Tower Junction Sub-phase artifacts of the Late Precontact Period (Dickerson 2009: 52), dating to just slightly younger than Avonlea. This site is located within the North Hebgen Project Area. An incomplete chert side-notched projectile point was recovered just below the surface in a test unit in 1992 at site 24GA0859 located within one mile south of the North Hebgen Project Area (Deaver and Peterson 1992: 5.20).

Over fifteen miles to the south of the North Hebgen Project Area is site 24GA0416. An incomplete obsidian side-notch projectile point was recovered in 2006. Dickerson describes this artifact as a Tower Junction Sub-phase (Dickerson 2009: 67).
Contact Period

Protohistoric Period

The Protohistoric Period (approximately 300 to 200 AD), representing the transitional time between the Late Prehistoric Period and the Historic Period, has been described as “…a time of complex populations movements, technological innovations, and social change.” (Beckes and Keyser 1983: 335). One of the most significant social changes to occur during this period was the introduction of the horse during the early 1700s (Frison 1991: 122). In addition, material items that define the Protohistoric Period include glass trade beads and metal objects such as guns, metal cartridges, projectile points, and knives.

Investigations at prehistoric sites located within and surrounding the North Hebgen Project Area have been ongoing since the 1870s. The Obsidian Cliff quarries, located within Yellowstone National Park, were the focus of investigations by the Smithsonian Institution during the late 1870s (Dickerson 2009: 8).

Wayne Replogle, a park naturalist in Yellowstone National Park, spent eight years (during the late 1940s and early 1950s) researching the Great Bannock Trail (aka the Great Trail of the Indians or the Bannock Trail) and noting the locations of numerous lithic artifacts (Replogle 1956). The Great Bannock Trail was an aboriginal travel corridor approximately 200 miles in length stretching from the Camas Meadows in Idaho, across Targhee Pass and into the Madison River Valley, over the Gallatin Range and into the Gardiner River drainage, up the Yellowstone River and the Lamar River, to the Absaroka Mountains, and finally to the Clark Fork of the Yellowstone River and Shoshone River in Wyoming. Although named after the Bannocks of the Snake River Plains, the trail was used by several other tribes including the Flathead, Fort Hall and Wyoming Shoshoni, the Lemhi, and the Nez Perce along with early-day white explorers and trappers.

Although he never actually explored the areas later to become Yellowstone National Park, William Clark’s 1814 map contains labels such as “old Indian crossing” and “old Indian trail” locations that were based on information given him by John Colter (Bonney and Bonney 1970: 173). These locations are most likely early references to the Great Bannock Trail. Lieutenant Gustaus Cheyne Doane, during his 1870 Yellowstone Expedition, makes several brief mention of the Great Bannock Trail that he and his party encountered (Bonney and Bonney 1970: 243-244, 245, 247, 256).

Use of the Great Bannock Trail has been suggested to have occurred for at least forty years—from approximately 1838 to 1878 (Haines 1962: 1-3). Nez Perce Chief Joseph, along with approximately 750 followers, traveled portions of this route in 1877 while being pursued by U.S. Army General Oliver O. Howard (Howard and McGrath 1969, Roscoe 2005: 10). Less than a year later hostile Bannocks used the trail in 1878 in an attempt to reach hunting grounds in Wyoming (Bonney and Bonny 1970: 94). Replogle talked with individuals around the town of West Yellowstone who stated they drove cattle on the trail during the late 1890s and early 1900s (Replogle 1956: 6, 18).

Madsen (1958: 21-23) suggested a two-fold explanation for the popularity in use of the Great Bannock Trail by Native Americans. Buffalo populations began declining in the upper Snake River Valley of Idaho prior to 1840, necessitating distant travel to areas where buffalo were plentiful. In possession of horses, several tribes were able to make annual hunting trips to these distant places. The trail was known as one of four routes used by the Bannock to reach the eastern buffalo ranges of the Northern Plains and the Missouri River headwaters (Haines 1962: 3, Madsen 1958: 23). Davis postulates that obsidian may have been transported from the Obsidian Cliff Plateau along trails (Davis et al. 1995: 57) and the Great Bannock Trail appears to be one likely candidate. Haines clarifies the character of the Great Bannock Trail with the
Essentially, the Bannock Trail was a system of trailways, which, together, made up a complex route.” (Haines 1962: 5).

Early maps of the Yellowstone National Park area from the 1880s identify a portion of the Bannock Trail in the northwest corner of the Park (Yellowstone National Park 1881). As an employee of Yellowstone National Park, most of Replogle’s research focused on identifying locations of the trail within the confines of the park boundary. Nonetheless, he did conduct research in the area north of West Yellowstone. Interviews with several old-timers in town proved successful in documenting the trail around Horse Butte and along Duck Creek and Cougar Creek (Replogle 1956: 7-10, 13, 16-18). His fairly detailed description of the trail near Horse Butte describes two branches used depending on the weather conditions. The “good weather branch” passed to the east of Horse Butte and headed north toward the Duck Creek valley while the “bad weather branch” followed the Madison River (to the west and north of Horse Butte) to the Great Spring Indian campsite (Replogle 1956: 22).

Davis includes a sketch map showing the Bannock Trail heading toward the northeast to near the outlet of the South Fork Arm of Hebgen Lake where it bifurcates. One branch heads north along the west side of Horse Butte, crosses the north end of the Horse Butte Peninsula, heads toward Cory Spring along the north side of Grayling Creek, and then heads into Yellowstone National Park. The other branch heads north along the east side of Horse Butte, the swings east in the area of Rainbow Point Campground and heads toward Yellowstone National Park along the Duck Creek drainage.

During the 2015 survey a possible segment of the Great Bannock Trail was recorded coursing across the north end of the Horse Butte Peninsula in a north-south direction for approximately 0.6 mile. It does not exhibit a worn tread character with a surface slightly deflated below the surrounding ground; rather it appears the trail prism may consist of slightly greater packed soil that supports grassy vegetation and very little sagebrush. Ground surface visibility within, and adjacent to, the trail corridor is poor due to grassy vegetation and some sagebrush. The north end of the trail appears to head into Hebgen Lake (Note – the trail was inundated following the creation of Hebgen Lake in 1914) and at one time headed to nearby Giant Springs (aka Corey Spring) where a large Indian camp was located. The south end of the trail fades away as it approaches the lower flanks of Horse Butte.

Giant Springs, today known as Corey Spring (24GA0326), has long been recognized as a favored Indian camping spot in past times based upon many lithic artifacts and hearths found here through the years. Replogle also refers to this location as a ceremonial ground, where oncoming hunts and trips through the Yellowstone “country of mystery” were celebrated (Replogle 1956: 22). Of the entire length of the Bannock Trail, this particular spring area was a well-known meeting place for large groups seeking timber for fuel, good grazing for horses, and plenty of water.

Bannock Indian Chief White Bear and his people would frequent another favorite camping spot located approximately one mile to the south of Giant Springs, across Grayling Creek and near present-day Rainbow Point, during the early 1900s. Chief White Bear and his people would often stop in West Yellowstone for groceries or to trade hand-made gloves and moccasins for deer and elk hides (Eagle and Eagle 1978: 2-5, 2-33). The location of this camp spot (24GA1132) was identified in 1990 by Wind River Shoshone cultural resource specialists, through their oral history, as a place the Northern Shoshone would use as they traveled the Bannock Trail “…from the camus meadows of Idaho to the buffalo plains of Montana.” (Deaver 1990: 99-100).

Chief White Bear was well known in the Madison Valley west of the Madison Basin where he spent much of his life. He and his wife raised three sons—Yellow Bear, Spotted Bear, and Young White Bear—and was known to travel the ancient hunting trails of his people (Todd 1976: 878-879).
Historic Period

One of the first white settlers in the area immediately west of Yellowstone National Park, an area referred to as the Madison Basin, was Harry F. Dwelle. Locating on the South Fork of the Madison River less than four miles west of present-day West Yellowstone, Dwell established one of the first commercial businesses—the Grayling Inn—in 1884. His inn received mail from nearby residents and catered to stagecoach tourists traveling from Beaver Canyon, Idaho, via Monida, Montana into Yellowstone National Park. Frank Jay Haynes, a professional photographer and entrepreneur who later became the official photographer for the Northern Pacific Railway and Yellowstone National Park, became President of the Monida & Yellowstone Stage Company in 1898 (Eagle and Eagle 1978: 1-11, 1-15). It would be twenty-three years later before Dwelle would receive patent on his 160.0 acre homestead (Dwelle 1907).

Another early white settler, squatting in an area that would later be partially inundated by backwaters of Hebgen Dam, was bachelor rancher William A. Patt. Patt established his ranch at the mouth of Red Canyon Creek along the north side of Grayling Creek and about one mile west of Giant Springs in 1885 (MSU-Bozeman 2009) in the broad drainage of the Madison Basin. In addition to ranching, Patt was an accomplished carpenter and is credited with helping build the Sherwood Hotel at Henry’s Lake, Idaho and the Norris Hotel in Yellowstone National Park. Patt also guided and cooked for hunting parties in the area—on one occasion he cooked and guided for Theodore Roosevelt—and captured elk for shipment to zoos around the world (Roscoe 2005: 2, Vadnais 1992: 781-782).

Patt married German immigrant Emma Kerzenmacher in Helena, Montana in 1889 and soon after they arrived at their log cabin home in the Madison Basin (Vadnais 1992: 782). The Montana Park and Hotel Society in Helena, Montana asked Patt to keep a log of weather conditions in the Upper Madison Valley during 1890. These weather journal entries were later donated to Montana State University-Bozeman (2009). Patt did not file for a patent on his land in Madison Basin. Instead, in 1897, nearly twelve years after arriving in the area, he turned his ranch holdings over to his wife’s younger brother, Peter Kerzenmacher, and moved his family to Humphrey, Idaho (Roscoe 2005: 1-2).

On October 29, 1898 Peter Kerzenmacher’s wife Lulu was appointed postmistress of the Grayling Post Office located at their ranch home (Cheney1990: 125, Eagle and Eagle 1978: 1-15). Rising backwaters of Hebgen Lake—the result of the completion of the construction of Hebgen Dam in 1915—necessitated moving the post office and most of the other ranch buildings to higher ground (Roscoe 2005: 2, Eagle and Eagle 1978: 1-15). This post office remained in service until 1951 (Cheney 1990: 125). Between 1905 and 1910 Peter and Lulu received patent on 480.0 acres of land around the mouth of Red Canyon Creek (Kerzenmacher 1905, 1907, 1910).

Early settlers in the Madison Basin soon realized that in order to make a living they had to be flexible. While hunting and trapping opportunities were abundant, these activities did not provide for year-round income. In places, meadows along the Madison River provided forage for livestock but there was always the need to stockpile hay in order to maintain cattle and horse herds through the cold winter months. Many of the broad flats west of the Park were composed of obsidian sand which did not support nutritious stands of grass and were unsuitable for cultivating. On the other hand, recreation opportunities, both inside and outside the Park, brought a several-month burst of dollars to businesses that provided food, guiding services, lodging, and supplies. Timber was plentiful and several sawmill operations supplied the demands for log and lumber products (Eagle and Eagle 1978: 2-2, 2-5, 2-12).

Bootleg liquor was a source of income to a few enterprising individuals in the area as early as 1914. Apparently, there was no shortage of demand as transportation employees would deliver intoxicating spirits to Park engineers and soldiers. Even during the winter months of the 1930s, moonshiners were transporting their “…pretty good product” on rotary snowplow trains (Eagle and Eagle 1978: 2-12, 3-11-3-12). The
remains of at least two moonshine stills—belonging to Fred Reichenbach and Oliver “Snowshoe” Johnson—were recently located within the North Hebgen Project Area.

As early as 1877 a wagon road brought tourists up the Gallatin River to Yellowstone (Gray 2003). This wagon road may have extended only as far as Taylor’s Fork by 1898 but by 1910-11 the remaining portion of the wagon road, including fifty-three bridges and culverts, had been extended to the town of West Yellowstone (Houston 1933: 51). During the early 1900s E. H. Harriman, President of the Union Pacific Railroad, laid the framework to extend the Oregon Short Line Branch railroad north from Ashton, Idaho to the west boundary of the park (West Yellowstone Historical Society 2015). With the arrival of this railroad terminus in 1907 three individuals—Charles A. Arnet, Samuel P. Eagle, and L. A. (Dick) Murray—applied for one-acre permits from the Madison National Forest to construct hotels, residences, and stores (Eagle and Eagle 1978: 2-3).

Stagecoaches had been traveling eastward into the Park for several years and the area near the boundary line was often referred to “at the boundary.” Following the construction of a few houses near the railroad terminus the name “Boundary” was locally accepted as the town name. During construction of a railroad depot in 1908-1909 a railroad car named the “Terminus” was parked nearby and a post office was established with the name “Yellowstone, Montana.” This name was short-lived and by October 1908, when Charles Arnet was appointed postmaster, the post office name was changed to “Riverside” in reference to the U. S. Army Riverside Soldier Station which was located four miles to the east of the boundary along the Madison River. Despite being unpopular with locals and railroad officials, the name “Riverside” survived for twelve years until the post office and town name was permanently changed to West Yellowstone (Eagle and Eagle 1978: 2-6).

Several historic wagon roads—with destination or stop labels including Dwelle’s Store, Grayling Post Office, Monida, and Yellowstone National Park—are shown on 1902 GLO Plat Maps (BLM 1902a, 1902b, 1902c, 1902d). Segments of these historic wagon roads are still present and in use as Forest Service administration, access to private property, and recreation roads. Other segments were inundated by backwaters of Hebgen Lake following the completion of the Hebgen Dam construction in 1915. The remains of one stage station, located adjacent to a historic wagon road, was recorded during the 2015 survey.

**Forest Service**

The Federal Forest Reserve Act of 1891, supervised by the Department of the Interior, allowed the President of the United States to set aside timberlands from the public domain (West 1992: 30-32) and in 1899 the Gallatin Forest Reserve was established. It was comprised of approximately 45,000 acres located south of Bozeman (Parkcamper 2015). Apparently, the future townsite of West Yellowstone did not lie within the Gallatin Forest Reserve, rather it was located within the Madison Forest Reserve. This reserve, encompassing approximately 736,000 acres, was established in 1902 and became the Madison National Forest in 1907 following the transfer of jurisdiction of federal forests to the Department of Agriculture-U. S. Forest Service in 1905 (Davis 1983, MCHA 1983: 878-879). In June 1908 a six-block townsite was surveyed within the Madison National Forest (Eagle and Eagle 1978: 2-2).

The Madison National Forest was eliminated in 1931 and its administrative lands were divided between the Beaverhead, Deer Lodge, and Gallatin National Forests (MCHA 1983: 879). During the next forty years the Gallatin Reserve evolved through a series of land consolidations, eliminations, expansions, splits, transfers, and boundary adjustments into the Gallatin National Forest—which prior to 2014 boasted an administrative land base of over 1.8 million acres. In 2014 the Custer National Forest and the Gallatin National Forest formally combined to form the Custer Gallatin National Forest with an administrative land base of over 3.1 million acres (MacLean 2013: 68-69).
By 1920 there were at least fourteen districts identified on the Gallatin National Forest. At least fifty historic guard/ranger stations, dating from 1905 to 1940, were constructed across the forest and are described in a recent publication (MacLean 2013: 68-94). The Horse Butte Lookout consists of the original “Crow’s Nest” tree platform and an elevated tower located on the highest point on Horse Butte. The tree platform was constructed around 1933 and consisted of an open-air platform situated over twenty feet high in the upper branches of a large Douglas Fir tree. A rustic pole ladder provided access to the platform. The tree died several years ago and has fallen, but a few wood ladder rungs and several large spikes are still present on the main trunk of the tree. Several feet to the east of the tree platform is a forty-one foot tall, treated timber, L-4 tower upon which rests a 14 x 14 foot cabin. This tower, constructed in 1953 (Kresek 1998: 395, 398), is not presently staffed during fire season.

Some of the major programs on the Gallatin portion of the forest include grazing/range, mining, recreation, and timber. Three recreational hiking trails, located north of the Grayling Arm of Hebgen Lake, have been recorded as cultural sites (24GA1344, 24GA1362, and 24GA1372).

**Hebgen Dam and Earthquake Lake**

Construction of the earth-filled, concrete core wall Hebgen Dam—by the Montana Reservoir and Irrigation Company, predecessor to Montana Power Company—began in 1908 and was completed in 1915. The construction workers camp, or hydro camp, was built in 1909 and consisted of three building clusters—Cluster A was associated with a collection of maintenance related structures, Cluster B was associated with construction workers and operators, and Cluster C was associated with visitor facilities. Eventually, these three clusters would include a variety of structures including a dwelling, an office, a hospital, a garage, a store or storehouse which may have been a commissary, a dining room, a bunkhouse, several tent houses, tool sheds, root cellars, a barn/stable, a hen house, a granary, and a laundry. The isolated location of this camp demanded a high level of self-sufficiency—by the workers and for the animals used during the construction—which is reflected by various building structures. Through the years the majority of these structures have been razed or removed and presently, there is little evidence of the original historic hydro camp (Deaver 1990).

Hebgen Dam, located within the North Hebgen Project Area, is located on the Madison River approximately nineteen miles northwest of the town of West Yellowstone. Hebgen Lake is a regulating reservoir that serves as a supplementary water source during dry years for hydroelectric plants on the Madison and Missouri Rivers. The facility encompasses approximately 2672 acres of which approximately 800 acres are Forest Service administered lands (ERI 2002: 2).

With the rising waters of Hebgen Lake following completion of the dam construction in 1915, an unknown number of cultural sites located along the original courses of the Madison River and Grayling Creek were likely covered by water, never again to be exposed. Several recorded cultural sites, located along the present lakeshore, have been subject to deflation/erosion actions due to fluctuations of the lake level that have been ongoing for over one hundred years. These include prehistoric sites such as the Hebgen Lake Narrows Site (24G0101), the Giant Springs or Corey Spring Site (24GA0326), and the Rainbow Point Site (24GA1132). Historic sites such as the original Grayling Post Office location, segments of wagon roads, and portions of the Great Bannock Trail also lie beneath the waters of the Madison Arm and the Grayling Arm of Hebgen Lake.

An earthquake, registering 7.0 on the Ricter Scale, caused a massive mountain-slope slide of Sheep Mountain across the Madison River below Hebgen Dam on August 17, 1959 which eventually led to the creation of Earthquake Lake (ERI 2002: 26). Despite multiple cracks in the Hebgen Dam, and damage to the spillway, the dam held (UUSS 2015) and was soon repaired. The Hilgard Lodge (24GA0864), a small-scale resort offering rental boats and cabins located along the northeast shore of Hebgen Lake.
approximately one mile southeast of the dam, suffered irreparable damage as a result of this earthquake. This rustic lodge was constructed possibly during the mid-1930s. All of the buildings were structurally damaged to varying degrees and today at least two remain partially submerged in Hebgen Lake. Several stretches of U. S. Highway 287 were also damaged or fell into the waters of Hebgen Lake. Below the dam a campground was buried by the rising backwaters created by the mountain slope landslide. Twenty-eight people lost their lives due to this catastrophic event of nature.

**Civilian Conservation Corps**

In order to address nation-wide youth unemployment, to provide relief grants to states battling loss of natural resources, and to develop labor intensive public works program President Franklin D. Roosevelt signed Executive Order 6101 in April 1933 and established the well-known Civilian Conservation Corps or CCC’s (Brownell 2002: 5). One of two CCC camps on the Gallatin National Forest was located near the Basin Creek Ranger Station along the south shore of Hebgen Lake (the other camp was located at Squaw Creek/Shenango Ranger Station in the Gallatin Canyon north of Big Sky). During 1933 and 1934 this location hosted Company 1249 (Project F-15) and Company 1963 (Project DF-73). Over two hundred youths—boxcar-bound from New York City—and a cadre of adult supervisors arrived in 1933 where their efforts immediately focused on the construction of tent barracks, a mess hall, a barn, and a water tower.

Once these main camp necessities were completed the CCC boy’s work duties shifted to a variety of tasks including campground and road construction, bridge building, creosote-dipped telephone pole manufacturing, mountainside fire-break construction, gopher and larkspur eradication, and buffalo grass rehabilitation. The Cabin Creek Guard Station (24CB0479), located approximately six miles north of the Grayling Arm of Hebgen Lake, was built by the CCC and is still in use today as a Forest Service cabin rental. Three additional Forest Service cabins—Cinnamon Ranger Station, Porcupine Creek Guard Station, and Squaw Creek (Shenango) Ranger Station—were built by the CCC during the 1930s but it is not known which of the two CCC camps was responsible for their construction (MacLean 2013).

Sundays were devoted as a day of rest for the CCC boys but it often was consumed in laundry chores or perhaps by a visit from a local minister. Although the camp buildings once located near the Basin Creek Ranger Station are gone today and the area is no longer recognized as a former CCC camp, surrounding infrastructure elements such as several administrative buildings, campgrounds, hiking trails, and roads remain today as a testament to the legacy of the CCC (Dunbar 2002: 44-45).

One “CCC boy” who went on to achieve a position of somewhat prominence was artist/painter Eddie Glannon. Born near Pittsburg in 1911, Eddie spent only a short time in the Montana CCC camp near the Basin Creek Ranger Station. After meeting and marrying his wife in West Yellowstone, he moved to Roslyn, New York where he lived the rest of his life. In an interview prior to his death, Eddie stated that one invaluable lesson learned while in camp was “to love the land”. He also remarked that “…the life of the CCC gave experience with the earth that grew into a love for it, and for the generous people at the ranches…I think it changed our lives, too.” (Dunbar 2002: 45).

Today the West Yellowstone area is renowned for its recreation opportunities. The town provides accommodations and services to millions of tourists each year, heading into or out of Yellowstone National Park, virtually year-round. The Hebgen Lake District of the Gallatin National Forest administers much of its land base for the enjoyment of recreation seekers, but also administers land for livestock allotments and timber products.
Existing Condition
As of September 2015 there are 46 recorded cultural sites located within the North Hebgen Project area. Table 2 briefly describes the cultural sites located within the Project Area. Twenty-eight sites are considered prehistoric sites including two chert source locations; a stone circle; twenty-one lithic scatters; and four prehistoric camps. Three of the lithic scatters, 24GA0861, 24GS0862, and 24GA0863, are currently inundated by Hebgen Lake.

One of the prehistoric camps is referred to as the Rainbow Point camp and is associated with the Bannock Trail. According to Deaver (1990):

“The site is reported to be associated with the Bannock Trail by Replogle (1956) and Davis (1973). They base this putative association on proximity and general oral histories. The contemporary Wind River Shoshone cultural resource specialists maintain the site has continuing significance to their people. It retains integrity of relationship due to its location in the area known through oral history to have been used by the Northern Shoshone as they moved from the camus meadows of Idaho to the buffalo plains of Montana. From the Northern Shoshone point of view the site retains integrity of condition because it is still recognizable as a campsite even though it is partially inundated (Wise and Tarnesse 1990)”.

Two segments of the Bannock Trail, used prehistorically and historically, are located within the Project Area. The Shoshone and Bannock tribes established the route to the Plains that began at Camas Meadows in Idaho, over Targhee Pass, the Gallatin Mountains and the Absaroka Range into the Clarks Fork Valley and it became known as the Bannock Trail. From there, Bannock and Shoshone (often with Flathead and Nez Perce) would choose between the Yellowstone Valley and the Wyoming Basin to hunt bison. For at least forty years ending in 1878 with the Bannock War, tribes used the Bannock Trail for access to drainages such as the Madison, Gallatin, Yellowstone, Stillwater, Clarks Fork, and Shoshone valleys and through them to the Plains buffalo ranges (Haines 1962). It was considered a major historic transportation conduit between the Basin and the Northwest Plains.

The Great Bannock Trail is considered culturally sensitive, meaning Culturally sensitive site types “…associated with traditional Indian ceremonies, cultural practices and important events in tribal history…include burials, rock art, stone rings greater than 7 m in diameter, monumental rock features, fasting structures, eagle catching pits, sweat lodges, wooden structures, Sun Dance lodges and grounds, offering and prayer locales and historic battle sites (Deaver and Kooistra-Manning 1995: 3.13). One stone ring site is located within the Project Area, although it may have been “rebuilt” recently. The trail and stone ring may be associated with Shoshone-Bannock and/or Crow use of the North Hebgen Project Area and any proposed disturbance of these features would necessitate consultation with the Shoshone-Bannock and Crow Cultural Committee to assure proper respect and treatment.

One other site, the historic scatter with lithic cultural material (24GA0854), is also considered “multicomponent” containing both prehistoric and historic cultural material.

Table 2. Recorded Cultural Resource Sites within the North Hebgen Project Area

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Site Type</th>
<th>Site Status for Nomination to NRHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>24GA0101</td>
<td>Lithic Scatter</td>
<td>Undetermined</td>
</tr>
<tr>
<td>24GA0108</td>
<td>Lithic scatter</td>
<td>Undetermined</td>
</tr>
<tr>
<td>24GA0114</td>
<td>Lithic scatter</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Type</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>24GA0115</td>
<td>Prehistoric camp</td>
<td></td>
</tr>
<tr>
<td>24GA0397</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0398</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0444</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0479</td>
<td>Cabin Creek Guard Station</td>
<td>Eligible 1987</td>
</tr>
<tr>
<td>24GA0493</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0494</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0696</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0697</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0698</td>
<td>Prehistoric camp</td>
<td></td>
</tr>
<tr>
<td>24GA0848</td>
<td>Hebgen Hydro Camp</td>
<td></td>
</tr>
<tr>
<td>24GA0849</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0850</td>
<td>Prehistoric camp</td>
<td></td>
</tr>
<tr>
<td>24GA0852</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0853</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0854</td>
<td>Historic scatter, lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0855</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0860</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0861</td>
<td>Lithic Scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0862</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0863</td>
<td>Lithic Scatter</td>
<td></td>
</tr>
<tr>
<td>24GA0864</td>
<td>Hilgard Lodge Historic cabins</td>
<td></td>
</tr>
<tr>
<td>24GA1006</td>
<td>Stone ring</td>
<td></td>
</tr>
<tr>
<td>24GA1008</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA1131</td>
<td>Bannock Trail, lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA1132</td>
<td>Rainbow Point prehistoric camp</td>
<td></td>
</tr>
<tr>
<td>24GA1135</td>
<td>Chert source area</td>
<td></td>
</tr>
<tr>
<td>24GA1136</td>
<td>Chert source area</td>
<td></td>
</tr>
<tr>
<td>24GA1344</td>
<td>Trail 151</td>
<td></td>
</tr>
<tr>
<td>24GA1362</td>
<td>Trail 205</td>
<td></td>
</tr>
<tr>
<td>24GA1372</td>
<td>Trail 206</td>
<td></td>
</tr>
<tr>
<td>24GA1524</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>Site Code</td>
<td>Site Name</td>
<td>Site Type</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>24GA1656</td>
<td>Grayling Creek Bridge</td>
<td>Grayling Creek Bridge</td>
</tr>
<tr>
<td>24GA1767</td>
<td>Horse Butte Lookout Fire lookout</td>
<td></td>
</tr>
<tr>
<td>24GA1920</td>
<td>Reservoir &amp; log structure</td>
<td></td>
</tr>
<tr>
<td>24GA1921</td>
<td>historic depressions</td>
<td></td>
</tr>
<tr>
<td>24GA1922</td>
<td>Fred Reichenbach Historic cabin &amp; still remains</td>
<td></td>
</tr>
<tr>
<td>24GA1923</td>
<td>Snowshoe Johnson Historic cabin &amp; still remains</td>
<td></td>
</tr>
<tr>
<td>24GA1924</td>
<td>Lithic scatter</td>
<td></td>
</tr>
<tr>
<td>24GA1925</td>
<td>Historic sawmill pond, two trenches associated with a sawmill</td>
<td></td>
</tr>
<tr>
<td>24GA1926</td>
<td>Stage station remains and three wagon road segments.</td>
<td></td>
</tr>
<tr>
<td>24GA1927</td>
<td>Great Bannock Trail Segment</td>
<td></td>
</tr>
<tr>
<td>24GA1928</td>
<td>Wood Wagon Road</td>
<td></td>
</tr>
</tbody>
</table>

Fifteen historic sites are located within the Project Area including three recreational hiking trails; two log cabins with stills; four historic wagon road segments, including one associated with a stage stop; the Cabin Creek guard station; the Horse Butte Lookout; the Hilgard Lodge; the Hebgen Hydro camp; the Grayling Bridge; and three sites probably related to early sawmill operations in the area.

The two log cabins, each with its own still, were owned by two locally infamous people, Fred Reichenbach and “Snowshoe” Oliver Johnson. The four wagon road segments show up on 1903 GLO Plats as trails. One wagon road led from Yellowstone National Park to the town of Monida, MT and the Grayling Post office. The stage stop is located along this wagon road. Segments of this road have become FS Road #6697. Another wagon road also went to Grayling Post Office and now segments of this road have become parts of FS Roads # 1781, 6955, 6697, and 6697G. These three wagon road segments and stage stop have been consolidated into one site, 24GA1926. The fourth wagon road, the Wood Road, is not on travel management maps and is no longer in use.

Two cultural sites are associated with the management of the original Gallatin National Forest. The Cabin Creek Guard station was built by the CCC in 1937 is now used as a cabin rental. The current Horse Butte Fire Lookout was built in 1953 and is no longer in use. Three recreation trails, 24GA1344, 24GA1362, 24GA1372, may have been reconstructed by the CCC in the 1930’s and are maintained by the forest service.

The Hebgen Hydro Camp is the location of the 1909 construction workers camp built at the Hebgen Dam site. Circa 1914 the site contained facilities necessitated by Hebgen’s relative isolation – various storage facilities such as root cellars, meat storage sheds and a granary as well as support facilities such as a hospital and laundry. Very little remains of the camp since most of the structures were gradually abandoned and razed when no longer needed.
Heritage Report North Hebgen Multiple Resource Project

Grace Miller operated the Hilgard Lodge resort that included a store, wharf, boathouse and two guest cabins in 1958. The 1959 earthquake destroyed the resort which Grace Miller miraculously survived when her house floated down the lake. Today the site consists of four buildings, two of which are presently submerged by Hebgen Lake. One cabin and outhouse remain.

Two sites, the Grayling Bridge and the Cabin Creek Guard Station, have been formally evaluated for nomination to the NRHP. The Grayling Bridge was found NOT ELIGIBLE and has been replaced with a new bridge. No further consideration of this site is necessary for this analysis. The three lithic scatters, 24GA0861, 24GS0862, and 24GA0863, that are presently inundated will not be affected by this project and will not be included in further analysis.

The Cabin Creek Guard Station has been found ELIGIBLE for nomination to the NRHP. The remaining 41 sites have not been formally evaluated for nomination to the NRHP and are classified as UNDETERMINED. All 42 of these sites will be treated as ELIGIBLE throughout the effects analysis.

Environmental Consequences

Alternative 1 – No Action

Under this alternative no proposed treatment activities would occur. Normal on-going activities would still occur such as recreation, livestock grazing, road maintenance, hunting and wood gathering. In the short-term no impacts would occur on any heritage sites from any proposed treatments in the proposed action. However, in the long-term, without some sort of active management to reduce the risk of wildfire and establish more resilient ecosystems, the probability of a large wildfire is likely in the area. Dense pine stands and hazardous fuel loads on any existing heritage sites could cause the loss of important archaeological information. In addition, after a large wildfire vandalism and illegal site collection may increase with the new exposures of sites through erosion and lack of vegetative cover, and improved access and damage by dozer lines constructed during fire suppression efforts. Essentially, without some type of proactive site protection, 42 cultural resource sites would remain at risk from wildfire and fire suppression activities.

Project Design Features, Mitigation, Monitoring Common to Action Alternatives

Prehistoric and historic heritage resources are a nonrenewable resource. Heritage resources have many values including their use to gather scientific information on human culture history, interpretive and educational value, values associated with important people and events of importance in our history, and often an aesthetic value as in a prehistoric petroglyph or an historic landscape. For the American tribes, as well as other traditional culture groups, archaeological and historic sites often have importance for religious and ceremonial purposes or simply as locations for traditional uses important in a particular group’s ongoing cultural identity.

Since cultural resources would be protected under Section 106 of the NHPA, the potential to affect those properties becomes the measure of the effects of proposed treatments activities between the alternatives. An effect, according to 36 CFR 800.9(a), may include an alteration to the property’s characteristics of location, setting, or use. Adverse effects are defined as those which may diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling or association and include but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property
- Alteration of the character of the setting when that character contributes to the property’s qualification for the National Register,
• Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

A direct effect occurs when the action of the undertaking itself impacts the heritage resource. For example, ground-disturbing activities such as commercial harvesting with machinery and by hand; piling, burning, chopping and/or masticating natural and active fuels; prescribed burning; landing construction; and temporary road construction may damage or demolish a site. An indirect effect is not caused by the action itself but is the secondary result of the undertaking. An example would be manipulation of a watershed which could in turn cause increased erosion of heritage sites downstream or the upgrade of existing roads or trails which improves or allows public access into previously secluded site areas. Increased access can be directly related to an increase of vandalism or illegal/unauthorized artifact collection.

**Effects Common to All Alternatives**

Any treatment involving ground disturbing activities such as timber harvesting, log landing use, machine mastication and piling, and prescribed burning would have the potential to directly or indirectly affect cultural resources. Road maintenance, reconstruction, realignment, decommissioning and temporary road construction and obliteration are additional examples of activities that may directly affect cultural resources by altering or changing their existing character or integrity. Effects to cultural resources vary according to the magnitude of fuel reduction and forest health treatment activities dictated by alternative.

Integral to the North Hebgen Project is the use of the SIS as a proactive approach that would ultimately benefit cultural resources by treating pine stands and reducing fuel loads on the sites. This approach calls for the inclusion of the heritage sites in the proposed activity areas rather than avoiding the site by modifying the timber and/or fuel treatment boundary to exclude the site. It also eliminates the creation of “untreated islands or donuts” within the treatment areas. All sites would be avoided by ground disturbing harvest and fuel treatment activities, but where feasible, trees that may damage the sites or contribute to increased fuels would be removed.

Archaeological site treatments that can be utilized under the SIS include clearing of brush and downed timber, and selective removal of green, dying, and dead trees. Site treatment will be individually designed for each site located within treatment boundaries and implemented prior to harvest and/or fuel treatment activities. It will only be conducted in conditions where no ground disturbance would occur, and under the direct supervision of a Forest Archaeologist. Treated sites will be monitored throughout the life of the project to measure the success of the treatment and ensure the site is protected. Since the approach is individually prescribed and does not allow any ground disturbance within the site boundaries, no adverse effects to known sites is anticipated.

**Alternative 2 – Proposed Action**

**Direct and Indirect Effects**

Under this alternative eleven of the 42 cultural sites within the project area could become more “fire resistant” through SIS site treatments. Table 3 describes proposed site treatments for Alternative 2 that would avoid, reduce and/or remove adverse effects to sites located within the proposed treatment areas.

---

**Table 3 Alternative 2 Effects to Cultural Resources**
Eight cultural sites are located within Intermediate Harvest vegetation treatment units. The purpose of Intermediate Harvest treatments is to address high priority wildland urban interface (WUI) fuels reduction, aspen enhancement and/or forest health concerns, and these areas would be harvested with ground based equipment or skyline cable systems. Activity related fuels would be yarded to landings then burned. Excess residual fuels would be lop and scattered, trampled, masticated, chipped, piles and/or burned. All of these actions involve ground disturbing activities that have the potential to damage cultural resource sites.

Sites 24GA0698 (Prehistoric camp), 24GA1006 (Stone circle), and 24GA1767 (Horse Butte Lookout) are located in open areas where no fuels are present. These sites can be easily avoided by Intermediate Harvest vegetation treatments and no construction of landings, equipment parking, or temporary roads should occur within these site boundaries. Even though these sites would not receive individual site treatments, reduction of fuels within the treatment unit around these sites will help protect them from wild fire and fire suppression activities.
For prehistoric site 24GA1924, removal of fuels around and on the site could protect this site from negative effects of wildfire and fire suppression efforts. Potential disturbance such as construction of landings, equipment parking, or temporary roads within these site boundaries should be avoided.

Site 24GA1132, the Rainbow Point site, is located in an Intermediate Harvest unit as well as within the proposed Power Line Clearing corridor. This corridor is designed to reduce fuels outside of the permitted right of way but within 100 feet of the power line. All trees would be cleared up to one tree height (about 50 feet) of power lines then thinned to 100 feet from the power lines. The cultural site would benefit from the reduction of fuels across the site within both the treatment unit and power line corridor, but all ground disturbing activities would be required to take place outside of the site boundary. This includes activity related fuel yarding to landings, lands, temporary roads, and hand or machine piling.

Historic cultural sites are particularly susceptible to destruction from wildfire and fire suppression activities, especially if flammable materials such as log foundations or structures remain on site. 24GA1920, 24GA1921, 24GA1922, and 24GA1925 have flammable artifacts on site and fuel reduction around these historic sites would help protect them from wild fire and fire suppression activities. Potential disturbance such as construction of landings, equipment parking, or temporary roads within these site boundaries should be avoided, as well as any pile or landing burning.

Site 24GA1344, recreation trail 155, is slated for two vegetation treatments: Overstory Removal/Regeneration Harvest and Whitebark Pine Daylight. Overstory Removal/Regeneration treatment would harvest non-whitebark pine overstory, reserving the whitebark pine overstory as seed sources, and creating a two-aged stand structure. Some planting of additional whitebark pine may occur. Activity related fuels would be yarded to landings then burned. All excess residual fuels would be lop and scattered, tramples, masticated, chipped, piled and/or burned. The whitebark pine daylight treatment involves clearing vegetation within a specified distance of target whitebark pine saplings to enhance growth of these threatened pines. Excess residual fuels would be processed the same as through the regeneration treatment. The recreation trail would be avoided by these activities and would not be affected.

Site 24GA1923, Snowshoe Johnson Cabin, is located within a Group Selection/Natural Regeneration vegetation unit that involves the harvest of nearly all trees from within certain groups to facilitate regeneration of a new class of vegetation. Regeneration of trees would result from natural seeding although planting may be employed depending on the success of the natural regeneration. Activity related fuels would be yarded to landings then burned. All excess residual fuels would be lop and scattered, tramples, masticated, chipped, piled and/or burned. The site contains flammable artifacts and fuel reduction around this historic site would help protect it from wild fire and fire suppression activities. Potential disturbance such as construction of landings, equipment parking, or temporary roads within these site boundaries should be avoided, as well as any pile or landing burning.

No effects to culturally sensitive sites the Great Bannock Trail (24GA1927, 24GA1131) or stone ring (24GA1005) will occur since the trail is located outside of all currently proposed treatment units and the stone circle will be avoided. Consultation with the Shoshone-Bannock and the Crow Tribes should the trail and/or stone circle be included in any treatment units, temporary roads, or other ground disturbing activities.

**Proposed Road Work**

Segments of three wagon roads within the project area may be considered part of a network of historic wagon trails that provided vital transportation in the area, serving as mail routes, timber roads, and access to the Grayling Post Office. They are all recorded as one site, 24GA1926. Any proposed reconstruction, decommission or modification to the road template must be evaluated in consultation with the MTSHPO.
These roads include the Cougar Creek Road (FS# 1781); the Cougar West Road (FS #6955); the Whiskey Bay Camp Road (FS# 6697); and the Whiskey Bay G Road (FS# 6697G). Routine road surface grading to re-establish surface drainage should have no effect to these historic properties.

One prehistoric site, 24GA0698, is crossed by the Red Canyon Road (FS# 681) slated for routine road surface grading. By staying within the road template, surface grading will not affect 24GA0698.

**Cumulative Effects**

The cumulative effects of Alternative 2 would be the restoration of portions of the project area to a more desired condition where hazardous fuels are reduced and, eventually, a forest that is more resilient to natural disturbances events. Through the implementation of proposed site treatments, this alternative could preserve and protect 11 (26%) of the recorded cultural resources within the project area perimeter, and includes the cultural resources as an integral part of the future “more resilient” North Hebgen landscape. It is also consistent with Forest Plan direction to “maintain and enhance historic and prehistoric cultural resource values” (USDA Forest Service 1986:4, USDA-FS 1987: II-2).

There remain, however, 31 sites outside of the project treatment units that would remain at risk from wildfire and fire suppression activities. One of these sites, the Cabin Creek guard station, is a historic property.

Reducing the occurrence of large wildfires within the Project Area would result in the reduction in the number of cultural resources directly affected by exposure, damage or destruction following a wildfire event and reduction of indirect effects to sites from exposure, vandalism, and illicit artifact collection resulting in the loss of valuable information contained within sites.

**Conclusion**

Through the implementation of proposed site treatments, this alternative could preserve and protect 11 (26%) of the recorded cultural resources within the project area perimeter, and includes the cultural resources as an integral part of the future “more resilient” North Hebgen landscape. It is also consistent with Forest Plan direction to “maintain and enhance historic and prehistoric cultural resource values” (USDA Forest Service 1986:4, USDA-FS 1987: II-2).

There remain, however, 31 sites outside of the proposed treatment units that would remain at risk from wildfire and fire suppression activities. One of these sites, the Cabin Creek guard station, is a historic property.

**Alternative 3**

This alternative and its effects to cultural resource sites is the same as Alternative 2 except one site, 24GA1925, a historic sawmill would not be treated or protected. Through the implementation of proposed site treatments, this alternative could preserve and protect 10 (24%) of the recorded cultural resources within the project area perimeter. There remain, however, 32 sites outside of the project treatment units that would remain at risk from wildfire and fire suppression activities. One of these sites, the Cabin Creek guard station, is a historic property.

**Cumulative Effects**
Cumulative effects for Alternative 3 are similar to Alternatives 2 except only 24% (10) of the 42 recorded cultural resource sites would be made more “fire resistant” through proactive site treatment.

**Alternative 4**

This alternative and its effects to cultural resource sites is the same as Alternative 2.

**Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans and Other Disclosures**

Alternatives 2, 3, and 4 would comply with the NHPA through the use of the “Wildland Urban Interface and Large Scale Hazardous Fuels Reduction Site Identification Strategy (SIS)” which is part of the Montana Programmatic Agreement (MTPA). The Montana Programmatic Agreement (MTPA) is between the Advisory Council for Historic Preservation, the Montana State Historic Preservation Officer (MTSHPO) and Region One of the United States Forest Service and dictates how the Custer Gallatin NF is to comply with certain sections of the NHPA. The Montana This SIS protocol allows for proactive archaeological site treatment to reduce hazard fuels making the cultural resource more “fire resistant” rather than avoiding sites and leaving untreated “islands” within project areas.

They are also consistent with Forest Plan direction to “maintain and enhance historic and prehistoric cultural resource values” (USDA Forest Service 1986:4, USDA-FS 1987: II-2).

**Comparison of Alternatives**

Comparisons of the four alternatives indicate that Alternatives 2 and 4 would have the most beneficial effects to cultural resources since these alternatives would actively treat at least 11 cultural resource sites. Alternative 3 would actively treat 10 cultural resource sites. Alternative 1 would not pro-actively treat any of the 42 sites within the project area.

**Mitigations**

No adverse impacts are expected on any known heritage site or any site that would be identified during additional field surveys or during implementation. Specific measures taken to protect heritage resources are integrated into the proposed action project as Project Design Features and Mitigation Measures in Chapter 2 and include the following:

- All heritage field inventories will be completed for temporary roads, and landing locations.
- All sites within ground disturbing units will be reviewed by the Forest Archaeologist and individual treatment prescriptions assigned prior to ground disturbing activities.
- Forest Archaeologist will monitor all approved treatments. Forest Archaeologists will be notified prior to conducting the approved treatments.
- All activity fuels will be piled outside the perimeter of all heritage sites. No mechanized equipment will be allowed to operate within the heritage site boundaries unless specifically allowed by the prescribed site treatment.

Halcyon LaPoint & Mike Bergstrom 2/25/2016

Name and Title Date
References Cited


BLM (Bureau of Land Management). 1902a. GLO Plat Map For T12S, R4E. Public Room, Billings,
Montana.


Houston, E. Lina. 1933. Early History of Gallatin County Montana. Published as a Gift to “The Museum Of The Rockies” by Wesley and Florence Davis and Vern and Ethel Sexton.


UUSS (University of Utah Seismograph Station). 2015. Photographs from the 1959 Hebgen Lake, MT Earthquake.


Appendix A

Wildland Urban Interface and Large Scale Hazardous Fuels Reduction
Site Inventory Strategy (SIS)

Background

The Forest Service has been directed by Congress to implement an accelerated, multi-year program of hazardous fuels reduction as one component of the National Fire Plan and in response to The Healthy Forests Restoration Act of 2003. Current, unmanaged fuel loads in many areas support large, hot, uncontrolled, and devastating wildfires that destroy life and property, including historic properties. The Healthy Forest Initiative instructs the Forests to reduce fuel loads to lessen the effects of catastrophic fires. In an effort to restore the forests to a more fire resistant and natural condition, combination of treatments such as prescribed fire, thinning and timber harvest are proposed for landscape treatments from 500-10,000 acres.

Hazardous fuels reduction treatments will also help protect historic properties from the devastating effects of catastrophic wildfires, including associated suppression activities and subsequent erosion, such as the fires experienced in Montana in the last four wildfire seasons. From our experience in the Kraft Salvage and Ft. Howe Complex fires, we found that wildfire in the Ponderosa Pine Parklands burn in a mosaic fashion often burning some of the sites intensely and other portions very lightly. The intensity is a factor of fuel loading on the sites. Fuel loading can be the result of past fire producing downed dead timber, deep undergrowth providing “fuel ladders”, dense ponderosa pine forests that are encroaching into the open parkland, along with years of fire control practices. Although beneficial to historic properties over the long-term, various fuels reduction treatments have the potential to affect historic properties, particularly “fire-sensitive” sites. This SIS protocol identifies steps that will be taken to avoid and/or minimize those effects while accomplishing the objectives of the National Fire Plan, the Healthy Forest Restoration Act, and long term protection of the heritage resource.

Scope

This SIS covers all hazardous fuels reduction activities within Wildland Urban Interface (WUI) projects and other large-scale hazardous fuels reduction projects (larger than 500 acres). Activities covered include: hand thinning; mechanical thinning; timber sales embedded in thinning contracts; slash disposal, including lopping and scattering, chipping, pile burning, and windrow or jackpot burning; and broadcast burning

Reduction of fuels can be achieved in a variety of ways, including mechanical and manual thinning and the use of prescribed fire. Treatments in Wildland Urban Interface areas usually involve a two-fold approach. First and most urgent, in areas immediately adjacent to communities, thinning is used to create fuel breaks capable of stopping or slowing a wildfire before it reaches homes and other developments. The slash that results from thinning can either be piled and safely burned or removed for fuel wood or other uses. In the areas leading up to the fuel breaks, subsequent broadcast burning under prescribed conditions or a combination of thinning and burning can be used to reduce fuel loads in order to slow an approaching wildfire before it even reaches a fuel break. Both of these treatment strategies can help bring a crown fire to the ground, where it can be effectively and safely suppressed, thereby protecting life and property. See Appendix A. for descriptions of kinds of prescriptions that may be proposed in Region 1. Appendix B. is a list of term definitions.

SIS Protocol
The SIS protocol is conducted in six stages: 1. Pre-field Research and Sample Design; 2. Field Inventory; 3. Protection of fire sensitive sites; 4. Implementation; 5. Monitor; and 6. Documentation. The following guidelines will be used to determine initial survey strategies under this SIS and site protective measures. The Forest Archaeologist shall determine or approve the level of field survey for each project.

Pre-field Research and Sample Design. The Forest archaeologists along with fuels specialist and timber staff will utilize relevant information to assess the fuel reduction project’s potential to affect heritage properties and the expected nature and distribution of heritage properties that may be affected. This stage identifies “fire-sensitive” sites and the inventory sample strategy.

A review of available literature on the effects on fire on cultural resources and on the experience of FS heritage resource specialists indicates that there are two categories of fire-sensitive sites. The first consists of sites long-known to be vulnerable to the effects of even low-temperature fires and/or light fuel loads, such as sites that contain organic materials, exposed architecture, etc. Fire sensitive sites in Region 1 include historic sites with standing, or down wooden structures or other flammable features or artifacts; rock art sites; prehistoric sites with flammable architectural elements and other flammable features or artifacts such as wickiups, wooden lodges, culturally modified trees (including aspen art and peeled/scarred trees) and certain traditional cultural properties (based on consultation with tribes).

The second group includes sites that have generally been considered to have less risk for fire effects in most situations, including prehistoric and historic sites with deeply buried cultural deposits; prehistoric and historic artifact scatters; and prehistoric and historic sites with non-flammable surface features. However, depending on field conditions especially fuel loading—as well as specific site characteristics and expected fire behavior, other site types may be fire-sensitive in certain projects.

Assessment of the expected nature and severity of project impacts (this should include consideration of all planned activities and entries) will be based on:

- type and intensity of mechanical treatment
- type and intensity of prescribed burn, including fuel loading and fire prescription, expected fire behavior
- associated activities

Assessment of the expected nature and distribution of heritage resources will be based on:

- heritage GIS survey and site layers or hard copy survey and site atlases
- previous heritage reports and site forms
- cultural resource overviews and planning assessments
- information obtained through tribal consultation and public input
- information provided by other resource specialists familiar with the project area
- topographic maps, aerial photographs, ortho-photo quads
- other available GIS layers and maps including soils, vegetation type, slope

From this information a map with known sites and potential fire-sensitivity sites along with a site probability map will be constructed. The site probability map will be divided into high, medium and low potential for heritage resources.

Field Inventory.

Any areas of intensive ground disturbance will receive 100% survey, including but not limited to:
• Intensive mechanical treatments- machine piling, windrowing, mechanical crushing, skid trails where identified (cutting units where skid trails are not defined will be surveyed 100%).
• mechanical fire line construction
• staging areas, constructed safety zones
• water bars and other constructed erosion control features
• Hand thinning units using mechanized equipment
• Commercial thinning, i.e. timber sales and their equivalent. Projects that affect 500 acres or less will be surveyed 100%. Projects that exceed 500 acres in size may be surveyed using the timber SIS. Additionally, any areas of ground disturbing activity will receive 100% survey, including all roads, landings, skid trails, and any other areas deemed necessary based on the sample survey.
• Fuel breaks

The prescribed burn areas will be inventoried with the following guidelines:
• Inventory of 100% high site potential areas, 75% of the moderate site potential areas, and 10% of the low site potential developed during the pre-field research
• Locate and record any sites identified during pre-field work as “fire-sensitive”
• Monitor all previously recorded sites within the APE
• Identify sites that are considered fire-sensitive based on fuel loading, fire effects, site characteristics, and expected fire behavior.

In addition to the prescribed burn area, a half mile buffer around the prescribed fire APE will be inventoried as described above for heritage resources. This half mile buffer serves as a containment area should the prescribed fire escape.

Site Treatment and Protection.

Prior to implementation of any of the fuel treatment projects, the forest archaeologist and fuels specialist (timber manager for commercial thinning and/or burn boss for prescribed burns) will visit all site identified as potentially “fire-sensitive” and develop treatment plans for each site to ensure that effects to historic properties (or fire-sensitive properties for prescribed fire undertakings) are avoided.

Treatments might include hand removal/clearing of brush and downed timber, and selective removal of green, dead and dying trees by mechanical methods (such as a Timbco tree harvester). Each treatment will be recorded and implemented prior to the burn/ sale, and will not involve any ground disturbance. All sites with flammable features such as homesteads will be omitted from the burn area but protective measures will still be employed. If the FS subsequently determines that adverse effects on historic properties in any phase of the project cannot be avoided, the FS will drop the site from the project area and reconfigure the boundaries of the APE to avoid the site. Various combinations of the following protection measures may be considered.

Protection for sites with flammable components or “fire sensitive” sites may include:
• Exclusion from project area
• Hand line
• Black line

• Wet line

• Foam retardant

• Structural fire shelter

• Remove heavy fuels from site by hand

For sites that are not “fire sensitive” or considered to have less risk for fire effects in low-temperature and or light fuel load conditions (such as prehistoric and historic sites with deeply buried cultural deposits, prehistoric and historic artifact scatters, and prehistoric and historic sites with non-flammable surface features) that are located within prescribed burn, thinning, hand and mechanical treatments to reduce fuels on the sites, and then burning over sites may be allowed with the following provisions:

• No ignition points within site boundaries
• No staging of equipment within site boundaries
• Allow thinning within site boundaries, provided:
  o Cutting is accomplished using hand tools only
  o Large diameter trees are felled away from all features
  o Thinned material is hand carried outside site boundary
  o Mechanized equipment such as Timbco tree harvester parked outside of site boundaries
• No use of mechanized equipment within site boundaries
• No staging of equipment within site boundaries
• No slash piles within site boundaries

The treatment plans will be included in an inventory reports and summarized in table format. The treatment plans will be reviewed by the Timber/fuels specialists, included in the burn plan, and implemented prior to prescribe burn. All treatments for commercial thinning will be included in the NEPA documentation and monitored during treatment by Forest Archaeologist and Timber staff representative.

Due to the mosaic nature of these burns, we do not anticipate 100 percent burn over the sites, but in case of future wildfire in the area, we anticipate that the treatments will, in the long run, make the sites more wild fire resistant. For the most part, sites located in open grasslands and parks will be allowed to burn, since the grass does not have the fuel loading problems as those in the timber units, and the burn is expected to be fast and cool.
Post burn and Project Monitor

Post burn inventory would be conducted over 30% of the high probability areas and 10% of the med to low areas. Immediately after the fire, the high and moderate probability areas will be sampled in areas where ground visibility was poor in order to discover any new sites exposed by the fire and analyze the effects. Each site where treatment was implemented will be re-visited by the archaeologist, timber and/or “burn boss” to evaluate the effectiveness of the treatment. A final report will be produced that includes the treatment results and fire descriptions.

The purpose of post-treatment monitoring is to gather data that will be used to improve planning for protection of heritage resources in future projects. When wildfire occurs within these areas, treated sites will be monitored to discern the usefulness of fuel reduction methods over the broad landscape.

Documentation and Summary Report

A final report will be produced that include the inventory report, the treatment results, and fire descriptions. The inventory report will include a description of all planned activities, equipment to be used, and expected impacts; a discussion of fuel loading and expected fire behavior if prescribed burns are planned; a detailed discussion and rationale for the survey strategy if less than 100%, including a rationale for what is considered “fire-sensitive”.

For prescribed burns, a summary of the inspection of fire-sensitive sites and any other sites to be monitored, including site-specific fuel loading; site-specific protection measures, and site-specific monitoring requirements. Where appropriate, treatment tables, survey maps, and burn plans will be included in the report.

An update and summary report of activities completed each FY will be included in the annual report for the PA under the site inventory strategy section. The report shall include a list of WUI and other large-scale hazardous fuels reduction projects as well as summaries of the results of monitoring fire-sensitive and non fire-sensitive sites in prescribed burns, including the effectiveness of the identification strategies and protection measures and any changes proposed to make these more effective.

By reducing the fuel loads on the heritage resource, the sites would not only be returned to a more natural Ponderosa Pine parkland environment, but also be made more fire resistant to wild fires when they may occur. This proposed SIS not only provides for a proactive site protection but will also provide new information on site location, condition and site typology /age. Locational information will be used during future wildfire events, and treated sites will be monitored post wildfire to evaluate, along with other resource specialists, the usefulness of fuel reduction methods over the broad landscape.
Appendix A. WILDLAND URBAN INTERFACE PROJECTS IN REGION 1

The following prescriptions were developed to guide Region One’s implementation of hazardous fuels reduction treatments in the Wildland Urban Interface.

<table>
<thead>
<tr>
<th>VEGETATIVE TYPE</th>
<th>TREATMENT ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spruce-fir</td>
<td>Thinning, pile and burn, lopping, chipping, fuel breaks.</td>
</tr>
<tr>
<td>Mixed Conifer</td>
<td>Thinning, pile and burn, lopping, chipping, fuel breaks, possibly broadcast burn (may not be feasible due to high mortality with Lodgepole and Spruce-fir)</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>Thinning, pile and burn, lopping, chipping, fuel breaks, broadcast burn.</td>
</tr>
<tr>
<td>Grassland</td>
<td>Broadcast burn (very short term treatment)</td>
</tr>
<tr>
<td>Sagebrush</td>
<td>Fuelbreaks, broadcast burn.</td>
</tr>
</tbody>
</table>

**SPRUCE-FIR**

Spruce-fir stands are intolerant to fire. Fire at low intensities will kill spruce and fir if even moderate amounts of slash surround the tree base or root crown, therefore treatment in spruce/fir components will be more limited in treatment options than the other vegetative types.

Mechanical treatments will most likely be preferred to provide the spacing necessary to eliminate interlocking crowns. Thinning is based on residual wind firmness for the area and the understory must be removed to eliminate the laddering effect of fire. Remaining basal area per acre may be increased above 80 square feet per acre only if the residual stand can be limbed or pruned to a height of 25 feet or more. Fire as a tool in spruce-fir forests can be utilized to create wildlife openings, diversity within stands, or enhancement of aspen. Thinning with fire in the spruce-fir type is not recommended due to the intolerance of the species to fire.

Fuelbed reduction following mechanical treatment should be accomplished through fuelwood utilization by the public, or methods other than fire to ensure protection of the residual stand.

**MIXED CONIFER**

Mixed conifer stands primarily contain white fir, Douglas fir, corkbark fir, limber pine, and scattered
ponderosa pine. Scattered spruce will also be found in the upper transition areas, and ponderosa pine will appear more frequently in the lower transition zones of the true mixed confer type.

Mixed conifer forests must be treated with mechanical means to reduce the current stand densities to a basal area of 40-60 square feet per acre within the areas of immediate threat. The treatment may also be feathered to increasing basal areas as distance from the immediate threat area increases. Prescribed fire may also be used initially in some areas but not in others, before some type of mechanical treatment, due to the high potential for escape.

Reducing the existing densities will most likely require multiple entries of both pre-commercial and commercial operations including the reduction of other vegetative species along with seedlings, saplings, and brush.

**PONDEROSA PINE**

Ponderosa pine forests will be treated with both mechanical means and prescribed fire. The recommended emphasis for fuel treatment is to reduce stand and crown densities by creating opening within the stands. Many areas will require labor intensive mechanical thinning that may be followed by piling, removing, burning, chipping, or other methods that will alter the fuels profile. Long term, continued maintenance of these treatments is essential.

Reducing the ponderosa pine densities will most likely require multiple entries of both pre-commercial and commercial operations including the reduction of other vegetative species along with seedlings, saplings, and brush.

**SAGEBRUSH**

Many areas can be effectively treated with prescribed fire without mechanical treatment. Fire can be used to effectively remove sagebrush from existing sites with a corresponding reduction in flame lengths on future ignitions. To maintain a site after initial treatment and where it can be safely executed, prescribed fire should continue to be utilized.

**METHODS TO BE USED TO ACCOMPLISH PRESCRIPTIONS**

**FUEL BREAKS** – Fuel breaks are created to help change the behavior of a wildland fire by modifying the fuel structure in an area immediately adjacent to or surrounding developments and property to be protected in the wildland urban interface. Thinning for fuel reduction in fuelbreaks is more intense due to their nearness to values to be protected and strategic location for fire control. Fuelbreaks will vary in width according to the fuel profile and topography and may range up to 500’ in width.

The fuelbreaks will often be “feathered” which means they will be incrementally less dense as they move
toward the developed area. A distance around the fuelbreaks will also be thinned, possible up to thousands of acres, so that a fire’s movement and intensity may be lessened as it approaches the main fuelbreak.

The arrangement of fuelbreaks will also differ. Some projects will have corridors of fuelbreaks, thinning within those breaks, and burning between them.

**THINNING** – Thinning reduces stand density by removing stems in the understory, midstory, and overstory. Thinning actions will vary between fuelbreaks and areas surrounding fuelbreaks. Guidelines used for thinning in fuelbreaks include reducing tree density to 20’ spacing between crowns to 40’ spacing between groups. Thinning outside fuelbreaks may include thinning to 10’ to 15’ spacing between crowns.

Pre-commercial thinning involves hand thinning of smaller diameter materials. Commercial thinning, accomplished through timber sales, involves larger materials.

Once thinning is accomplished, the slash will be treated in several ways, including piling the material so it can be burned. Usually < 3” material will be piled, while the > 3” material will be utilized for personal fuelwood or sold for commercial fuelwood. Piles will be burned in the fall and winter season and potentially during the summer if conditions become suitable. The actual piling of the material may be accomplished by hand or machine, where equipment such as dozers and small tractors will haul the material to piles. Slash is also pushed or dragged into windrows. Some slash may be “rough-piled” or “jackpot piled” where heavier concentrations of fuel are left where they fall and are burned on site.

Material that is large enough for commercial thinning (merchantable timber), usually > 6” may be removed to a landing using a rubber-tire skidder, or tracked vehicle. Both rubber-tire skidders and tracked skidders are used, but where slopes exceed 30%, tracked skidders are used more frequently because of their maneuverability. Whole tree skidding methods move the entire tree to the landing, then remove the branches, concentrating the slash where it can be utilized as fuelwood or burned.

**LOPPING AND SCATTERING** - Thinned areas not piled may be “lopped” to reduce fuel slash heights and then broadcast burned. Lopping consists of cutting smaller branches off the main stem so the height of the slash layer is reduced, which in turn allows for a less intense fire if the are is broadcast burned.

**CRUSHING** - Crushing involves dragging a large drum with protruding spokes or spikes over the vegetation, effectively breaking the fuel into smaller pieces. Another form of crushing uses a “brush crusher” in which a piece of equipment similar to a “weed-whacker” is attached to a tractor. The “brush crusher” is able to reduce the height of vegetation from 4’ to 6’ down to 6” in height. Both of these pieces of equipment are pulled or transported by either rubber tire tractors, or rubber or metal track dozers. A dozer may also be used to “walk” over slash and crush it.

**CHIPPING** - In the chipping process, slash is forced through a chipping machine, reducing the larger pieces of slash to small chips that are spread over the site to be burned at a later date, or left on site to naturally decompose.
**BROADCAST BURNING** - Broadcast burning uses fire over a designated area to consume natural or activity slash that has not been piled or windrowed. Broadcast burning may be used separately or in conjunction with mechanical methods such as thinning. Broadcast burns may be ignited by hand, by “terra-torches”, torches mounted on 4-wheelers or on a flat-bed truck, or with aerial ignition. Preparation for the burn may include line building, both by hand and machine.

**PILE BURNING** - Pile burning disposes of hand or machine-piled slash. Piling the slash and burning during cooler, wetter, or winter conditions reduces the chance of escape and lessens the potential for damage to the remaining vegetation on site. Piles are normally ignited by hand using fuses or drip torches.
Appendix B. DEFINITIONS

1. **Black Line.** A fireline created by burning the organic matter and then extinguishing the fire.

2. **Broadcast Burn.** A prescribed burn over a designated area to consume natural fuels or activity slash that has not been piled or windrowed. Broadcast burning may be used separately or in conjunction with thinning.

3. **Burn Plan.** A detailed plan for conducting a prescribed burn that identifies the burn units, fire control methods, burn prescription, fuel moisture, weather condition criteria, and contingency plans.


5. **Fire Prescription.** Measurable criteria that define conditions under which a prescribed fire may be ignited, set prescriptive parameters (rate of spread, intensity, flame length, etc.), guide selection of appropriate management response, and indicate other required actions.

6. **Fireline.** A narrow, linear strip, cleared of vegetation to dirt that inhibits and/or contains the spread of fire. Firelines vary in width from one foot to over 10 feet, with most being two feet in diameter or less.

7. **Fuel loading.** The nature and amount of accumulated fuels which contribute to the intensity and duration of a fire.

8. **Fuelbreak.** An area adjacent to or surrounding a Wildland Urban Interface area, where thinning and other treatments are used to substantially reduce hazardous fuels. Fuel breaks will vary in width according to the fuel profile and topography.

9. **Hazardous Fuels Reduction.** Activities to decrease fuel loading and stand density to a manageable degree to reduce fire intensity. Treatments include creation of fuel breaks, thinning, and disposal of fuelbed materials using mechanical or non-mechanical means, as described in Appendix E.
10. **National Fire Plan.** The report, *Managing the Impacts of Wildfires on Communities and the Environment, A report to the President in Response to the Wildfires of 2000*, prepared by the Secretaries of Agriculture and Interior. The report calls for action and funding in five key areas: Firefighting; Restoration and Rehabilitation of Burned Areas; Hazardous Fuels Reduction; Community Assistance; and Coordination and Monitoring.

11. **Prescribed Burn.** A prescribed fire ignited by management to meet specific objectives. A prescribed burn may involve broadcast burning over an entire area or burning of thinning slash that has been piled or windrowed. See Appendix E for a description of these techniques.

12. **Prescribed Fire.** Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions that allow the fire to be confined to a predetermined area and at the same time produce the intensity of heat and rate of spread required to attain planned resource management objectives. Prescribed fire may be management-ignited (prescribed burn) or naturally-ignited (prescribed natural fire).

13. **Thinning.** Removing trees and brush to reduce stand density

14.

15. **Wetline.** A fire line constructed using water or foam, intended to prevent the advance of fire.

16. **Wildfire.** An unwanted wildland fire.

17. **Wildland fire.** Any non-structure fire, other than prescribed fire, that occurs on undeveloped land.

18. **Wildland Urban Interface.** Those areas of resident populations of imminent risk from wildfire, and human developments having special significance. These latter areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that, if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.
Appendix C.

Duff Consumption Estimates For the Ashland Ranger District

Duff consumption is often expressed in three ways: depth reduction, percentage depth reduction, and percentage mineral soil exposed. Each expression is appropriate to evaluating certain prescribed fire objectives. Mineral soil exposure is commonly used to define site preparation needs. Depth of duff reduction relates to the actual amount consumed and smoke production. Percentage duff reduction is useful for describing and setting objectives of prescribed fire to leave specified amounts of duff on site (Brown et al. 1985:1).

Consumption of duff is strongly influenced by moisture content. Duff burns independently of surface fuels below a duff moisture content of about 30 percent. Prescribed burning is frequently done at duff moisture contents between 30 and 120 percent, to avoid independent duff burns.

The following table is based on field estimates and is supported by a study completed on similar cover types as those on the Ashland Ranger District. The following citation is referenced for this documentation: “Predicting Duff and Woody Fuel Consumed by Prescribed Fire in the Northern Rocky Mountains” (Brown, James K. et al., Intermountain Forest and Range Experiment Station, Ogden, UT, INT-337, March 1985).

The information in the following table lists data collected from the Lubrecht Experimental Forest, which has similar cover types to those on the Ashland Ranger District. Based on personal experience this documented experiment is very representative of what occurs on the Ashland Ranger District.

<table>
<thead>
<tr>
<th>Variable</th>
<th>L¹</th>
<th>L²</th>
<th>A¹</th>
<th>A²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duff depth reduction (%)</td>
<td>23 to 73</td>
<td>14 to 35</td>
<td>40 to 65</td>
<td>20 to 40</td>
</tr>
<tr>
<td>Mineral Soil Exposure (%)</td>
<td>1 to 51</td>
<td>0 to 16</td>
<td>5 to 30</td>
<td>0 to 10</td>
</tr>
<tr>
<td>Duff Depth Reduction (in)</td>
<td>0.6 to 3.0</td>
<td>0.5 to 1.1</td>
<td>0.1 to 2.0</td>
<td>0.1 to 1.5</td>
</tr>
<tr>
<td>Pre-burn duff depth (in)</td>
<td>1.7 to 4.3</td>
<td>2.0 to 3.0</td>
<td>0.5 to 2.0</td>
<td>0.5 to 2.0</td>
</tr>
<tr>
<td>Duff Moisture Content (%)</td>
<td>16 to 102</td>
<td>28 to 106</td>
<td>15 to 90</td>
<td>15 to 90</td>
</tr>
<tr>
<td>NFDR 1,000-hr. timelag moisture content (%)</td>
<td>11 to 15</td>
<td>13 to 18</td>
<td>11 to 15</td>
<td>11 to 18</td>
</tr>
<tr>
<td>Pre-burn Tons/Acre (0 to 3”)</td>
<td>1.44 to 7.68</td>
<td>1.33 to 4.27</td>
<td>2.45 to 5.44</td>
<td>2.45 to 5.44</td>
</tr>
<tr>
<td>Pre-burn Tons/Acre 3” plus</td>
<td>4.84 to 47.96</td>
<td>9.55 to 46.92</td>
<td>3.35 to 27.95</td>
<td>3.35 to 27.95</td>
</tr>
</tbody>
</table>