National Park Service
U.S. Department of the Interior
Yellowstone National Park
Wyoming, Montana, Idaho

Lamar River Bridge
Environmental Assessment

August 2009

Lamar River Bridge

Environmental Assessment

Summary

The National Park Service (NPS) proposes to replace the bridge carrying the Northeast Entrance Road over the Lamar River in Yellowstone National Park. The bridge is currently 68 years old. Although the bridge still has an operating rating above state legal load limits, the deteriorated condition, in combination with substandard details and dimensions, has necessitated an evaluation of the future course of action to keep this crossing safe and reliable. The Western Federal Lands Highway Division of the Federal Highway Administration, in partnership with the Yellowstone National Park, is considering options to replace this bridge. This EA presents the findings of the alternatives analysis which was prepared with the intent of recommending a future course of action for this bridge. This EA is a comparative analysis of three alternatives: (A) No Action, (B) Replace the existing bridge with a new structure on the existing alignment, and (C) Replace the existing bridge with a new structure on a new alignment.

The existing bridge is nearing the end of its service life and it has many structural and functional deficiencies. The fair to poor structural condition of the bridge is due to extensive deterioration of the concrete deck. The piers and abutments do not have the adequate reinforcing to withstand a seismic event and the shallow foundations are subject to rocking during seismic events and are classified as scour critical, meaning water currents could eventually undermine structural components of the bridge). The bridge railings and approach railings are also substandard.

Alternatives B and C replace the entire bridge with a new structure. These options are very similar to each other with exception of the alignment, construction phasing and maintenance of traffic flow. Alternative B follows the current bridge alignment, while Alternative C aligns the bridge just upstream from the current alignment.

Two other alternatives were considered to rehabilitate or replace the existing superstructure and reuse the existing substructure: (1) Rehabilitate the existing bridge and widen the deck, (2) Rehabilitate the existing bridge and replace the entire superstructure. These alternatives were rejected as they did not meet all objectives for the project.

Alternatives C is the NPS's preferred alternative.

Public Comment - You may submit written comments through the NPS Planning, Environment and Public Comment Internet website (http://parkplanning.nps.gov/yell) or mail them to the Superintendent at the address below. This Environmental Assessment will be on public review until September 25, 2009. It is the practice of the NPS to make all comments, including names and addresses of respondents who provide that information, available for public review following the conclusion of the NEPA process. Individuals may request that the NPS withhold their name and/or address from public disclosure. If you wish to do this, you must state this prominently at the beginning of your comment. Commentators using the NPS website can make such a request by checking the box "keep my contact information private." The NPS will honor such requests to the extent allowable by law; however, you should be aware that the NPS may still be required to disclose your name and address pursuant to the Freedom of Information Act. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments are due by midnight, September 25, 2009.

Superintendent
Yellowstone National Park
Lamar River Bridge EA Comments
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CHAPTER 1: PURPOSE AND NEED

Introduction

The National Park Service (NPS) is proposing to replace the Lamar River Bridge located on the Northeast Entrance Road within Yellowstone National Park. Construction is anticipated to begin in the fall of 2010 and continue through 2011.

The Northeast Entrance Road connects Mammoth Hot Springs, Tower, Roosevelt, Lamar, and the Northeast Entrance and provides access to other areas in the Park (Figure 1). The Lamar River Bridge is located along this road about five miles east of Tower Junction and about 24 miles west of the Northeast Entrance. The Northeast Entrance road, the Mammoth to Tower segment of the Grand Loop Road, and the North Entrance Road are the only roads within the park that are kept open year-round. The roads are plowed in the winter months and provide the only winter access to the communities of Silvergate and Cooke City, Montana. Beyond the Northeast Entrance, U.S. Highway 212 connects the park to Silvergate and Cooke City, and in the summer months, to Red Lodge, Montana via the Beartooth Highway. Travelers can also reach Cody, Wyoming from the Northeast Entrance during the summer months.

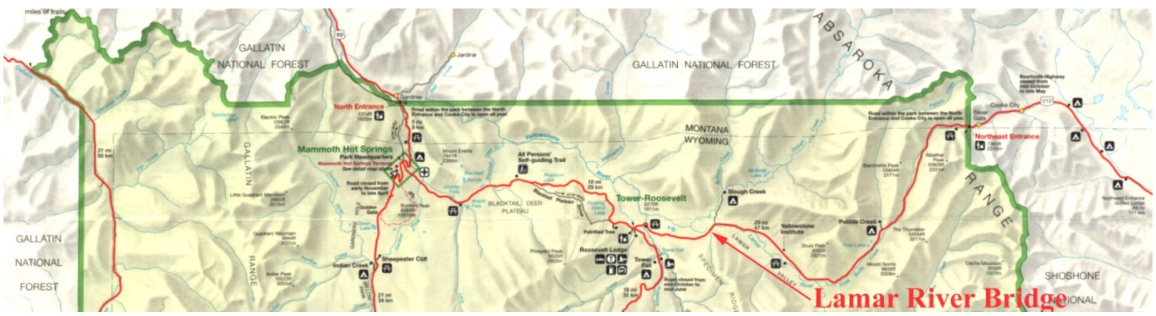

Figure 1: - Map of Yellowstone National Park
Location of the Lamar River Bridge project in the northeast portion of Yellowstone National Park.

An engineering Alternatives Analysis Study of the Lamar River Bridge was completed in February, 2008 (PBS&J, 2008) to explore repair, rehabilitation, and/or replacement alternatives for the 68 year old structure. The study found that the existing bridge, the third bridge to cross the Lamar River in this vicinity, was nearing the end of its service life. The study provided the basis for the alternatives discussed in this document.

This Environmental Assessment (EA) presents two action alternatives for proposed replacement of the bridge and assesses the impacts that could result from continuing current management (i.e., no-action alternative) or implementing one of the two action alternatives. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR 1508.9), and the National Park Service Director's Order (DO)-12: Conservation Planning, Environmental Impact Analysis, and Decision-making.

Background

Yellowstone National Park (YNP), America's first national park, is home to a variety of wildlife, spectacular geysers and hot springs, and a beautiful landscape. The park was established by an Act of Congress on March 1, 1872, and is managed by the National Park Service. The 2.2 million acres of the park were "set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people" and to "provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition."

The Lamar River Bridge was constructed in 1939 and is 335 feet long, and 35-40 feet above the river. From 1939 until the early 1980s, the bridge was preserved primarily through routine maintenance activities without any significant problems. During the 1980s, structural deterioration became a concern and repairs were made in 1989 when the concrete seats of the bridge piers were rehabilitated, and again in 1999, when a new asphalt concrete surface was placed on the bridge.

Existing Conditions

Figure 2 - Existing Lamar River Bridge

The current bridge has the following characteristics: Two concrete abutments, two concrete piers located within the high-water mark of the Lamar River, two steel girders resting on the abutments and piers, a concrete deck, and open rails (or railings). The bridge is a three-span structure. The main spans are fixed at Abutment 1, and the deck has expansion joints at both piers and Abutment 2 (see Figure 3). The main superstructure (or deck) spans are constructed of girders with a floorbeam and stringer deck-supporting system (See Figure 4). The steel is coated with a lead-based paint system, and the main column reinforcing steel is less than half of the minimum required by current Federal Highway Administration (FHWA) design specifications.

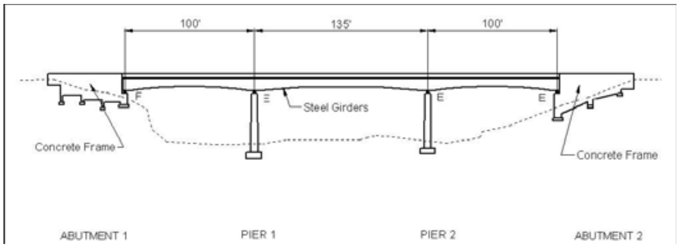

Figure 3- Existing Structure Elevation

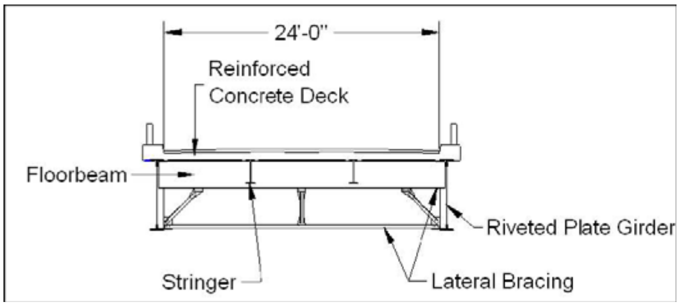

Figure 4 - Existing Structure, Main Spans

The existing steel railing does not conform to current FHWA strength or geometric requirements for bridge rails and the approaches do not have transition approach railings.

The bridge is supported by footings founded on rock with allowable bearing pressures of four to five tons per square foot. The piers are founded on shale while the abutments are founded on sandstone or basalt. While all these rock materials provide firm foundation support, they all are erodible.

The materials used to construct the bridge have lesser strengths than materials used today. Additionally, the bridge was designed for a vehicle which is much lighter than the current design vehicle; additional capacity is not available for heavier vehicles without strengthening.

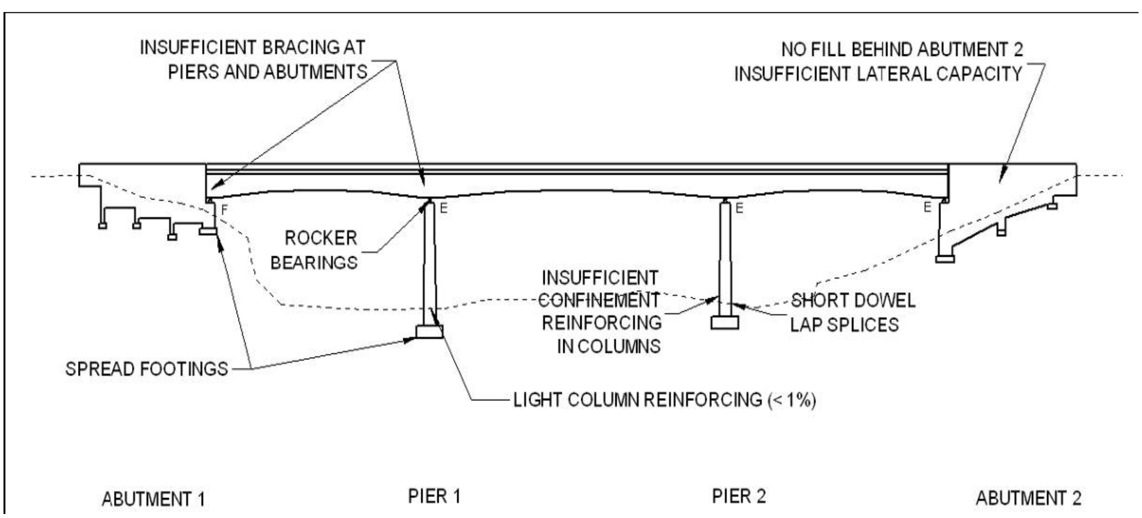

Figure 5 - Seismic Vulnerability

According to the Federal Highway Administration Bridge Inspection Report (2006), the fair to poor structural condition of the bridge was due to extensive deterioration of the concrete deck. The definitions used to rate this bridge follow a system developed by the Federal Highway Administration (FHWA 1988). The definitions are:

- FAIR CONDITION - all primary structural elements are sound, but may have minor section loss, cracking, spalling (i.e. concrete popping from the surface due to the effects of weather) or scour.
- POOR CONDITION – advanced section loss deterioration, spalling or scour.

The poor condition rating was due to deterioration that has occurred at the outer edges of the bridge deck, along curbs and sidewalks, and less towards the interior sections where vehicles pass. The emergence of rebar from various locations of the deck has also been noted. The girders had no documented damage, except for deterioration of the paint system. While the inventory rating (the load level which can safely utilize a bridge for an indefinite period of time) was lowered based on the 2006 inspection, it still has an operating rating above state legal load limits. The operating level is the absolute maximum permissible load level to which a bridge may be subjected.

The 2008 Alternatives Analysis study stated the bridge had structural and functional deficiencies in addition to the deterioration of the deck. The two-girder system supporting the bridge was considered ineffective. The study recommended redundant support structures, such as the use of three girders. The study also stated there were hydrologic concerns about how the Lamar River bridge piers are being scoured by the Lamar River

Seismic Vulnerability of Existing Bridge

Yellowstone National Park is in an area of high seismic activity (Seismic Zone 4 – seismic zones are indicators of where an earthquake is likely to occur, with zone 4 having the greatest probability). Faults have been mapped in the vicinity of the bridge by Taylor and others (1989), but not through the bridge area. Based on United States Geological Survey (USGS) hazard maps, there are active faults within 50 miles of the project area. In 1959, the Hebgen Lake earthquake occurred approximately 50 miles from the Lamar River Bridge with a magnitude of 7.3, showing that large quakes are possible in the area. The existing bridge is supported on footings and founded on shale, sandstone bedrock, and fractured volcanic tuff. The 2008 Alternatives Analysis study found the piers and abutments did not have the adequate reinforcement to withstand a seismic event and the shallow foundations would be subject to rocking during seismic events.

Purpose and Need

The purpose of this proposal is to preserve the existing vehicular access route along the northern portion of Yellowstone National Park by maintaining a safe and efficient river crossing over the Lamar River while ensuring park resources are protected.

Based on the existing condition described above, this proposal is needed to meet or exceed current FHWA bridge design and construction standards by having in place a bridge that will accomplish the following objectives:

1. Bring the bridge superstructure (deck) back to excellent condition for the long term.
2. Improve the bridge sub-structure by constructing an adequate pier configuration.
3. Increase the vehicular load capacity for the bridge.
4. Minimize stream channel scour at piers, while protecting the stream channel.
5. Improve seismic tolerance.
6. Improve safety along bridge railings.

Relationship to Other Plans and Policies

Current plans and policy that pertain to this proposal include:

Yellowstone National Park Master Plan (NPS 1974)—Record of Decision that strives to strike a balance between human impacts and park resources by developing management objectives for General Management, Resource Management, Visitor Use, and Interpretation.

Statement for Management (NPS 1991)— Describes existing conditions and management objectives for natural resources, adjacent lands coordination, visitor use, cultural resources, and park operations and planning.

Parkwide Road Improvement Plan EA (NPS 1992)— Describes rehabilitation or reconstruction of most segments of the Grand Loop Road, and the five paved entrance roads within the park.

NE Entrance Road Resurfacing, Restoration, and Rehabilitation EA (NPS 1997)— Describes rehabilitation of the road to keep it useable, until it can be reconstructed at some point in the future.

NPS Management Policies 2006
Management decisions regarding transportation facilities require a full, interdisciplinary consideration of alternatives and a full understanding of their consequences. The Service must find transportation solutions that will preserve the natural and cultural resources in its care while providing a high-quality visitor experience.

Appropriate Use

Sections 1.4 and 1.5 of *Management Policies* (2006) direct that the National Park Service must ensure park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 of *Management Policies* (2006), *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the service; and
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it. More information on the definition of unacceptable impacts as cited in §1.4.7.1 of *Management Policies* (2006) can be found in the *Environmental Consequences* chapter.

A bridge providing access to important areas of the park is a common and vital structure in most park units. This is especially true of the Lamar River Bridge which is along the only year round travel route in the park. Proper location, sizing, as well as construction materials and methods would ensure that unacceptable impacts to park resources and values would not occur. The proposed Lamar River Bridge is consistent with the park's master plan and other related park plans. With this in mind, the NPS finds that construction related to rehabilitating or reconstructing the Lamar River Bridge is an acceptable use at Yellowstone National Park.

Public Scoping

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an environmental assessment. Yellowstone conducted both internal scoping with appropriate NPS resource specialists and external scoping with the public and interested parties. This interdisciplinary process helped to refine the purpose and need, identify potential actions to address the need, and determine likely issues and resource impact topics (i.e., resources that could be impacted by the implementation of a given course of action or alternative).

Public scoping to further identify issues and concerns began on July 28, 2008 with a press release, mailing to interested parties, and posting of a scoping newsletter on the NPS Planning, Environment and Public Comment (PEPC) website.

A total of three written comments were received through mailed letters through PEPC. One comment stated that the bridge should be left alone, the second that it should be replaced or fixed, and the third suggested if a new bridge needed to be constructed, the old bridge could be left in place to allow bison to cross.

Impact Topics Retained for Further Analysis

Impact topics for this plan have been identified by the interdisciplinary team on the basis of: 1) federal laws, regulations, and orders; 2) *NPS Management Policies 2006*; 3) National Park Service knowledge of resources at Yellowstone National Park; and 4) comments received during public scoping. Impact topics that were carried forward for further analysis in this EA are listed below, along with the reasons why the impact topic was further analyzed. For each of these topics, the text also describes the existing setting or baseline conditions (i.e., affected environment) within the project area. This information will be used to analyze impacts against the current conditions of the project area in the *Environmental Consequences* chapter.

NATURAL RESOURCES

- **Water Resources, Floodplains, Wetlands, and Hydrology**

The existing bridge is located within surface waters and within the 100-year floodplain of the Lamar River. There is a potential for increased sedimentation during and after construction and the potential for localized stream morphology changes. Periodic runoff could occur during storm events. Some slight increase in hard surfacing could occur, which could increase the amount of impervious surface in the area, which could possibly increase the erosion potential of the area. Therefore, these topics have been retained for further consideration.

- **Migratory Birds, including Bird Species of Management Concern**

Construction-related noise could potentially disturb migratory bird species, and have potentially adverse impacts. Removal of all or portions of the bridge structure could disturb nests of migratory birds. Effects could be temporary or long-term. For these reasons, migratory birds, including bird species of special management concern, have been retained for further analysis as an impact topic.

CULTURAL RESOURCES

- **Historic Structures**

Historic structures are the buildings, structures, objects, cultural landscapes and districts listed on or eligible for listing on the National Register of Historic Places (NR). In 1997, the Wyoming State

Historic Preservation Office (WYSHPO) concurred with the park's determination that the Lamar River Bridge is eligible for listing on the National Register of Historic Places prior to the rehabilitation and resurfacing of the Northeast Entrance Road. The bridge is also identified as a contributing feature of the Northeast Entrance Road Historic District. Since an adverse affect to the bridge has been determined, the topic of historic structures has been retained for further analysis as an impact topic.

SOCIAL AND ECONOMIC RESOURCES

- **Socioeconomics**

The proposed actions within this plan would not change local and regional land use or appreciably impact local businesses or other agencies. Implementation of the proposed action could provide a negligible beneficial impact to the local nearby economies due to minimal increases in employment opportunities for the construction workforce and revenues for local businesses and governments generated from these additional construction activities and workers. However, any increase in workforce and revenue would be temporary and negligible, lasting only as long as construction. If the No-Action alternative were adopted, the existing Lamar River Bridge would continue to deteriorate and safety concerns would continue to escalate leading to an eventual closure of the bridge and thus severing access beyond. Because the impacts to the socioeconomic environment would exceed a minimal threshold, this topic has been retained.

- **Health and Human Safety**

The NPS Management Policies 2006 state that while recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. At some point in the future the existing bridge would become unsafe for visitor or employee use as explained in the Existing Condition discussion above. Given these issues, health and human safety has been retained for further analysis as an impact topic and road and bridge safety have been retained as an impact topic.

- **Park Operations**

Routine maintenance activities for the Park include maintenance of visitor use facilities, roads, systems infrastructure. Resource and visitor protection activities also rely on vehicle access across the Lamar River. Construction of a new bridge structure would reduce maintenance of the bridge. Due to the critical nature of access across the Lamar River, park operations have been retained for further analysis as an impact topic.

Impact Topics Dismissed From Further Analysis

Some impact topics have been dismissed from further consideration, as listed below. The rationale for dismissing these specific topics is stated for each resource.

- **Topography, Geology, and Soils**

The locations for bridge alternatives will be restricted to sites directly adjacent to the existing bridge or within the same footprint of the current bridge. Modifications of the topography and excavation of soils would be required to facilitate construction activities in all alternatives, but these modifications would be imperceptible or not measurable. Given that there would be no significant topographic or geologic features in the project area and that the area has been previously disturbed, this topic has been dismissed from further analysis in this document.

- **Threatened and Endangered Species**

The gray wolf and Canada lynx are protected pursuant to the Endangered Species Act (ESA) of 1973, as amended, and present within potential project areas in the park. The Lamar Bridge is not within a Lynx Analysis Unit of the park, and would therefore be a "No Effect" per Section 107 of the ESA. No loss of wolf habitat would occur; construction activities should not significantly affect wolf behavior or travel patterns. The Parkwide Road Biological Assessment submitted to U.S. Fish and Wildlife Service (USFWS) in 2008 and the subsequent Biological Opinion prepared by the USFWS in 2009 for the Yellowstone Park Roads Program, meets the Section 7 requirements of the ESA for this project. The Lamar River Bridge project is included as part of a Parkwide Roads Program for which Section 7 compliance is complete, thus, the topic of threatened and endangered species has been dismissed from further analysis as an impact topic.

- **Vegetation including Rare Plants, Wetlands, and Exotic Plants**

The locations for the alternatives to reconstruct the Lamar River Bridge have been surveyed for rare plants, wetlands, and exotic plants. Vegetation in the area of the Lamar River Bridge is primarily a sagebrush-grassland community with some scattered patches of conifers and aspens. Most of the conifers are spruce and fir along the slopes of the Lamar River. Willows and other shrubs occur along the drainage channels.

The immediate vicinity of the Lamar River Bridge was surveyed in the summer of 2005. Rush-pink skeleton-weed (Lygodesmia juncea) has apparently never been reported to occur in Yellowstone National Park, and thus the discovery of the site near the Lamar River Bridge represents an addition to Yellowstone flora. Rush-pink is native to North America, and is widespread in the Great Plains of the United States and of southern Canada, reaching west to the St. Anthony Sand Dunes in Idaho, western Washington and southern British Columbia and south into Utah. Rush-pink often grows on sandy soil or on sand dunes. The population in Yellowstone is on extremely south-facing sandy deposits associated with the bench above the Lamar River. The extent of the population at the Lamar River Bridge is unknown since the sandy south-facing slope continues to the west, and the survey was arbitrarily terminated. This species, though, at the edge of its range west of the Great Plains, is not rare in Wyoming or in the adjacent states of Idaho and Montana and is therefore not tracked by any of the state heritage programs. While common in the states surrounding Yellowstone National Park, Rush-pink is considered a highly restricted species within Yellowstone National Park that is inherently part of the biodiversity of Yellowstone, and therefore needs to be carefully managed to preserve its presence in the park. Considering the species is widespread and its habitat will be avoided, though, this impact topic has been dismissed.

- **Wildlife**

All existing guidelines for limiting human entry into critical wildlife habitat, including Bear Management Areas and closures for nesting birds or denning wildlife, would be followed during construction activities for the bridge. Noise would increase during construction, which may disturb wildlife in the general area. However, construction-related noise would be temporary and pre-construction sound conditions would resume following construction activities. Therefore, the general topic of wildlife has been dismissed from further analysis in this document. There are no nesting birds using the Lamar River Bridge with the exception of a few swallow nests, and a raven nest. Removal of these nests could occur prior to nesting season to reduce impacts to these birds. Impacts to migratory birds would be minor or less, therefore migratory birds have been dismissed as an impact topic.

- **Wilderness**

Of the park's 2.2 million acres (2,022,221 acres) 91% is recommended wilderness, and per NPS policy must be managed to preserve wilderness character. As none of the alternatives are located within recommended wilderness, or would have greater than negligible impacts to wilderness resources, wilderness has been dismissed from further analysis as an impact topic.

- **Soundscapes**

During construction, human-caused sounds would likely increase due to construction activities, equipment, vehicular traffic, and construction crews. Any sounds generated from construction would be temporary, lasting only as long as the construction. Sound from current automobile traffic currently exists and levels are not expected to change after completion of this project. Therefore, the topic of soundscapes has been dismissed from further analysis as an impact topic.

- **Visual Quality including Viewsheds**

Outstanding scenic character has always distinguished national parks from other areas. Yellowstone abounds with impressive viewsheds of the highest quality. The majority of Yellowstone's landscape appears untouched by humans and retains its primeval characteristics. Less than two percent of the park is developed and visitor use facilities are predominantly grouped along the figure-eight road system and in a handful of small communities, leaving substantial acreage in its natural condition. Because the project would not change the appearance of the bridge substantially, visual quality, including viewsheds, has been dismissed from further analysis as an impact topic.

- **Paleontological Resources**

Small pieces of fossil wood have, over the centuries washed down numerous Yellowstone watercourses after being dislodged from the site of their origin through natural processes; this fossil wood does not represent a primary fossil locality and therefore is not significant.
Since the general locations for any proposed new rehabilitated or reconstructed bridge have been previously disturbed by construction, little potential exists for excavation and construction activities to encounter paleontological resources. Therefore, this topic has been dismissed from further analysis.

- **Archeological Resources**

An archeological inventory of a 260 acre block surrounding the existing Lamar River Bridge was completed in the summer of 2002. The inventory resulted in the investigation of one previously recorded prehistoric site (48YE414), eight new prehistoric sites (48YE1352-48YE1359), one new site with both historic and prehistoric materials (48YE1360) and five isolated finds. The isolated finds consist of four prehistoric artifacts, and one historic artifact. The latter (IF-WY-102-LB3) is a metal spike that may have helped anchor an earlier bridge across the Lamar River. In addition, no further investigation of the Lamar River Bridge (48YE818) or a prehistoric site (48YE173) adjacent to the bridge was conducted, since there was no change in the site characteristics from their original recording. All of the sites are recommended as not eligible, except for sites 48YE414, 48YE1353, 48YE1355, 48YE1357, and 48YE1359, which are recommended as unevaluated pending additional evaluative test excavations.

Construction will not impact any of the sites identified during the inventory, and appropriate steps would be taken to protect any archeological resources that may be inadvertently discovered during construction. Because the project will not disturb any known archeological sites, the effect of the project on archeological resources would be negligible, and this topic has been dismissed from further analysis.

- **Ethnographic and Indian Trust Resources**

Native American tribes traditionally associated with the park were apprised of the proposed project during scoping. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during project implementation, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed. Indian trust assets are owned by Native Americans but held in trust by the United States. There are no Indian trust resources at Yellowstone National Park.

Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways. After consultation concerning the replacement of the Lamar River Bridge with the tribes affiliated with the park, no ethnographic concerns have been raised to date. Therefore, this topic has been dismissed from further analysis.

- **Cultural Landscapes**

Cultural landscapes are complex resources that range from large rural tracts covering several thousand acres to formal gardens of less than an acre. In the broadest sense, a cultural landscape is a reflection of human adaptation and use of natural resources and is often expressed in the way the land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by reflecting cultural values and traditions.

The Lamar River Bridge does not constitute a cultural landscape. The bridge has been documented as a part of the Northeast Entrance Road Historic District, determined eligible for listing on the National Register of Historic Places. No National Register eligible cultural landscape has been documented in the area of, and including the Lamar River Bridge.

- **Museum Collections**

Yellowstone's archives, library, and museum collections contain more than 5.3 million items, making them the second largest in the National Park Service. Most of these items are kept in the Heritage and Research Center (HRC), which is located outside the park entrance in Gardiner, Montana. This action is not anticipated to have measurable effects to these items. Therefore, the topic of museum collections has been dismissed from further consideration.

- **Air Quality**

Bridge construction activities could result in negligible degradation of local air quality, but such effects would last only as long as construction. Federal, state or local ambient air quality standards would not be exceeded. The Class I air quality designation for Yellowstone National Park would not be affected by the proposal. Therefore, air quality has been dismissed as an impact topic.

- **Lightscape Management**

The proposed action would not incorporate any exterior lighting on proposed facilities or structures. Any lighting needed during construction would be short-term in nature and limited to the duration of the construction. Therefore, this topic has been dismissed.

- **Prime and Unique Farmlands**

None of the soils in the park are classified as prime and unique farmlands. Therefore, the topic of prime and unique farmlands has been dismissed.

- **Environmental Justice**

None of the alternatives would have health or environmental impacts on minorities or low-income populations or communities as defined in the CEQ document Environmental Justice: Guidance under the National Environmental Policy Act (CEQ 1998). Therefore, environmental justice has been dismissed as an impact topic in this document.

CHAPTER 2: ALTERNATIVES CONSIDERED

This chapter discusses three alternatives to address the deteriorating condition of the Lamar River Bridge in Yellowstone National Park. The action alternatives discuss options for replacing the bridge at its existing location or at a location adjacent to it.

Alternatives Carried Forward

Alternative A – No-Action

Under Alternative A, *No Action;* no substantial improvements would be performed other than in accordance with routine maintenance operations. The Lamar River Bridge would continue to deteriorate and experience reduced load capacity. At a point in the future, the bridge would need to be closed and visitors, park staff, and residents of Cooke City and Silvergate would not be able to access many areas served by the Northeast Entrance Road within Yellowstone National Park. This no-action alternative assumes that the NPS would not make major changes to current management.

Action Alternatives

By replacing the Lamar River Bridge, all of the deficiencies (structure capacity, redundancy, scour resistance, and seismic vulnerability) of the existing bridge could be eliminated. The new structure would accommodate the park's roadway width standard with safer rails while providing structure redundancy and resistance to the scour and seismic demands. The 75-year service life and reduced maintenance needs offered by these options would ultimately yield the most cost-efficient long-term solution.

Alternative B – Replace Existing Bridge on Existing Alignment

Alternative B (figure 6) would completely remove the existing bridge and provide an entirely new structure. The new bridge would be located on the same horizontal alignment as the existing bridge, without a permanent shift in the traffic lanes. Because traffic would be maintained during construction, an on-site detour with a temporary bridge would be required. By completely reconstructing the structure, there is more flexibility in configuring the bridge for cost, impact, and constructability.

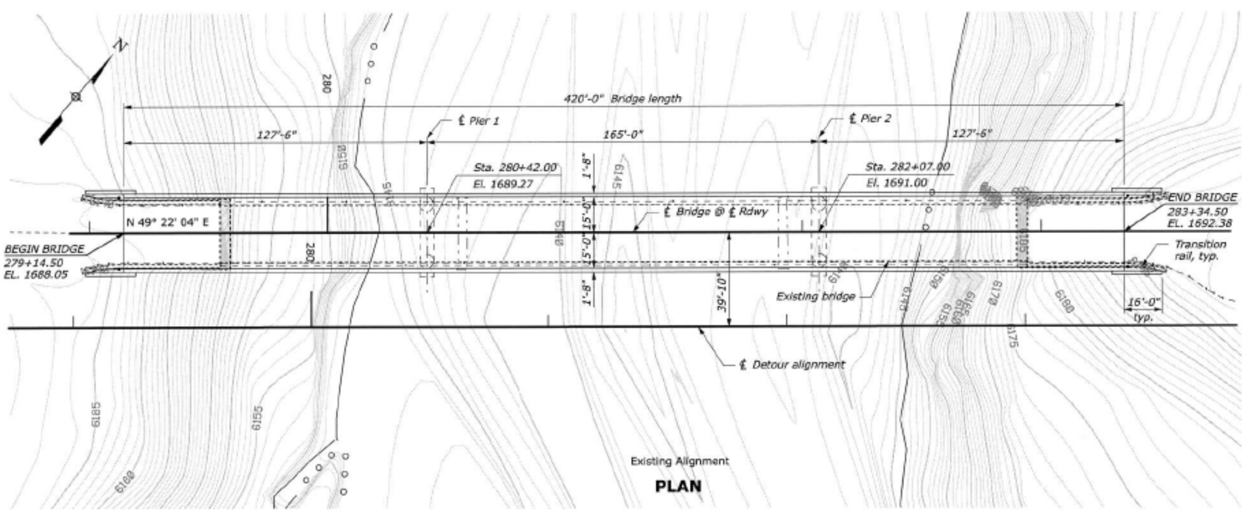

Figure 6 - Alternative B

This alternative would require approximately 400 linear feet of approach roadway work both east and west of the existing bridge. The current roadway width is less than the current park standard of 11-foot lanes and 4-foot shoulders. The approach work would adhere to the park standards by way of a taper at both the east and west ends of the final design for Alternative B.

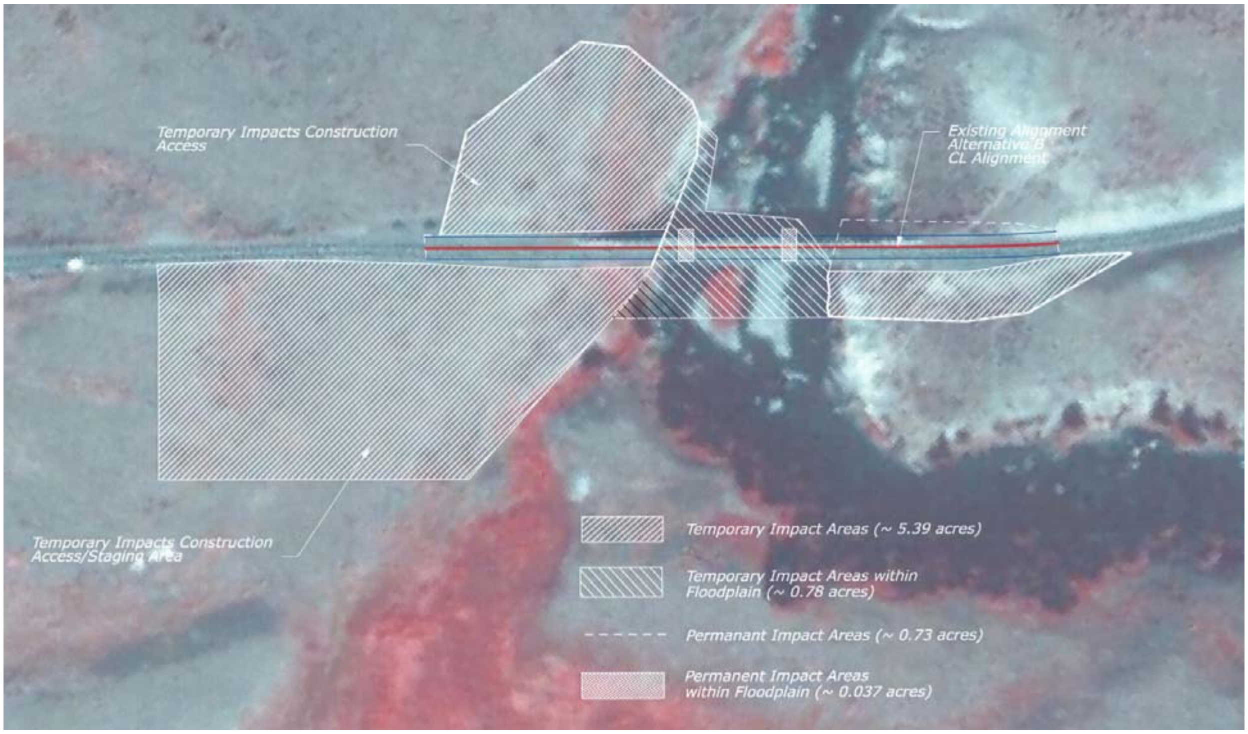

Figure 7 - Alternative B Impact Areas

The temporary bridge crossing would have an estimated bridge length of about 450 feet, enough to span over the river and connect to the existing ground contours without the need for walls. The bridge would be 24 feet wide and would carry a single lane in each direction. The length of the temporary detours on each end of the bridge would be minimized by tight curves. The cost for the temporary roadway detour has been included in the alternative estimate. The temporary detour bridge would require a construction access route to the river for construction of new piers, creating new ground disturbance southwest and southeast of the proposed bridge site. Preliminary estimates place the cost of a temporary bridge at $1.9 million. Due to the cost for the temporary bridge, the total project cost would be considerably higher (estimate of $8.5 M) than Alternative C.

The temporary bridge would be located adjacent and just upstream of the existing bridge. The temporary bridge would have two lanes and be capable of carrying commercial loads. No traffic lights would be required, though a reduction in speed would be posted as required by the curves on the temporary road access to the temporary bridge. Traffic would continue to use the existing bridge while the temporary bridge is constructed. Once the temporary bridge is constructed, traffic would be diverted to the temporary bridge while construction of a new bridge is completed. Removal of the existing bridge may require use of the temporary bridge, creating some traffic delays, and possible short-term closures.

Construction Schedule

This alternative would require more time and resources to accomplish as compared to Alternative C. This would result from first needing to construct a detour and temporary bridge, then removal of the existing bridge prior to constructing a new bridge. The alternative is anticipated to need at least 12-18 months to complete. The project is anticipated to begin in late summer of 2010.

Alternative C (Preferred) – Replace Existing Bridge along New Alignment

Alternative C (figure 8) constructs a new bridge adjacent to the existing bridge rather than on the existing alignment as described in Alternative B. One major advantage of constructing the replacement structure on a new alignment is that the existing bridge can remain in-use during construction. Also, because the existing bridge foundations will not be used, the new foundations can be located at the most desirable and least impacting position.

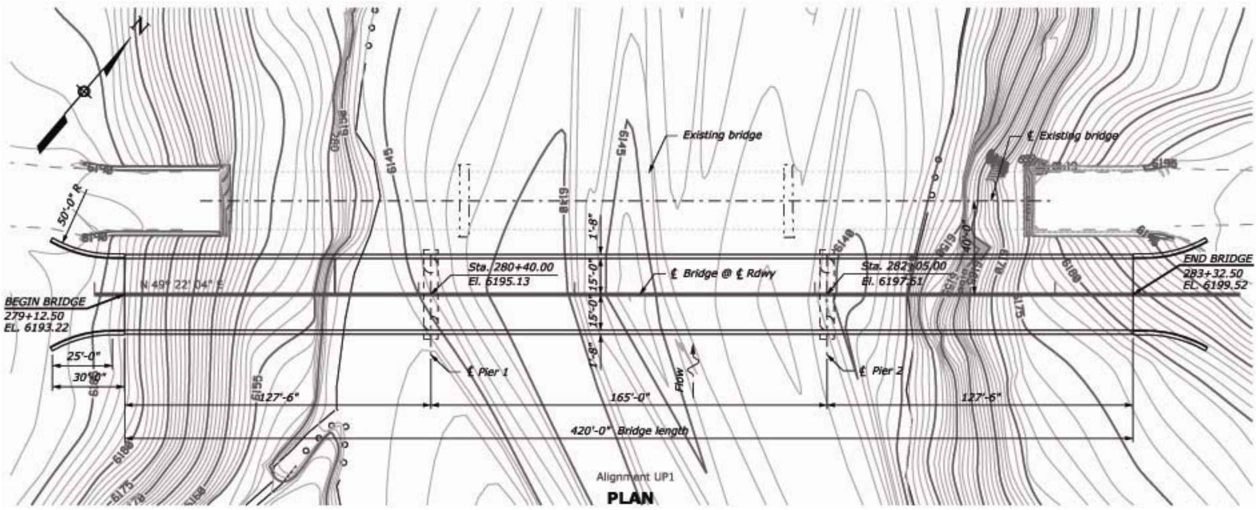

Figure 8 – Alternative C

A comparison of Alternative C with Alternative B is based on the only factors that differ; traffic control and cost. For instance, building the bridge and approach roadway offset from the current alignment means construction can occur while maintaining access and keeping the public safe. Conversely, while the temporary bridge imparts a large cost to Alternative B, the long approach roadway alignment shift of Alternative C would cost about $1M.

Alternative C would require approximately 4080 linear feet of approach roadway work divided both east and west of the existing bridge. The alignment is approximately 40 feet (centerline to centerline) upstream (south) of the existing alignment. As previously mentioned the current roadway width is less than the current park standard of 11-foot lanes and 4-foot shoulders. The approach work would taper at both the east and west ends of the final design for Alternative C to match the existing road width.

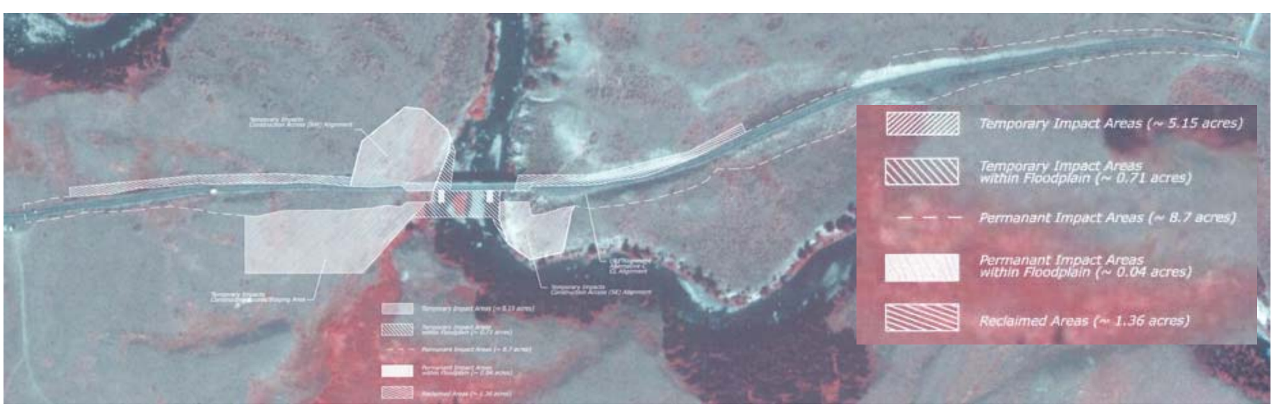

Figure 9 - Alternative C Impact Areas

A temporary bridge will not need to be constructed for this alternative. Instead, this alternative would use the existing bridge as the temporary detour bridge. A construction access route to the river would be constructed for pier construction of the new bridge. This access route would create new ground disturbance southwest and southeast of the proposed bridge site. The cost of constructing the approach road and connecting it back to the existing roadway alignment has been included in the total project cost estimate (estimate of $5.9 M).

Construction Schedule

The construction of this alternative would require less time and resources to complete than Alternative B, due to the fact that a new bridge construction could begin immediately without the need for a detour route to carry traffic. The new bridge would likely be used to aid the effort of removal of the existing bridge and some traffic delays and possible short-term closures may be necessary. This alternative is anticipated to need at least 12-18 months to complete. The project is anticipated to begin in late summer of 2010

Elements Common to Alternatives B and C

The replacement bridge for the action alternatives would be 30 feet wide with each travel lane being approximately 11 feet wide and 4-foot wide shoulders. Approach road width would also be 30 feet wide with identical travel lane and road shoulder width.

Road closures of up to 8 consecutive hours may occur at times to facilitate construction.

Substructure

The substructure of a bridge includes the piers and abutments. On this substructure rests the girders and deck (or superstructure). New abutments and piers would provide solutions to the problems associated with the existing structure such as: structurally deficiency, scour, and seismic vulnerability.

Piers

Cast-in-place concrete piers would be constructed on site and would be a type that will appear very similar to the form of the existing piers (see Figure 10 for the proposed pier shape). The piers would be anchored to the earth by drilling shaft foundations. One recommended feature of this pier is the concrete debris wall between the columns at the waterline. This wall is used to prevent flow debris, such as trees and branches, from accumulating between the columns. Accumulation of large amounts of debris accelerates the formation of scour holes and increases the extent of scour.

Abutments

Cast-in-place concrete abutments would be constructed on site and would be founded on drilled shafts. The exact configuration would be determined by the span layout requirements of the bridge.

Span Configuration

Based on FHWA's conceptual analysis, it was determined that a 3-span configuration would have the least cost, straightforward design, and would match the look of the existing bridge.

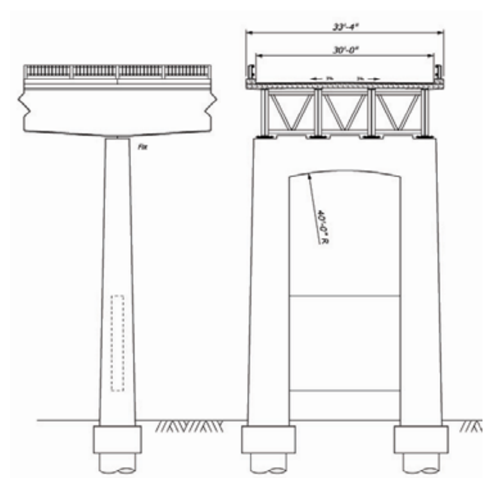

Figure 10: View of Pier Shape Considered for All Action Alternatives

Superstructure

Steel I-girders with a cast-in-place concrete deck would be used. In Wyoming and Yellowstone National Park, steel girders have historically been used due to their cost-efficiency. Steel girders appear to be the best option and would be used for this bridge due to cost, constructability, and replication of the form and material of the historic girders. A 3" hot-mix asphalt wearing surface with a waterproofing membrane would be applied to the full bridge length. The bridge rail would be the picket fence style used on most other bridges within Yellowstone and would have a Wyoming Department of Transportation (WYDOT) Box Beam transition railing. The existing bridge has scuppers that drain rainwater from the deck and drop it into the river below, the new bridge deck would not have these, instead water would be drained to the end of the bridge and down a rock lined waterway at the end of the wing walls to reduce erosion. The existing phone line hung from the existing bridge would be incorporated into the new bridge so as not to be seen.

Girders

The proposed total bridge width of 33'-4", would use a three or four girder layout. The girder system would provide a redundant superstructure, eliminating the potential for bridge failure if a portion of the superstructure fractures. A three-girder system reduces the girder weight by approximately 15% and results in a superstructure savings of about 1-2% of the total project cost over a bridge using four girders.

A haunched shape, slightly arched on the bottom side of the girder, would be used for the bridge. The haunched girder would increase steel weight by approximately 7% over a flat girder, resulting in an increased project cost of approximately 1-2%. This increase is considered acceptable to improve the aesthetics of the bridge, and to match the existing bridge design.

Railings

The proposed bridge rail for this project is a steel picket-type railing sitting atop a nine-inch tall concrete curb similar to the rail of the existing bridge, and has been used on several Western Federal Land Highways Division (WFLHD) projects in Yellowstone National Park. Approximately 50 feet of concrete walls with flared ends, similar to the present walls, would be used on the approaches to each side of the bridge.

Removal of the Existing Bridge

The removal of the existing bridge would require confinement techniques to contain the construction debris for protection of the river. Potential demolition techniques to minimize environmental impacts include raised netting, tarps suspended beneath the removal area, use of small localized equipment, and a river diversion. Removing old piers and installing new piers requires work within the waterway and will generate turbidity. In-stream flow diversion structures may be needed for completing the work. Some light blasting may be required in order to remove the existing piers to a level of approximately 7 feet below the river bed. Additionally, the existing bridge girders are coated with a lead-based paint and environmental regulations dictate special requirements for removal, handling, and disposal of this paint.

In River Work

In-stream work would require a minimum of two months and possibly longer. Work would likely require coffer dams to be installed and used to prepare foundations for a detour bridge, a minimum of two coffer dams of approximately 20 feet x 50 feet (Alternative B), or four smaller coffer dams of approximately 20 feet x 20 feet for a permanent bridge (Alternative C). Turbidity would occur during work platform (crane pad) construction, coffer dam installation and removal, and Detour Bridge or existing bridge substructure removal operations. It is anticipated that up to 4 separate crane pads would be constructed throughout the project, though they would not all be present within the river at the same time. Some pumping of water from the coffer dams may be required, and if done water would be pumped to an upland site where impacts could be keep to a minimum. Turbidity monitoring and limits would occur to meet any requirements stated in a Wyoming Department of Environmental Quality (WYDEQ) 401 permit that would be obtained for the project.

Addressing Hydraulic Concerns

As seen in the existing bridge plans, the vertical alignment of the roadway provides more than enough clearance above the design flood elevation. As such, as long as the abutments are located beyond the riverbanks, there should not be any hydraulic flow considerations or constraints.

Designing the bridge foundations to accommodate the anticipated hydraulic scour is of utmost importance. Preventing scour structurally is accomplished by designing the foundation such that the structural stability is not at risk from scour. Deep foundations such as drilled shafts or driven piles naturally achieve this because they are (typically) designed to attain their strength from non-scouring soils such as bedrock.

Construction of the Substructure

The abutments will be constructed on glacial fill material, outside of the river limits. The construction of the abutments would require drilling through the large boulders and cobbles.

Unlike the abutments, the piers would be constructed in the river. The river has a natural high ground "island" in the middle that remains above the low flow-water level. The piers for the three-span configuration would be located in the low-flow channels on either side of the "island." As a result, cofferdams would be required to create a dry working environment for the foundation construction. Other anticipated activities include sealing and dewatering of the cofferdams. Delivery of materials and equipment to the pier locations would most likely require temporary diversion of the river to create a construction access. Alternatively, the equipment and materials could be delivered to working areas, protected by cofferdams, by a crane.

Erection of the Superstructure

The erection of the superstructure will be somewhat complicated by the limited access in and around the river. If crane pads are needed to set the girders, an access road would need to be constructed to the river, and the pads would likely need to be constructed within the river limits.

Staging, Stockpiling, and Disposal Areas

Staging and stockpiling areas would be needed near the project area for equipment and materials (steel, concrete forms, gravel, machinery). Staging and stockpiling areas would be located in existing turnouts at either end of the existing bridge, or within the construction limits of the project including any new or temporary access roads that would be needed as part of this project. Turnouts adjacent to the bridge (popular with fisherman) would be closed for the duration of the project. A two to three acre site adjacent to the existing road and just south of the existing road on the west side of the river could also be used for staging and stockpiling of equipment. This area would be rehabilitated at the completion of the construction project. If a concrete batch plant is used, it would be located at the Frog Rock Pit (within the park) located approximately 11 miles west of Tower Junction, or in the two to three acre site previously mentioned. No washing of aggregate would be allowed at either of these sites. Topsoil from the potential two to three acre site would be removed prior to use, stockpiled, and replaced to aid in revegetation of the site. Approximately 10,000 to 12,000 cubic yards of excess embankment material (soil and gravel) would be stockpiled at the Frog Rock pit for use on future road construction jobs within the park.

Temporary Work Bridges

Temporary work brides may need to be placed to allow equipment access for bridge construction and removal. Work bridge construction may involve placement of large concrete pads on existing gravel bars and spanning with old rail car beds or something similar. These bridges would be placed and removed as needed in the immediate vicinity of the proposed bridge, or the existing bridge.

Construction Access Roads

Construction access for equipment would be constructed within the alignment of the new or existing bridge, or directly adjacent to them. These access routes would be kept to the minimum amount of disturbance for the equipment needing access to the river. Construction access for equipment would be needed on both banks of the river. All access routes would be rehabilitated in the same manner as described for the staging and stockpiling areas.

Traffic Delays

In general, up to 30-minute traffic delays can be expected from Memorial Day through Labor Day. Night closures may occur from 10:00 pm to 6:00 am if needed either before Memorial Day or after Labor Day. During a short period of time when girders are being set, some delays longer than 30 minutes may occur during daytime hours. If closures are not needed, the road would remain open without delay.

Construction Schedule

This alternative would require less time and resources to accomplish as compared to Alternative B. This would result from not needing to construct a detour and temporary bridge, prior to the construction of a new bridge. Alternative C, like Alternative B, is anticipated to need at least 12-18 months to complete. The project is anticipated to begin in late summer of 2010.

Aesthetics

One of the specific goals of this project is to consider aesthetics. Any bridge structure must match the overall flavor of the existing structures in the park and surrounding vicinity. The characteristics of other bridges identified to accomplish this are:

- Architectural features are subtle and blend into the natural environment.
- Girders are often variable depth (haunched).
- Guardrails are typically open so as to not restrict the views.
- Native materials, most commonly stone masonry or veneer, are used in some locations.
- Structure types are frequently simple.

Mitigation Measures (for Alternatives B and C)

The following mitigation measures have been developed to minimize the degree and/or severity of adverse effects, and would be implemented during construction of the action alternative:

- The new bridge would be designed using characteristics to resemble the existing historic bridge.

- Park staff would develop content for a Wyoming Travel and Tourism Internet website that would discuss the historic nature and design of existing and past bridges within Yellowstone National Park.

- No permanent rip-rap would be placed in or along the Lamar River as part of this project.

- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.

- Topsoil conservation measures would be employed prior to construction, to enhance revegetation efforts at the end of the construction phase.

- Construction zones would be identified and fenced with construction tape, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

- Revegetation and recontouring of disturbed areas would take place following construction, and would be designed to minimize the visual intrusion of the structure. Revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species using native species. All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed. Weed control methods would be implemented to minimize the introduction of noxious weeds. This project would follow Topsoil Retention/Vegetation Guidelines developed for previous projects within the park.

- Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as the use of silt fences would be used to minimize any potential soil erosion.

- Dust generated by construction would be controlled by spraying water on the construction site, if necessary. Any water used for dust control would be taken from the Yellowstone River at the jobsite. Any equipment used would be cleaned using NPS protocols for reducing the spread of any exotic or problem species.

- To reduce noise and emissions, construction equipment would not be permitted to idle for long periods of time.

- To minimize possible petrochemical leaks from construction equipment, the contractor would regularly monitor and check construction equipment to identify and repair any leaks.

- Construction workers and supervisors would be informed about special status species. Contract provisions would require the cessation of construction activities if a species were discovered inhabiting the project area, until park staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.

- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of any discovery and the park would consult with the state historic preservation officer and the Advisory Council on Historic Preservation, as necessary, according to §36 CFR 800.13, *Post -review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.

- The National Park Service would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors would also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.

- To minimize the potential for impacts to park visitors, variations on construction timing may be considered. One option includes optimizing work conducted in the shoulder seasons (Spring and Fall). Another option may include implementation of daily construction activity curfews such as not operating construction equipment on busy holiday weekends. The National Park Service would determine this in consultation with the WFLHD.

- Construction workers and supervisors would be informed about the special sensitivity of park's values, regulations, and appropriate housekeeping.

- According to *NPS Management Policies 2006*, the National Park Service would strive to construct facilities with sustainable designs and systems to minimize potential environmental impacts. Development would not compete with or dominate the park's features, or interfere with natural processes, such as the seasonal migration of wildlife, hydrologic activity associated with wetlands, or hydrothermal processes. To the extent possible, the design and management of facilities would emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings. The National Park Service also reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology.

Alternative Summaries

Table 1 summarizes the major components of the alternatives and compares the ability of these alternatives to meet the project objectives identified in the *Purpose and Need* chapter. As shown in the following table, Alternatives B and C meet each of the objectives identified for this project, while the No Action Alternative does not meet all of the objectives.
A section that describes elements common to all alternatives follows the descriptions.

Table 1 – Alternatives Summary and Project Objectives

Alternative A No Action	Alternative B Replace Bridge on Current Alignment	Alternative C Replace Bridge on New Alignment
• The existing bridge would not be reconstructed or replaced. The bridge would need regular and increasing maintenance. • No new deck would be installed; periodic crack sealing and chip seal of deck pavement would need to be done. The bridge condition and load capacity would continue to deteriorate with time and would eventually need to be closed. . • The piers were rehabilitated in 1989 and are limited to H-15 vehicle design specifications (generally a 30,000 pound vehicle). • No scour reduction measures have been taken at bridge piers. Scour would require monitoring and maintenance. • Bridge is considered fracture critical and has a high degree of vulnerability to seismic events.	• The entire bridge would be replaced on its current alignment. An on-site detour and a temporary bridge would be required. The temporary bridge would be one lane in each direction and about 450' in length. • The bridge deck and girders would be new construction using three steel I-girders and a 30-foot reinforced cast-in-place deck slab. • The bridge would be a three-span bridge using 2 piers. Abutments and piers would be cast-in-place concrete. The bridge would be capable of newer HL-93 vehicle design specifications (generally a 72,000 pound vehicle). • Bridge railings and approach railings would be installed. • Pier foundations would be designed for maximum scours. • The new bridge would be designed for seismic events.	• The entire bridge would be replaced just upstream of the current bridge. The new bridge would be located about 45 feet south of the existing bridge and parallel with it. • The existing bridge would carry traffic during construction. Approximately 4,000 feet of new road would be constructed to match to new bridge location; the same amount of road to the existing bridge would be removed and the area rehabilitated. • The bridge deck and girders would be new construction using three steel I-girders and a 30-foot reinforced cast-in-place deck slab. • The bridge would be a three-span bridge using 2 piers. Abutments and piers would be cast-in-place concrete. The bridge would be capable of newer HL-93 vehicle design specifications (generally a 72,000 pound vehicle). • Bridge railings and approach railings would be installed. • Pier foundations would be designed for maximum scours. • The new bridge would be designed for seismic events.
Meets Project Objectives?	**Meets Project Objectives?**	**Meets Project Objectives?**
No Does not meet any of the six objectives under the Purpose and Need.	Yes Meets all six objectives under the Purpose and Need.	Yes Meets all six objectives under the Purpose and Need..

Table 2 –Summary of Project Impacts and Costs for Alternatives B and C

	Alternative B	**Alternative C**
Total Area of Temporary Impact	5.39 Acres	5.15 Acres
Area of Temporary Impact within Floodplain	0.78 Acres	0.71 Acres
Total Area of Permanent Impact	0.73 Acres	8.70 Acres
Area of Permanent Impact within Floodplain	0.037 Acres	0.04 Acres
Total Reclaimed Area (Existing Pier, Abutment, and Road Removal)	N/A	1.36 Acres
Length of Construction Season	April-November	April-November
Total Estimated Cost of the Project	$8.5 million	$5.9 million

Table 3 – Environmental Impact Summary by Alternative
This table summarizes the anticipated environmental impacts for Alternatives A, B, and C. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

Impact Topic	Alternative A No Action	Alternative B Existing Alignment	Alternative C New Alignment
Natural Resources			
Water Resources, Floodplains, and Hydrology	Short-term, minor , adverse impacts	Long-term minor to moderate adverse impacts	Long-term, minor to moderate, adverse impacts
Cultural Resources			
Historic Properties	Long-term, moderate, adverse impacts (adverse effect § 106 of NHPA)	Long-term, moderate, adverse impacts (adverse effect § 106 of NHPA)	Long-term, moderate, adverse impacts (adverse effect § 106 of NHPA)
Social Resources			
Health and Human Safety	Long-term, minor, adverse impacts	Long-term, minor, and beneficial impacts	Long-term, minor, beneficial impacts
Park Operations	Long-term, minor, adverse impacts	Long-term, moderate, beneficial impacts	Long-term, moderate, beneficial impacts
Socio-economics	Long-term, moderate adverse impacts	Long-term, minor beneficial impacts	Long-term, minor beneficial impacts

Alternatives Considered but Rejected:

The following three alternatives were considered for project implementation, but were dismissed from further analysis for the reasons described.

Rehabilitate the Existing Bridge and Widen the Deck

This alternative would have re-used the existing bridge with minimal repairs to restore the structural condition rating while maintaining the original design load capacity. The work would include re-decking the existing bridge and rehabilitating the existing superstructure (deck and girders) and substructure (piers and abutments). Re-decking would be done with a conventionally reinforced concrete deck with similar thickness to the existing.

Cleaning and repainting of the steel superstructure would be required to extend the service life of the bridge. The steel components of the bridge are currently coated with lead-based paint, a hazardous material. This material cannot be allowed in the river or surrounding ground, therefore this can only be accomplished with a full perimeter containment of the bridge. The paint and blasting material would be disposed of as hazardous waste and the workers would wear special protective clothing and use respirators. The strengthening, cleaning and repainting of the steel superstructure are not considered feasible or cost effective.

Since seismic vulnerabilities would be difficult and costly to retrofit, no seismic retrofit would occur as part of this alternative. Traffic would be maintained on a single 12’ lane during deck replacement construction. After rehabilitation of the bridge, it would still be classified as scour critical, fracture critical, and the vehicle capacity would still be limited to the substandard vehicles.

Widening the deck roadway width to 30 feet would require a deck slab about 34 feet wide, roughly seven feet wider than the existing deck. Because the roadway width is only 30 feet, it would not carry more vehicle lanes than the existing bridge. This, in combination with additional deck loads, makes it unlikely that existing girders would have the strength to carry additional loads.

While this alternative is feasible, it would not fully meet the purpose and need of the project. The level of work required to extend the service life of this bridge would be difficult to justify when comparing the cost to the replacement alternatives. The service life of the rehabilitated bridge would still be significantly less than the new bridge alternatives. If this alternative were to be implemented, the bridge would still be classified as scour critical and the vehicular capacity would still be limited to the substandard H-15 vehicle based on the capacity of the existing piers, therefore this alternative was dropped from further consideration.

Rehabilitate the Existing Bridge and Replace Entire Superstructure

This alternative is similar to the alternative described above in that portions of the existing bridge are reused while others are replaced. In this alternative, the entire superstructure (deck and girders) are replaced. To enhance seismic behavior of the existing substructure, several retrofit measures would be necessary. Scour measures at the piers would also need to be installed. Because the entire superstructure would be replaced, a temporary bridge would be required to carry traffic during construction.

While this alternative is feasible, there are some downsides to it including:

- The bridge would still be limited to the original H-15 design vehicle due to the small amount of reinforcing in the columns.
- The riprap scour countermeasures provide protection from scour but are not guaranteed to prevent scour under very large flows. The riprap would also need to be monitored and maintained.
- Portions of the original bridge to remain are already 68 years old and, no matter how well they are rehabilitated will deteriorate faster than the new portions. This would require more future maintenance and repair than a completely new bridge would require.

Construction of this alternative would impact the river and surrounding land. The following construction activities would affect the site:

- Excavation and placement of the scour riprap countermeasures would have temporary impacts to the river and banks. Excavating equipment must access the pier bases, requiring temporary access roads and berms across the floodplain. To prevent large increases in turbidity during excavation and riprap placement the work area should be confined with a turbidity barrier.
- Removing and placing the superstructure would require large cranes that may need to sit in the floodplain. This would require temporary access roads and berms in the floodplain as well as a substantial pad under the crane.
- Construction and removal of the temporary bridge carrying the detour would require construction in the river, floodplain, and on the banks. Equipment would need to access the floodplain areas to accomplish this work.
- Temporary detours would require disturbance of ground outside the existing roadway.

While this alternative is feasible, it would not fully meet the purpose and need of the project. The level of work required to extend the service live of this bridge would be difficult to justify when comparing the cost to the replacement alternatives. The service life of the rehabilitated bridge would still be significantly less than the new bridge alternatives. If this alternative were to be implemented, the bridge would still be classified as scour critical and the vehicular capacity would still be limited to the substandard H-15 vehicle based on the capacity of the existing piers, therefore this alternative was dropped from further consideration.

Replace the Existing Bridge with New Structure on a New Alignment

This alternative would be nearly identical to Alternative C, but would locate the new bridge immediately downstream (north) of the existing bridge. While impacts to the Lamar River associated with the placement of the new bridge downstream would be the same as the upstream alternative, this alternative would require substantially more new road alignment to properly reconfigure the road approaches to the bridge. This would increase the area of impacts and construction impacts to vegetation while also increasing the cost of the project. As this alternative increases the area of disturbance and construction cost while not providing any additional benefits, the alternative was dropped from further consideration.

Identification of the Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative A, *No Action*, would not meet the second and third evaluation factors above, as it would not address the inherent safety concerns of the aging structure. Seismic concerns, fracture critical aspects, and deteriorating bridge deck would not be addressed. This alternative would not improve scour concerns at the base of the bridge piers. This alternative does not proactively allow the NPS to maintain into the future, a river crossing for park visitors and neighboring residents.

Alternative B, *Replace Existing Bridge along Existing Alignment* would keep the new piers much closer to their existing locations, and requiring less permanent disturbance outside the existing roadway. A temporary bridge and approaches would require temporary disturbance outside the existing roadway. A temporary bridge would also require additional piers in the water for the duration of the construction, and additional impacts from the construction of the temporary bridge.

Alternative C *Replace Existing Bridge along New Alignment* is the environmentally preferred alternative because it best addresses these six evaluation factors. Alternative C would meet the health and safety objectives of the project, while minimizing environmental impacts to the extent possible. Alternative C would create a temporary increase in the amount of disturbed area within the park because of the approximately 4,000 feet of new road alignment that would be required. The rehabilitation of the area of road to be removed would serve as mitigation for this temporary impact. The bridge pier locations for a bridge upstream of the existing bridge would cause slightly more hydraulic changes to the river bottom and the existing island bar that have formed and stabilized over the years since the new bridge has been constructed. This would likely be a smaller impact though than the additional hydrologic changes due to the additional piers from the temporary bridge.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. While Alternative B meets the Purpose and Need for the project, the project objectives, and is the environmentally preferred alternative, due to slightly reduced impacts, Alternative C is recommended as the National Park

Service Preferred Alternative. While Alternative C has slightly higher area of permanent disturbance, the impacts are relatively comparable to Alternative B, while requiring a significantly less expenditure of public funds.

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions in areas potentially affected by the alternatives. This section describes the following resource areas: Natural Resources including Water Resources, Floodplains, and Hydrology; Migratory Birds including Species of Management Concern; Cultural Resources including Historic Properties; and Social Resources including Health and Human Safety, Park Operations, and Socioeconomics.

The 1916 Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife, and natural and historic resources of national Parks, "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."

NATURAL RESOURCES

The Lamar River Bridge is located downstream from a substantial bend in the Lamar River. There have been some channel effects from the presence of the bridge. Mid-channel bars have formed both upstream and downstream of the present bridge and the channel appears to have widened in this reach (Martin 2004).

The geology at the project site consists mainly of bouldery gravel and silts left by glacial outwash overlying volcaniclastic (volcanic material reworked by wind or water) sandstones and conglomerate (individual stones cemented together) and unconsolidated tuff (welded volcanic ash) merging into consolidated volcanic tuffs.

At the east abutment slope and cut bank, the geology consists of 20-25 feet of bouldery gravel glacial outwash deposits sitting atop several stratifications classified as fair rock. Bedrock exists below these soils at an approximate elevation of 6122. High water from the river has scoured a cutbank into the toe of the slope creating overhanging conditions with some rockfall.

The west abutment slope has similar geology to that of the east abutment, although the glacial outwash layer is only about ten feet deep. Again, this river bank has been scoured leaving a 15 foot cutbank in the deposits. The geology between the riverbanks is relatively simple; bedrock is approximately five feet down from a layer of the bouldery gravel glacial outwash. .

Water Resources, Floodplains, and Hydrology

<u>Water Resources</u>
There are hydrologic concerns about how the Lamar River Bridge is affecting the river and a more detailed analysis is warranted (Martin 2004). There are concerns that if the Lamar River Bridge is moved, it could change the depositional flow of the river and affect erosion. As described above, the river has caused scouring at the abutment slopes. Below the east abutment in the cutbank area, evidence such as nick points and undercutting suggests that the Lamar River has scoured into the lower five feet of the slope. This has created overhanging conditions. High water is estimated at levels of approximately 6145 feet in elevation. This is in the vicinity of the scour nick points that are evident on the east cutbank. Below the west abutment, the river appears to have scoured into the glacial outwash deposits causing calving and slumping of the materials.

<u>River Channel</u>
Immediately upstream of the existing bridge the Lamar River channel splits into two smaller channels that flow around a middle-channel gravel-cobble bar. The existing bridge piers are located in the middle of the smaller flow channels. Historic photographs suggest that before the existing bridge was constructed the middle-channel gravel-cobble bar was more of an established woody-vegetated island. Flow velocity acceleration around the piers may have contributed to erosion of the island. Based on the USGS gage station data for the Lamar River, the site has experienced flooding exceeding the 5-year event 14 times since 1923. Frequent extreme flooding may be a primary cause of the island sediment and vegetation depletion. Without knowing the flood history prior to 1923, it is difficult to predict how much of an influence the frequent

extreme flooding has had on island depletion.

The Lamar River at the bridge crossing is entrenched with steep banks. Bedrock outcrops along most of the east bank and under lays gravel-cobble glacial-fluvial deposits on the west bank. The gravel-cobble glacial-fluvial deposits are generally susceptible to toe erosion, undercutting, and sloughing. The west bridge abutment is located near the apex of a meander bend. Lateral river migration trend is to the southwest. The slow migration rate is controlled by bedrock and large boulder lag deposits. Flow velocity acceleration around the existing bridge piers has aggravated the bank toe erosion at the crossing site.

Wetlands
The data gathered during the field season of June 2005, found two wetlands in the Lamar River Bridge area totaling 2.1 acres in size.

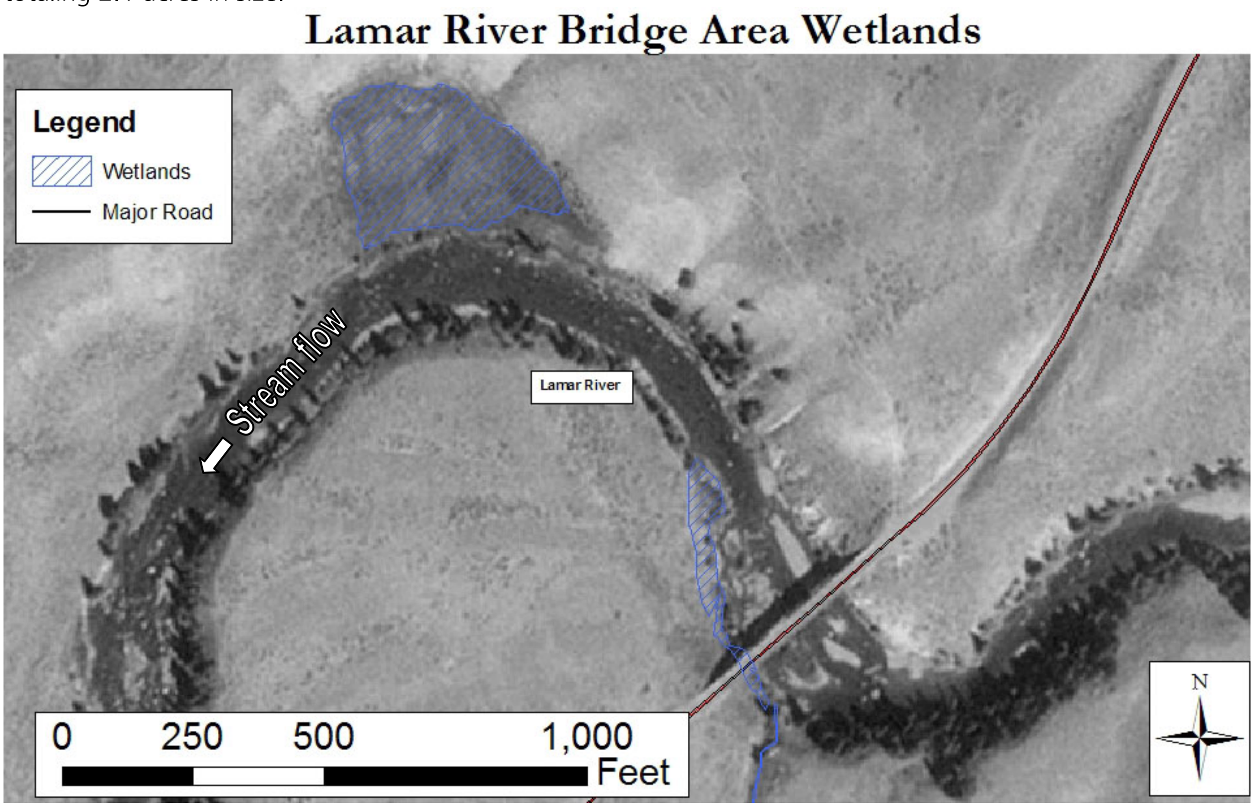

Figure 11 – Wetland Map

Water Quality
Streams and lakes in Yellowstone are designated as Class I, Outstanding Resource Waters, by the state of Wyoming. Class I waters are not allowed further water quality degradation by point sources of pollution, and existing water quality must be maintained.

Fisheries.
Fish, both native and introduced, are an important component of the park's animal life. When explorers first visited Yellowstone, the vast majority of lakes, and most streams above major waterfalls or cascades were devoid of fish. As a result of stocking for increased angling opportunities in early park years, the Yellowstone fishery is now comprised of 13 native and five introduced species, including the native westslope and Yellowstone cutthroat trout, longnose dace, mountain whitefish, arctic grayling, longnose sucker, and the introduced brown, brook, and rainbow trout. This mixture provides high-quality angling opportunities for visitors as well as food for birds, otters, grizzly bears, and other wildlife.

The eastern portion of Yellowstone National Park contains historically native species of cutthroat trout. There is limited survey data on these cutthroat trout due to the difficulty of sampling in the Yellowstone River. Native cutthroat trout inhabit the Lamar River.

Migratory Bird Species Including Species of Management Concern

Migratory birds are those species that generally migrate south each fall from breeding grounds to their wintering grounds. They may winter in habitats throughout the Pacific Region and central North America or even farther south into Mexico, Central and South America, and the Caribbean. In the spring, they return north to their breeding grounds, where they have young and the cycle repeats. Migratory birds generally follow four geographical flyways during their north-south spring and fall migrations across North America: Atlantic, Mississippi, Central, and Pacific. Yellowstone is in the Pacific Flyway west of the continental divide and in the Central Flyway for most of the park. Concentrations of migrating birds are more susceptible to collisions with structures.

In Yellowstone National Park, 320 bird species have been documented; 148 of these species nest in the park. Although a few species reside in Yellowstone year-round, including common raven, Canada goose, blue grouse, gray jay, red-breasted nuthatch, American dipper, and mountain chickadee, most are migratory species. Most migrate to Mexico and Central America for the winter and migrate to the U.S. in the spring. Migration brings many birds back to the park from their winter journeys south; other birds are passing through to more northern nesting areas. Most birds migrate to lower elevations and more southern latitudes beginning in September. Fall transients include tundra swans and ferruginous hawks. A few species including rough-legged hawks and bohemian waxwings migrate here from the north for the winter.

Yellowstone bird Species of Management Concern includes the bald eagle, American peregrine falcon, trumpeter swan, and white pelican. These species are monitored as are ospreys, common loons, harlequin ducks, great gray owls, and colonial nesting birds. In addition, annual North American Bird Migration counts, Christmas bird count, Glacier Boulder route songbird survey, and breeding bird surveys are conducted. The North American Bird Migration Count, also known as the International Migratory Bird Day Count, has been conducted since 1992 to determine general population and arrival trends of migratory birds in Yellowstone National Park. The 2007 migration count was conducted on May 12th (Appendix 1). Five observers recorded a total of 1,902 individual birds, including 94 total species of birds of which 69 species were within the confines of Yellowstone National Park . A 15-year summary of the data during 1993-2007 indicates the numbers of species and birds observed during these surveys have been relatively consistent among years (Appendix 2).

Bird Species of Management Concern

Bald Eagle

Current data indicate populations of bald eagles (*Haliaeetus leucocephalus*) have recovered in the lower 48 States, with an estimated minimum of 7,066 breeding pairs today compared to 487 active nests in 1963 (71 FR 8239). Numbers of nesting and fledgling bald eagles in Yellowstone also increased incrementally during 1987-2005 (McEneaney 2006). Resident and migrating bald eagles are now found throughout the park, with nesting sites located primarily along the margins of lakes and shorelines of larger rivers. The bald eagle management plan for the Greater Yellowstone Ecosystem achieved the goals set for establishing a stable bald eagle population in the park, with a total of 26 eaglets fledged from 34 active nests during 2005 (McEneaney 2006). This is the highest number of fledged eaglets recorded to date in Yellowstone and the increasing population trend indicates habitat is not presently limiting the growth of the population. The U.S. Fish and Wildlife Service removed the bald eagle from the List of Endangered and Threatened Wildlife on August 8, 2007 (72 FR 37346).

Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) was removed from the List of Endangered and Threatened Wildlife and Plants on August 25, 1999 due to its recovery following restrictions on organochlorine pesticides in the United States and Canada, and implementation of various management actions, including the release of approximately 6,000 captive-reared falcons (64 FR 46541). The U.S. Fish and Wildlife Service has implemented a post-delisting monitoring plan pursuant to Section 4(g)(1) of the Endangered Species Act that requires monitoring peregrine falcons five times at 3-year intervals beginning in 2003 and ending in 2015. Monitoring estimates from 2003 indicate territory occupancy, nest success, and productivity were above target values set in the monitoring plan and that the peregrine falcon population is secure and viable (71 FR 60563). Peregrine falcons reside in Yellowstone from April through October, nesting on large cliffs. The numbers of nesting pairs and fledglings in Yellowstone has steadily increased from zero in 1983 to 30 pairs and 44 fledglings in 2005 (McEneaney 2006).

Trumpeter Swan

Trumpeter swans (*Cygnus buccinator*) were nearly extinct by 1900, but a small group of birds survived by remaining year-round in the vast wilderness of the greater Yellowstone area. This remnant population enabled the restoration of the species and today there are approximately 30,000 trumpeter swans in North America (U.S. Fish and Wildlife Service 1998). Yellowstone National Park supports resident, non-migratory trumpeter swans through the year, as well as regional migrants from the greater Yellowstone area and longer-distance migrants from Canada and elsewhere during winter. The National Park Service is committed to the conservation of resident trumpeter swans and preserving habitat for winter migrants in Yellowstone because swans are part of the natural biota and a symbolic species with considerable historical significance. However, since 1977 the park has supported relatively low and decreasing numbers of nesting pairs (median = 7, range = 2-17) and fledglings (median = 3, range = 0-12), while the abundance of the overall population has increased from <1,000 to >5,000 swans (McEneaney 2006, U.S. Fish and Wildlife Service 1998). Also, Yellowstone provides limited and temporary winter habitat for migrant swans due to limited sections of ice-free water that diminish as winter progresses (McEneaney 2006). Thus, it does not appear that the dynamics of swans in Yellowstone will strongly influence the overall recovery of trumpeter swans in the Rocky Mountain region of the Pacific flyway.

Counts of resident, adult trumpeter swans in Yellowstone decreased from a high of 69 in 1961 to 10 in 2007. Causes of this relatively consistent decrease are unknown, but may include decreased immigration, competition with migrants, and effects of sustained drought and predation on productivity (McEneaney 2006). The Rocky Mountain trumpeter swan population operates at a scale larger than Yellowstone, and the dynamics of resident swans in Yellowstone appear to be influenced by larger sub-populations and management actions in the greater Yellowstone area and elsewhere. Numbers of adult swans counted during autumn aerial surveys at Yellowstone and Red Rock Lakes in the Centennial Valley of Montana indicated concurrent and substantial increases in abundance during 1931-1955, followed by concurrent and substantial decreases in abundance during 1961-2005. These results suggest swan dispersal from the larger subpopulation in the Centennial Valley may be an important factor for maintaining resident swans in Yellowstone by filling vacant territories or pairing with single adult birds (McEneaney 2006). Also, increases in the number of Canadian migrants to Yellowstone during winter over the last several decades may be reducing food resources for resident swans during breeding (U.S. Fish and Wildlife Service 1998). Resident swans in Yellowstone are also susceptible to random, naturally occurring events operating at local and regional scales (e.g., severe winter weather, droughts, and predation). Drought conditions since 1995 have been the most severe recorded in northwestern Wyoming (Wyoming Division 01 Palmer Drought Severity Index) since monitoring began in 1895 (http://www.cpc.ncep.noaa.gov), resulting in an extensive reduction in the abundance and size of wetlands for nesting, molting, and feeding.

White Pelican

American white pelicans (*Pelecanus erythrorhynchos*) were identified as a Species of Management Concern and listed as a high-priority in the park's Strategic Plan because nesting attempts decreased from >400 during the mid-1990s to 128 during 1999, and Yellowstone has the only current nesting colony of white pelicans in the National Park system (McEneaney 2002). Pelican control in the 1920s, followed by human disturbances in the 1940s and 1950s, kept the population at low levels. Since that time, pelican numbers have increased, but still fluctuate greatly from year to year, both in the number of nesting attempts and fledged juveniles. Flooding occasionally takes its toll on production, as does disturbance from either humans or predators (McEneaney 2002). The shallow-spawning Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) is the main food for white pelicans in Yellowstone. However, there are serious threats to this subspecies that could affect white pelicans, including interbreeding with introduced rainbow trout (*Oncorhynchus mykiss*), the illegal introduction of lake trout (*Salvelinus namaycush*) which prey upon cutthroat trout, and several outbreaks of whirling disease in major spawning tributaries. The recent drought in the Yellowstone area has made several spawning tributaries run dry in late summer, preventing cutthroat fry from migrating to Yellowstone Lake and making them easy prey for predators such as gulls, pelicans, and others. These threats have significantly reduced cutthroat populations in Yellowstone Lake and adjacent parts of the Yellowstone River. In 2007, a total of 427 pelicans nested and fledged 362 young, suggesting the subpopulation has recovered somewhat from the substantial decrease during the mid- to late-1990s.

A wide variety of birdlife can be found in the proposed project area. Some of the birds observed are mountain chickadee, western tanager, red-tailed hawk, Hammond’s flycatcher, American crow, common raven, Williamson’s sapsucker, red-naped sapsucker, warbling vireo, yellow-rumped warbler, chipping sparrow, mountain bluebird, northern flicker, vesper sparrow, savannah sparrow, green-tailed towhee, Brewer’s blackbird, Brewer’s sparrow, Wilson’s snipe, ruby-crowned kinglet, brown creeper, red-breasted nuthatch, hairy woodpecker, Clark’s nutcracker, killdeer, Cassin’s finch, red crossbill, MacGillivray’s Warbler and rufous hummingbird. Harlequin ducks nest near Tower on the Yellowstone River. Peregrines and ospreys nest near Tower Fall proper.

CULTURAL RESOURCES

Historic Structures

Historic Structures (only historic structures are discussed here since archeological, ethnographic, and paleontological resources were dismissed)

The Northeast Entrance Road Historic District extends 28.61 miles from a point at the northeastern boundary of the park to a point where the road meets the Grand Loop at Tower Junction. The road corridor includes the road, the bridges, a 10-foot section on either side of the road, and any designed pullouts. The Northeast Entrance Road (48YE821), including historic features such as culverts, bridges, and retaining walls, is eligible for the National Register (WY SHPO concurred on 3/14/97).

In 1897, new bridges were built to span the Yellowstone and Lamar Rivers. The Lamar River Bridge was 3/8 mile downstream from today’s bridge. “In 1918, the Pebble Creek Bridge, the Lamar River Bridge, and the Soda Butte Bridge were carried away by high freshets (National Register Form).” In 1940, a 335-foot bridge over the Lamar River was completed. The Lamar River Bridge is a contributing structure to the Northeast Entrance Road Historic District. “The significance of the bridge typifies the design philosophy of the NPS which was to harmonize man-made features with their surroundings (HAER report).” The Lamar River Bridge (Site 48YE818) has been documented as part of the Historic American Engineering Record (HAER) and as part of a parkwide inventory of roads and bridges (Culpin 1994). The Wyoming SHPO concurred on 4/9/97, that the bridge was eligible for the National Register.

The proposed project would be located on the Northeast Entrance Road Historic District, on and adjacent to the Lamar River Bridge, Yellowstone National Park in Park County, Wyoming. The Lamar River Bridge and the Northeast Entrance Road are eligible for listing on the National Register of Historic Places. Archeological resources (Table 4) have been found in the vicinity of the current Lamar River Bridge and the Northeast Entrance road corridor as it passes over the Lamar River.

Yellowstone's historic resources reflect a number of noteworthy historical themes, including the growth of tourism, Yellowstone as a "proving ground" for America's national park system, Army protection and management of the park's resources, and the park's pioneer road transportation system.

A systematic survey and documentation of the bridges, drainage structures, and other historic features of the road was conducted in 1997. Documentation of the historic bridges, retaining walls, box culverts, masonry culvert headwalls, and other landscape elements of this segment of the Northeast Entrance Road was combined with information from the historic resource study, The History of the Construction of the Road System in Yellowstone National Park, 1872-1966, (Culpin 1994) and used to evaluate the historic district. All prehistoric and historic archeological sites and historic structures, including road features, were documented and evaluated for National Register of Historic Places status. Consultation with the Wyoming State Historic Preservation Officer provided concurrence on those NR eligible archeological sites and structures found within the area of potential effect of the reconstruction of the Lamar River Bridge.

The Lamar River Bridge (Site 48YE818) has been documented as part of the Historic American Engineering Record (HAER) and as part of a parkwide inventory of roads and bridges (Culpin 1994). It has been recommended as eligible for nomination to the National Register. The Northeast Entrance Road Historic District, including historic features such as culverts, bridges, and retaining walls, is eligible for the National Register of Historic Places.

Table 4 –Historic Properties Within the Area of Potential Effect

Lamar R. Bridge	48YE818	Bridge	Eligible
N.E. Ent. Rd. Hist. Dist.	48YE821	Highway	Eligible
Prehist. Archeo. Site	48YE414	Lithic Scatter	Unevaluated- potentially eligible
Prehist. Archeo. Site	48YE1354	Lithic Scatter	Not Eligible
Prehist. Archeo. Site	48YE1357	Lithic Scatter	Unevaluated – potentially eligible
Prehist. Archeo. Site	48YE1358	Lithic Scatter	Not Eligible
Prehist. Archeo. Site	48YE1352	Middle Archaic LS	Not Eligible

SOCIAL AND ECONOMIC RESOURCES

Health and Human Safety

The NPS is committed to providing appropriate, high-quality opportunities for visitors and employees to enjoy the parks in a safe and healthful environment. Further, the NPS strives to protect human life and provide for injury-free visits. Human health and safety concerns associated with this bridge include: seismic concerns with the current bridge, age and design of the current bridge, maintaining a safe and efficient river crossing for emergency vehicles, commercial deliveries to the town of Cooke City, and maintaining daily maintenance operations for the Northeast portion of the Park

Park Operations

Park operations include both NPS and concessioner activities that emcompass maintenance of all roads, trails, buildings and other structures in a safe and aesthetically pleasing condition, preventing deterioration that would render them unsightly, unsafe, or beyond efficient repair. Maintenance activities such as road maintenance, trash removal, transportation of supplies, snow removal, are all part of park operations. Maintenance areas near the Lamar River Bridge are located at Roosevelt, and the Northeast Entrance of the park.

Socio-Economics

Yellowstone plays a prominent role in the social and economic life of the Greater Yellowstone Area. Gateway communities have developed outside the park's five entrances, where they provide food, lodging, medical services, groceries, gasoline, other automotive supplies/services, gifts, souvenirs and other goods and services to the public. The availability of services varies from community to community. Quantity and quality of services depend on the size of the community and the volume of traffic passing through. The gateway communities are relatively small. The link between tourism and all the gateway communities is evident. Remote areas the size of these local communities would not have the types and number of permanent and seasonal businesses if they were not located near Yellowstone National Park and did not have access to the visitors the park attracts. The economic viability of the gateway communities depends heavily on the recreation and tourism traffic that is generated by Yellowstone and other public recreation destinations. The flow of traffic through the park, in turn, depends on the maintenance and improvement of the park's road system. Gateway communities understand this relationship. The link between tourism and the economic life of the Cooke City/Silver Gate and Gardiner communities is evident.

The Northeast Entrance Road provides access across the Lamar Valley to the Northeast Entrance and connects to the rest of the park at Tower Junction. It provides direct access to the park from Silver Gate, MT; Cooke City, MT; Billings, MT; Cody, WY; and other communities via U.S. Highway 212. Increased wildlife viewing since the reintroduction of wolves has changed the type and amount of use on the Northeast Entrance Road. In addition, road reconstruction on Yellowstone’s East Entrance Road and Wyoming North Fork Highway (U.S. Highway 14/16/20) in 1995-1996 encouraged some visitors to use the Northeast Entrance Road for the short-term.

The Northeast Entrance has the potential to become a more popular gateway to Yellowstone National Park due to improvements to the highway system outside the park’s boundary. The Beartooth Scenic Highway (U. S. Highway 212) continues to be improved, and the Chief Joseph Highway (Wyoming Route 296) between U.S. Highways 212 and 14/16/20, through the Sunlight Basin area has been upgraded to a paved road. These improvements facilitate loop tours from Cody through the Northeast and East Entrances during the early summer to late fall seasons. Visitor use patterns may adapt to take advantage of this improved access through the Northeast Entrance to visit the scenic and less crowded northeast corner of the park.

Use of the park during the winter is becoming more important for some gateway communities. In the Cooke City area, approximately 37,000 snowmobilers are recorded annually on U.S. Forest Service trails. (R. Johnson, personal communication, 2004.)

Most park roads are closed from approximately November 1 to April 30. When covered by snow the road system is available for snowcoach, snowmobile, and crosscountry ski use. The only exception is the Northeast Entrance Road. This road is kept open because it is the only winter road link for the year-round residents of Cooke City and Silver Gate. The vast majority of snowmobilers drive through the North Entrance, through Tower Junction, to access the Cooke City area, as the Beartooth and Chief Joseph Highways are closed during the winter.

Visitor use and economic activities in Yellowstone are highly seasonal. June, July, and August are the months of highest use; with 50 percent of the park’s visitation arriving in July and August. The shoulder-season months, May and September, receive less use but the volume is still heavy. Use in the winter months is relatively low, accounting for about six percent of the overall visitation. In the late 1980s and early 1990s, winter use grew 10 to 15 percent annually, reaching more than 140,000 in 1992-93. In 1996-97, winter use had dropped to approximately 113,000. The winter of 2000-2001 saw winter use back up to 139,000. The increase could partly be related to the introduction of wolves. Visitors frequent the Northern Range both during the summer and winter seasons to watch wolves.

In the past 10 years the annual park visitation to Yellowstone has been 2.8-3.1 million recreational visits. The 2008 there were 3,066,580 recreational visits to the park. These visits represented more than one million vehicles entering the park and using the road system within the six-month period from May through October. The West Entrance accounted for 41.5 percent of the vehicles and the North Entrance provided access for approximately 18.4 percent of the total. The Northeast Entrance was the least used, providing for 5.8 percent of the total traffic entering the park. The remaining amounts were the South Entrance with 21.9 percent and East Entrance with 12.3 percent.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

NEPA requires that environmental documents disclose the environmental effects or consequences of a proposed federal action and any adverse impacts that could not be avoided, if the proposed action were implemented. This section of the EA provides a basis for comparing the three alternatives and the impacts that would result from their implementation. Impact topics were selected based on internal and external scoping. This section is based on review of scientific information collected by the NPS, external sources, and scientific literature.

Each impact topic is analyzed for direct, indirect, and cumulative impacts from each of the alternatives. Impacts are described in terms of context (site specific, local, and/or regional effects), duration (short- term or long- term), timing (direct or indirect), and type (adverse or beneficial). Context, duration, and timing are factored into intensity thresholds (negligible, minor, moderate, major) defined for each impact topic. Definitions of intensity levels vary by impact topic, but the following definitions apply to all impact topics:

Term	Definition
Beneficial	a positive change in the condition of the resource or a change that moves a resource toward its desired condition
Adverse	a negative change in the condition of the resource or a change that moves a resource away from its desired condition
Direct	an effect that is caused by an action and occurs at the same time and place
Indirect	an effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable
Short- term	an effect which in a short amount of time would no longer be detectable, as a resource returns to its pre- disturbance condition; generally the duration of any portion of this project, which is expected to be five years or less.
Long- term	a change in a resource or its condition that does not return to pre- disturbance levels and for all practical purposes is considered permanent.

Cumulative Impacts

NEPA regulations require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non- federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts for each alternative were analyzed by adding the direct and/or indirect impacts of each impact topic to other past, present, and reasonably foreseeable future actions within the Lamar River watershed and surrounding area. The scope for cumulative impacts varies to some degree for each impact topic.

Because cumulative impacts were determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions, it was necessary to identify other ongoing or reasonably foreseeable future projects at Yellowstone National Park and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the park's boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis:

- **Canyon Junction to Tower Junction (Dunraven Road) Road Improvement Project:** This road reconstruction project began in late summer 2003. The segment of the Grand Loop Road that comprises the Dunraven Road construction project stretches from Tower Junction to Canyon Junction, a total of 18.4 miles (29.3km). The entire road will be widened from its existing 19–22 feet to 24 feet and design will address needs for better drainage, more pullouts and parking areas, and slopes that can revegetate in the short, 2–3 month growing season. Design and construction are being accomplished in two phases. The first phase, from Chittenden Road to Canyon Junction, was completed in 2005. The second phase from Chittenden Road to Tower Junction is scheduled to begin in 2010, but is dependent upon highway funding. The second phase of the project would include the Tower Fall Campground road and the entrance road to Roosevelt Lodge, again dependent on funding. This project may also be split into three phases due to costs and the potential lack of funding for the entire project (Federal Highways proposed project schedule, 2007). The project would also include modification of the existing parking area at Calcite Springs (26 auto spaces, 3 RV/bus spaces). The road would shift away from the existing parking area to improve safety by separating the parking from the road. A traffic island would protect some very large Douglas-fir trees. The large parking area (approximately 80 auto spaces, approximately 9 RV/bus spaces) at the Tower Fall general store would be modified.

- **Beartooth Highway and Northeast Entrance Road Construction:**
  (aka Beartooth Highway Segment 1, Phase 2) – This work consists of reconstructing 4.3 miles of road adjacent to the park and widening it from a current 20 feet to 28 feet. Construction started in 2007 and is expected to be complete by Fall of 2009. Additional Beartooth Highway work is proposed for the future.

- **Canyon Rim Drives road project:** This project was started in 2007 with the rehabilitation of the Artist Point parking area and pedestrian walkways and observation areas. The project was completed in 2008, where most work was concentrated on the North Rim Drive, camper services access road, and parking area just northeast of Canyon Village.

- **Resurfacing of the South Rim Drive;** This project would overlay the existing pavement with a new lift of asphalt to be completed by park maintenance crews in either 2009 or 2010.

- **Norris-Madison Phase 3 road reconstruction project:** This project, scheduled to begin in fall 2009, is the third phase of the Madison to Norris road project. Work will include paving the new alignment above the Gibbon Canyon, and the removal of the road along approximately two miles of the Gibbon River. A new bridge will be constructed upstream of Gibbon Falls to connect the new alignment with the existing road alignment. A bridge at the north end of Gibbon Canyon will be removed.

- **Norris to Golden Gate – Road Reconstruction Project, future:** The road segment from Norris to Golden Gate is scheduled to be reconstructed in 2011. The project would take 2-3 years to complete.

- **Sylvan Pass Reclamation and Road Reconstruction:** This project would reconstruct a portion of the East Entrance Road through Sylvan Pass, and rehabilitate an area that has for many years served as a source of gravel and rock for road reconstruction projects within the park. Design work for the Sylvan Pass project in progress and scheduled construction in 2008.

Impairment

As taken directly from section 1.4.5 in NPS 2001 Management Policies, the impairment that is prohibited by the NPS Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect impacts; the cumulative impacts of the impact in question and other impacts. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;

- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result, which cannot reasonably be further mitigated, of an action necessary to preserve or restore the integrity of park resources or values. Impairment may occur from visitor activities, NPS activities in the course of managing a park, or activities undertaken by concessioners, contractors, and others operating in the park.

Each impact topic contains a conclusion statement for each of the four alternatives that summarize the direct, indirect, and cumulative impacts and whether implementation of the alternative would result in impairment to a park resource or value.

NATURAL RESOURCES

Water Resources, Floodplains, and Hydrology

Guiding Principles and Policies

The NPS Management Policies 2006 state that the NPS "will perpetuate surface waters and groundwaters as integral components of park aquatic and terrestrial ecosystems" (sec. 4.6.1). The policies also state, "the NPS "will manage for the preservation of floodplain values; minimize potentially hazardous conditions associated with flooding; and comply with the NPS Organic Act and all other federal laws and executive orders related to the management of activities in flood-prone areas" (sec. 4.6.4).

Planning for a bridge crossing over a waterway causes concern for impacting the natural habitat of the sensitive river environment. Environmental impacts must be considered for the temporary conditions during construction and final conditions. Some of the impact considerations include:

- Introducing construction debris and other pollutants in the river, particularly during removal of the existing bridge.
- Increasing turbidity during project construction.
- Temporary diversion of streamflow, and other temporary impacts (during construction).
- Permanent impact to natural streamflow conditions.

Methodology and Intensity Level Definitions

Available information on water resources, floodplains, and hydrology of the areas surrounding and affected by the Lamar River Bridge were reviewed. This included information on other riparian corridors along the Lamar River. The potential impacts of each alternative on wetlands, floodplains, and riparian areas were evaluated by comparing their proposed locations to bank structure, access issues, stream bed characteristics, and construction schedule. Predictions about short- and long-term impacts were based on available information and best professional judgment and past road and bridge impacts to similar watersheds within the regional ecosystem. The predicted intensity of adverse impacts is based on the following:

A wetland survey was completed to ensure that design and location of any permanent or temporary features (abutments, piers, temporary bridge, temporary and permanent road alignments, staging areas) would be located in a manner sensitive to wetland resources.

No rip-rap is necessary and will not be included as part of this project.

Construction could increase the possibility of debris and pollutants getting into the drainages and adjacent wetlands. An oil/hazardous material spill contingency plan would be required to be prepared prior to construction by the contractor.

Impact analyses for water resources and hydrology focused on the perpetuation of natural ecological relationships and processes, continued existence of native wildlife and vegetation populations, minimization of sedimentation, and changes to stream flows. In compliance with the Clean Water Act, a Section 404 permit would be obtained from the Army Corps of Engineers for all work within the waters of the United States and adjacent wetlands. A National Pollutant Discharge Elimination System (NPDES) permit would also be obtained. The thresholds of change for intensity of impacts and the duration of impacts are defined below.

Intensity Level Definitions

Negligible Impacts would cause no perceptible change in an existing wetland area or function, ability of a floodplain to convey floodwaters, hydrologic function, and no changes to riparian vegetation and wildlife communities would occur.

Minor Impacts would be measurable and could change wetland or floodplain areas and functions, or hydrologic processes. The action would affect a few individuals of plant or wildlife species within an existing wetland or riparian area within the park. Changes to hydrology would be considered insignificant and short-term. Any changes would require considerable scientific effort to measure and have barely perceptible consequences to wetland, riparian habitat, or hydrologic function.

Moderate Impacts would be measurable and long-term but relatively local. Mitigation measures associated with the water resources, floodplains, and hydrology would be necessary and the measures would likely succeed. Impacts to existing wetland areas or floodplain functions could be mitigated by the restoration of impacted wetlands elsewhere in the park, or modification of proposed facilities in floodplains. The action would have a measurable effect on plant or wildlife species within an existing wetland or riparian area, but all species would remain indefinitely viable within the park.

Major Impacts are readily measurable and have permanent consequences for an existing wetland area or floodplain function which could not be mitigated. Wetland and riparian species dynamics would be upset, and species changes would noticeable on a regional scale. Mitigation measures would be necessary and their success would not be guaranteed.

Duration Short-term effects would last only during the implementation of the project including mitigation and monitoring measures. Long-term effects would constitute a permanent impact.

IMPACTS OF ALTERNATIVE A: NO-ACTION ALTERNATIVE

Analysis. Under Alternative A, no action would be taken to replace the existing bridge. The river channel would not be expected to change as piers, abutments, and temporary bridge access roads would not be constructed. Sedimentation due to changes in the riverbank would remain low, as most previously disturbed areas have revegetated over the years since this bridge was constructed. No wetland or fisheries impacts are foreseen. The piers would remain as placed without stabilization. Hydrologic scour and cutbank formation would continue to occur. Historic photographs suggest that before the existing bridge was constructed the middle-channel gravel-cobble bar was more of an established woody-vegetated island. Flow velocity acceleration around the piers may have contributed to erosion of the island; though difficult to accurately predict, continued erosion to the island may occur. If the bridge were to continue to deteriorate into the river, falling debris could damage or change stream channels. The gravel-cobble glacial-fluvial deposits are generally susceptible to toe erosion, undercutting, and sloughing. Flow velocity acceleration around the existing bridge piers has aggravated the bank toe erosion at the crossing site and will continue to do so. Impacts from this alternative to Water Resources, Floodplains, and Hydrology would be negligible.

Cumulative Effects. Past, present, and reasonably foreseeable future actions within the vicinity of the Lamar River Bridge (discussed earlier), potential sedimentation into creeks and rivers related to construction projects would be considered negligible to minor and short-term. Retaining the current bridge would not add any cumulative impacts caused by construction or placement of a new bridge. Retaining the current bridge could cause foreseeable emergency actions that would not benefit from the careful planning and design represented in the action alternatives.

Conclusion. Alternative A would result in short-term minor direct or indirect impacts. There would be short-term, minor, adverse cumulative impacts to water resources, floodplains and hydrology from potential erosion and sedimentation into adjacent water bodies (mostly during rain or snowmelt events). Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to water resources, floodplains, or hydrologic resources under Alternative A. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies (2006).

IMPACTS OF ALTERNATIVE B - REPLACE EXISTING BRIDGE ON EXISTING ALIGNMENT

Analysis. Under Alternative B, the new bridge piers will be placed approximately 20 feet closer to the stream banks. Placing the new piers closer to the stream bank would likely increase the bank toe erosion rate at the crossing site. Placing the new piers closer to the stream bank, on the existing alignment, would likely decrease the middle-channel gravel/cobble-bar erosion rate. The bank toe erosion would be controlled by bedrock and large boulder lag deposits that are present in the area, and is not expected to be significantly greater than what is occurring naturally. Based on a geologic cross section of the bridge site, any toe erosion and surface soil slumping is not expected to undermine the bridge abutment foundations or approach road embankments. Riprap would not needed for mitigation of the toe erosion.

A new bridge on the current alignment would not increase or decrease the average channel flow velocities. Some increase in flow velocities would be expected between the new bridge piers and the stream banks.

Removing the old bridge piers and installing the new piers would require flow diversion such as coffer dams, or caisson structures. If the structures do not block more than 25 percent of the active channel width and are removed before the flood season, detrimental increases in flow velocity would not be expected.

The new bridge with changed pier locations would not create a hydraulic backwater upstream of the crossing that induces channel deposition. Sediment would be discharged to the stream from bank erosion and bed scour around the piers. Amount and timeframe depends on frequency and size of the large flood events. The amount is expected to be relatively small and easily processed by the stream without significantly increasing downstream riffle and bar deposition. The bridge piers and abutments would be founded on bedrock. Riprap would not needed for mitigating bridge pier scour.

Removing the old bridge piers and installing the new piers would require disturbing the stream bottom and releasing sediment and turbidity. Working in the low flow season and inside coffer dams or caissons should reduce the sediment and turbidity discharge levels to manageable duration and amounts. The replacement of piers within the water would constitute the only permanent wetland impact, which would be mitigated by removal of the piers from the existing bridge.

No significant impact on river hydrology or ecology is anticipated. Minor short-term local siltation of the river would likely occur as a result of in-stream work activities, construction activity, and erosion of disturbed soils before vegetation becomes reestablished. Negligible impacts to fisheries are predicted due to the short-term sedimentation that could occur. Erosion control measures would be left in place until vegetation is reestablished to 70 percent of cover. Scheduling and standard construction contract stipulations for erosion control measures (e.g., silt fences) are designed to prevent erosion from degrading water quality. In-stream construction activities would be designed to take full advantage of the low flow periods of the river. Impacts to Water Resources, Floodplains, and Hydrology from this alternative would be short-term and minor to moderate from stream siltation and turbidity, and long-term and minor from streambank erosion near the piers.

Temporary impacts associated with a temporary bridge would occur as a result of temporary bridge piers, and the potential temporary crane pads that may be needed for its construction. These piers and pads would be removed after the new bridge is completed. Wetland impacts would occur from, piers from the new bridge, access associated with the temporary bridge, and construction access roads. Total permanent wetland impacts would be approximately 0.04 acre. These impacts would be mitigated by the removal of the existing bridge piers and restoration of the wetlands after construction.

Cumulative Effects. When added to the other past, present, and reasonably foreseeable future actions affecting Yellowstone's water resources, floodplains, and hydrology, Alternative B would add negligible to minor direct or indirect impacts from potential sedimentation to adjacent water bodies, 0.04 acres of wetland impacts, and temporary impacts at the river's edge due to construction activities and equipment operation.

Conclusion. Alternative B would result in long-term minor to moderate direct or indirect impacts to water resources, floodplains, and hydrology. Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to water resources, floodplains, or hydrologic resources under Alternative B. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies (2006).

IMPACTS OF ALTERNATIVE C: (Preferred) REPLACE EXISTING BRIDGE ON NEW ALIGNMENT ALTERNATIVE

Analysis. Under Alternative C, the new bridge piers again would be placed approximately 20 feet closer to the stream banks, though about 40 feet upstream of their present location. Placing the new piers closer to the stream bank would have the same likely increase to the bank toe erosion rate as Alternative B, and controlled by bedrock and large boulder lag deposits in the same way. Again, any toe erosion and surface soil slumping is not expected to undermine the bridge abutment foundations or approach road embankments. Riprap is not needed for mitigation the toe erosion. The new bridge piers for this alternative would (as is the case with the existing piers) cause flow velocity acceleration around the piers of the new bridge, and would tend to increase erosion at the upstream end of the middle-channel gravel-cobble bar. Negligible impacts to fisheries are predicted due to the short-term sedimentation that could occur.

Removing the old bridge piers and installing the new piers would also likely require flow diversion structures (coffer dams, or caisson structures). Detrimental increases in flow velocity are not expected.

The new bridge would not create a hydraulic backwater upstream of the crossing that induces channel deposition. Sediment would be discharged to the stream from bank erosion and bed scour around the piers. Amount and timeframe again depends on frequency and size of flood events, and the amount is expected to be small. The bridge piers and abutments would be founded on bedrock. Riprap is not needed for mitigating bridge pier scour.

Turbidity would occur during removal of old bridge piers and installation of the new piers. Working in the low flow season and inside coffer dams or caissons should again reduce the sediment and turbidity discharge levels to manageable duration and amounts. The replacement of piers within the water would constitute the only permanent wetland impact, which would be mitigated by removal of the piers from the existing bridge.

Both bridge alignments (Alternative B and C) have approximately the same impacts on river morphology. The bridge from this alternative (40 feet upstream of the existing alignment) would extend the current middle-channel gravel-cobble bar erosion to the head of the bar. It is unknown how much of the middle-channel gravel-cobble bar erosion has been from frequent extreme floods and how much has been from increase flow velocities around the bridge piers. Impacts to the middle-channel gravel-cobble bar from this alternative would likely occur gradually. The timeframe depends on frequency and size of the large flood events. Sediment discharged to the stream from bed scour, middle-channel gravel-bar erosion, and bank erosion would be easily processed by the stream without significantly increasing downstream riffle and bar deposition.

Temporary impacts to wetlands would occur from potential temporary crane pads that may be needed for its construction, construction access roads, and piers from the new bridge. Total permanent wetland impacts would be approximately 0.04 acre. These impacts would be mitigated by the removal of the existing bridge piers and restoration of the wetlands after construction. Temporary crane pads would also be removed and any wetland impacts would be rehabilitated.

Recontouring the cut slopes adjacent to the road on the east side of the river would be done to reduce their slope steepness in order to improve chances for revegetation and increase cover, thereby reducing erosion potential.

No significant impact on river hydrology or ecology is anticipated. Slope stabilization would occur on the east side of the existing bridge by reducing slope angle and allowing for increased revegetaion of the slope. As with Alternative B, minor short-term local siltation of the river would likely occur as a result of in-stream work activities, construction activity, and erosion of disturbed soils before vegetation becomes reestablished. Erosion control measures would, again in this alternative, would be left in place until vegetation is reestablished to 70 percent of cover. Scheduling, construction stipulations are designed to prevent erosion from degrading water quality. In-stream construction activities would again be designed to take full advantage of the low flow periods of the river.

Impacts to Water Resources, Floodplains, and Hydrology from this alternative would be short-term and minor to moderate from stream siltation and turbidity, and long-term and minor from stream bank erosion near the piers and gravel-cobble bars.

Cumulative Effects. When added to the other past, present, and reasonably foreseeable future actions affecting Yellowstone's water resources, floodplains, and hydrology, Alternative C would add negligible to minor direct or indirect impacts from potential sedimentation to adjacent water bodies, construction activities at the river's edge, and equipment operation.

Conclusion. Alternative C would result in long-term minor to moderate direct or indirect impacts to water resources, floodplains, and hydrology. Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to water resources, floodplains, or hydrologic resources under Alternative B. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies (2006).

CULTURAL RESOURCES

Historic Properties

Guiding Regulations and Policies

In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to historic properties including cultural landscapes for this project were identified and evaluated by (1) determining the area of potential effect (APE); (2) identifying cultural resources present in the area of potential effect that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Methodology and Assumptions
Impacts to historic properties and cultural landscapes are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA).

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must be made for affected historic properties and cultural landscape that are eligible for or listed on the National Register of Historic Places. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). *Adverse effects* also include reasonably foreseeable effects caused by the Preferred Alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register of Historic Places.

The CEQ regulations and the National Park *Service's Conservation Planning, Environmental Impact Analysis and Decision-Making* (Director's Order #12, NPS 2001) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g. reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

In order for a historic property to be listed in the National Register of Historic Places, it must meet one or more of the following criteria of significance: (A) associated with events that have made a significant contribution to the broad patterns of our history; (B) associated with the lives of persons significant in our past; (C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; (D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and association (*National Register Bulletin, How to Apply the National Register Criteria for Evaluation*).

Intensity Level Definitions
There are two historic structures located within the area of potential effect of this undertaking. The Northeast Entrance Road Historic District, 48YE821, has previously been determined eligible for the National Register and a nomination is in draft form. The Northeast Entrance Road, WY-24-28, has been documented using Historic American Engineering standards. The second historic structure is the Lamar River Bridge, 48YE818, determined eligible for the National Register of Historic Places and documented to Historic American Building Record standards, WY-12. Current laws and policies require that the following conditions be achieved in the park for historic properties (e.g., buildings, structures, roads, trails, cultural landscapes).

Analyses of the potential intensity of impacts to historic resources were derived from a review of the List of Classified Structures, the park's programmatic agreement for roads, research in the park archives to determine the potential eligibility of the historic resource(s), and on-site investigations to determine a project's proximity to historic resources. The impact intensities for Cultural Resources are as follows:

Negligible: Historic resources would not be affected or the effects would be below the level of detection. A "negligible effect" corresponds to a "no effect" determination by the park for §106 purposes.

Minor: Effects to historic resources would be detectable (e.g., minor replacement of deteriorated historic fabric with new, in-kind material, or minor external alterations that do not affect the character-defining features of the structure or building), although the effects would result in little, if any, loss of significance or integrity. The National Register eligibility of the historic resource would not be affected by the project. A "minor effect" corresponds to a "no adverse effect" determination by the park for §106 purposes. Consultation with the SHPO would occur.

Moderate: Effects to historic resources would be readily detectable, would have the potential to diminish the significance or integrity of the site, structure, or building, and may jeopardize its National Register eligibility. A "moderate effect" corresponds to either an "adverse effect" or a "no adverse effect" for §106 purposes depending on mitigation measures proposed. Mitigation measures resulting from consultation could include such items as conservation measures to stabilize the site, structure, or building; Historic American Building Survey (HABS) level photography and/or as-built construction drawings; large-scale, in-kind replacement of historic fabric or use of simulated materials to replicate historic fabric; reuse of portions of the historic structure or building; and/or design of the new structure or building to preserve elements of form and function of the historic structure or building.

Major: Effects to historic resources would be obvious, long-term, and would diminish the significance and integrity of the site, structure, or building to the extent that it is no longer eligible for listing in the National Register. A "major effect" would correspond to an "adverse effect" for §106 purposes.

IMPACTS OF ALTERNATIVE A: NO-ACTION

Analysis. Under this alternative, the historic bridge would continue to weather with time. Substantial rehabilitation or replacement of the bridge would not occur. The No-Action alternative would constitute benign neglect and would eventually result in the collapse of the bridge and closure of thru traffic on the Northeast Entrance Road. No action constitutes neglect under the Criteria of Adverse Effect, and the closure of the Northeast Entrance Road would constitute isolation and alteration of character defining features of the National Register eligible road, a criterion of adverse effect. Safety concerns related to allowing traffic on the bridge would continue to grow, and eventual closure of the bridge would occur. Therefore, this alternative has the potential to have long-term, moderate adverse impacts to one or more of the park's historic properties and cultural landscapes. In terms of Section 106, Alternative A would have an *adverse effect* on historic resources.

Cumulative Impacts. Past, present and future actions that affect these historic properties would have an affect considered to be minor.

Conclusion. Alternative A would result in long-term moderate impacts (adverse effect under Section 106) on historic resources. Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative B. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REPLACE EXISTING BRIDGE ON EXISTING ALIGNMENT

Analysis. Alternatives B would replace the entire bridge in its present location and would have a minor impact on the Northeast Entrance Road Historic District. Locating a new bridge on its present location would not require any change in the existing alignment. A previous earlier road alignment had the bridge and approach roads just upstream of the existing bridge.

Alternative B, replacing the existing bridge where it currently exists, would have a moderate impact on the Lamar River Bridge. The Advisory Council on Historic Preservation and the Wyoming State Historic Preservation Officer has been notified of the possibility for "adverse effect" with the replacement of the Lamar River Bridge. In accordance with the stipulations of the Programmatic Agreement Among [the]National Park Service, The Advisory Council on Historic Preservation, [the] Wyoming State Historic

Preservation Officer, [the] Montana State Historic Preservation Officer, for Principal Park Road System Improvement, Yellowstone National Park, if a there is no other feasible alternative to the demolition of a historic road structure, documentation according to the standards of the Historic American Engineering Record will be completed prior to the removal of the structure. To further mitigate the adverse effect of the replacement of the bridge, the Wyoming State Historic Preservation Officer, the Advisory Council on Historic Preservation and Yellowstone National Park will enter into a Memorandum of Agreement stipulating further actions to mitigate the adverse effect. These actions include providing current and historic photographs, measured drawings, and text on Yellowstone's historic bridges for inclusion in the Wyoming Travel and Tourism's Yellowstone National Park micro-site component of their website. Yellowstone National Park will also update and complete the draft National Register nomination for the Northeast Entrance Road Historic District.

Cumulative Impacts. Past, present and future actions that affect these historic properties would have an affect considered to be minor. These past actions in combination with the proposed actions under this alternative would result in long-term, moderate, and adverse impacts.

Conclusion. Alternative B would have long-term, moderate adverse impacts (adverse effect under Section 106) on historic resources. Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative B. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: (Preferred) REPLACE EXISTING BRIDGE ON NEW ALIGNMENT ALTERNATIVE

Analysis. Alternative C would replace the entire bridge adjacent and upstream of its existing location, and would have minor impact to the Northeast Entrance Road Historic District. Locating a new bridge adjacent to the current bridge would require a minor movement of the road alignment approaching the bridge at both ends. Previous bridges over the Lamar River in this location were up-stream from the present bridge. The road alignment has previously been altered in this manner. The National Register Multiple Property Document for Yellowstone's roads states that, "It is not the road alignment, width of the road, surfacing material or traffic patterns that are significant. It is the designed features using natural materials 'blending with nature' and the continuing design philosophy that allows the road and its features to 'lay lightly on the land' that are significant".

Alternative C would have a moderate impact on the Lamar River Bridge. The Advisory Council on Historic Preservation and the Wyoming State Historic Preservation Officer has been notified of the possibility for "adverse effect" with the replacement of the Lamar River Bridge. In accordance with the stipulations of the Programmatic Agreement Among [the]National Park Service, The Advisory Council on Historic Preservation, [the] Wyoming State Historic Preservation Officer, [the] Montana State Historic Preservation Officer, for Principal Park Road System Improvement, Yellowstone National Park, if a there is no other feasible alternative to the demolition of a historic road structure complete documentation according to the standards of the Historic American Engineering Record will be completed prior to the removal of the structure. To further mitigate the adverse effect of the replacement of the bridge, the Wyoming State Historic Preservation Officer, the Advisory Council on Historic Preservation and Yellowstone National Park will enter into a Memorandum of Agreement stipulating further actions to mitigate the adverse effect. These actions would be the same as discussed for Alternative B regarding the information to be included on the Wyoming Travel and Tourism's website, and completion of the draft National Register nomination for the Northeast Entrance Road Historic District.

Cumulative Impacts. Past, present and future actions that affect these historic properties would have an affect considered to be minor. These past actions in combination with the proposed actions under this alternative would result in long-term, moderate, and adverse impacts.

Conclusion. Alternative C would have long-term, moderate adverse impacts (adverse effect under Section 106) on historic resources. Because there would be no major, adverse impacts to historic resources whose conservation in necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative C. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

SOCIAL AND ECONOMIC RESOURCES

Health and Human Safety

Guiding Regulations and Policies
The National Park Service is concerned about the safety of visitors to its parks and will cooperate with proposals to enhance visitor safety as long as those proposals do not result in a derogation of NPS resources or conflict with the current or planned use of NPS property (NPS 2006).

The NPS Management Policies 2006 state that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. The policies also state, "While recognizing that there are limitations on its capability to totally eliminate all hazards, the National Park Service and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees" (sec. 8.2.5.1). Further, the NPS will strive to protect human life and provide for injury-free visits (sec. 8.2.5).

Methodology and Assumptions
The analysis of human health and safety were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to safety were derived from the available information on the Park and best professional judgment.

Intensity Level Definitions

The impact intensities for safety are as follows.

Negligible: The impact to visitor or park staff safety would not be measurable or perceptible.

Minor: The impact to visitor or park staff safety would be measurable or perceptible, but it would be limited to a relatively small number of visitors at localized areas.

Moderate: The impact to visitor or park staff safety would be measurable and perceptible and would involve a large number of visitors in many areas of the park. Accidents rates would change slightly.

Major: The impact to visitor or park staff safety would be substantial. Accident rates in areas usually limited to low accident potential are expected to substantially increase in the short- and long-term and impacts to the safety of park visitors would be readily apparent throughout the park.

Duration: Short-term impacts would last during bridge construction, typically less than 1 year. Long-term impacts would occur throughout the life of the facility, taking into consideration operation and maintenance of the facility.

IMPACTS OF ALTERNATIVE A: NO-ACTION

Analysis. Under the no-action alternative, long-term moderate adverse impacts to health and safety would occur. The bridge would continue to deteriorate until it is no longer operative. Increased repairs would be necessary to the bridge. Repairs would expose persons making the repairs to lead-based paint, a hazardous material. Safety concerns with the current bridge would not be addressed. Visitors would have a higher chance of incidents as the deterioration worsens over time.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under the no-action alternative include any roadway improvements in the park by the Western Lands Federal Highways Program (WLFHP) in conjunction with the park, which could be expected to provide beneficial impacts to those traveling the roadways; however, the rate of accidents has remained stable at around 200 accidents per million visitors since 1975. Since the road improvement program began in 1991, approximately 35% of park roads have been reconstructed. Based on this limited percent of improved roads, after analyzing existing accident data, it is likely that the road improvement program will have a negligible impact on the number of accidents in the park. The improved roads have addressed many safety concerns though, such as sharp drops at the pavement edge, improved guardwalls, and guardrail systems, and an improvement in adjacent slopes to allow for better recovery from the driver in the event of leaving the pavement. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor adverse impacts under the no-action alternative, would result in long-term minor beneficial impacts to human health and safety.

Conclusion. Under the no-action alternative, combined impacts to human health and safety would be long-term minor and adverse based on improved roadways throughout the park, and the existing Lamar River Bridge which would still need repairs or replacement.

IMPACTS OF ALTERNATIVE B: REPLACE EXISTING BRIDGE ON EXISTING ALIGNMENT

Analysis. Alternative B would have long-term minor beneficial impacts to health and safety, because visitors, staff, and local residents, would be able to use a bridge that has had substantial safety issues (fracture critical, scour at piers, lead paint, seismic concerns) addressed. There would be short-term minor impacts to health and safety during construction, because of the bridge demolishing activities and the introduction of heavy equipment to the area.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under Alternative B are similar to the no action alternative. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts under Alternative B, would result in long-term minor beneficial impacts to human health and safety.

Conclusion. Under Alternative B, combined impacts to human health and safety would be long-term, minor, and beneficial based on a replacement bridge, and improvements to roads within the park over the past several years and road improvement projects planned for the near future.

IMPACTS OF ALTERNATIVE C: (Preferred) REPLACE EXISTING BRIDGE ON NEW ALIGNMENT ALTERNATIVE

Analysis. Under the Preferred Alternative, impacts to health and safety would be very similar to those stated for Alternative B. The only changes would be from improvements in traffic flow during construction of the new bridge. Under this alternative, the existing bridge would continue in use throughout the construction phase with little impact from construction operations. No temporary bridge would be used, and the existing straighter road alignment would be used. Resulting impacts from this alternative would be long-term, minor and beneficial.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under the Proposed Alternative are similar to the no action alternative. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts under the Proposed Alternative, would result in long-term minor beneficial impacts to human health and safety.

Conclusion. Under the Preferred Alternative, combined impacts to human health and safety would be long-term, minor, and beneficial based on improvements to roads within the park over the past several years, road improvements planned for coming years, and a replacement bridge being constructed. .

Park Operations

Methodology and Assumptions

The Northeast Entrance Road is a vital link for park operations for the northeast portion of the park. Visitation to this portion of the park has grown in recent years due in part to the popularity of wolf-watching activities by park visitors. The Northeast Entrance Road is the only road in the park kept open year-round. The road provides the only wheeled vehicle access to the communities of Cooke City and Silver Gate during the winter months. Yellowstone Institute classes are ongoing throughout the year. Road closures would have a great impact on park visitors, local residents, educational opportunities, NPS staff, and emergency vehicle access.

Other essential park operations include interpretation, maintenance, administration, and resource management. Park management and operations, for the purpose of this analysis, refers to the quality and effectiveness of park staff to maintain and administer park resources and provide for an effective visitor experience, while at the same time having the resources available to conduct other essential park operations. This impact analysis is based on the current description of park operations presented in the "Affected Environment" chapter of this document.

Impacts to park staff's ability to perform emergency services and essential operations were determined by evaluating the effect that time delays or the lack of access, due to bridge construction, on those services and operations. Reduced road closures are assumed to provide greater benefits to park operations.

Intensity Level Definitions

The following thresholds for evaluating impacts on park operations and management were defined and applied to beneficial and adverse impacts:

Negligible: Park operations would not be impacted or the impact would not have a noticeable or measurable impact on park operations.

Minor: Impacts would be detectable and would result in a measurable, but small, change in park operations.

Moderate: Impacts would be readily apparent and would result in a substantial adverse or beneficial change in park operations that would be noticeable to staff and the public.

Major: Impacts would be readily apparent and would result in a substantial change in park operations that would be noticeable to staff and the public and would be markedly different from existing operations.

Duration: Short-term effects would be less than one year. Long-term effects would continue beyond one year.

IMPACTS OF ALTERNATIVE A: NO-ACTION ALTERNATIVE

Analysis. Under the no-action alternative, long-term moderate adverse impact to park operations would occur due to continued deterioration, increased maintenance activities and costs. There would continue to be reductions in the load-bearing capacity of the bridge, and gradually larger vehicles would be phased out from using it. These vehicles would need to use alternative routes that would increase travel times considerably, and in the winter months (due to limited access) could stall projects from occurring. The gateway communities of Silvergate and Cooke City would need to have deliveries and goods scheduled and re-routed to avoid the eventually lowered weight capacities of this bridge. This would result in long-term, moderate, adverse impacts to park operations.

Cumulative Impacts. Under the no-action alternative, past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to park operations and maintenance would include the improvement of roads and bridges from past and future FLHP projects. The addition of four-foot shoulders to many of the roads has had minor beneficial impacts by allowing traffic to continue to flow in many instances when it would have been completely stopped in the past due to wildlife jams. The improved road base under these same roads has allowed large vehicles to use the roads without causing damage that would otherwise need to be repaired on a recurring basis. These beneficial impacts on park operations resulting from these past, present and future actions, would be considered long-term moderate and beneficial to park operations.

Conclusion. Cumulative impacts combined with impacts from the no action alternative would result in long-term minor adverse impacts to park operations.

IMPACTS OF ALTERNATIVE B: REPLACE EXISTING BRIDGE ON EXISTING ALIGNMENT

Analysis. Under alternative B, the construction of a new bridge would result in decreased maintenance activities, increased bridge load capacity, and a wider driving surface on the bridge resulting in long-term minor beneficial impacts to park operations.

Cumulative Impacts. Cumulative impacts under Alternative B are expected to be similar to the no action alternative, due to past improvements or roads and bridges. These road improvements have resulted in long-term moderate beneficial impacts to park operations.

Conclusion. The combined impacts to park operations under Alternative B are expected to be long-term, moderate, and beneficial.

IMPACTS OF ALTERNATIVE C: (Preferred) REPLACE EXISTING BRIDGE ON NEW ALIGNMENT ALTERNATIVE

Analysis. Under the Preferred Alternative, impacts would be the same as discussed for Alternative B. A new bridge would result in decrease maintenance, increased bridge load capacity and a wider driving surface. The new bridge would increase the ability to effectively allow RV and bus traffic, park staff would be able to use the bridge for large and wide loads, without the added need to temporarily close the bridge, and hold traffic in order to perform essential park operations. Long-term minor beneficial impacts for park operations would result.

Cumulative Impacts. Cumulative impacts under the Preferred Alternative are expected to be similar to the Alternative B, resulting in long-term, moderate beneficial impacts to park operations. The impacts on park operations resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts under the Proposed Alternative would result in long-term minor beneficial impacts to park operations.

Conclusion. The combined impacts to park operations under the Preferred Alternative are expected to be long-term, moderate, and beneficial.

Socio-economics

Methodology and Assumptions

Yellowstone plays a prominent role in the social and economic life of the greater Yellowstone area. Gateway communities of varying sizes have developed outside the park's five entrances. Communities near the Northeast Entrance of the park include: Cody and Powell Wyoming; and Cooke City, Silver Gate, and Red Lodge Montana. Cooke City and Silver Gate are within a few miles of the park's boundary, while the other communities listed are about an hour-plus drive from the park.

These gateway communities provide food, lodging, fuel and other automotive supplies and services, as well as souvenirs and other goods and services to the visiting public.

The link between tourism and the economic life of the Cooke City and Silver Gate gateway communities is evident. A remote are the size of these local communities would not have the types and number of permanent and seasonal business it supports if it were not located near Yellowstone National Park and did not have access to the visitors the park attracts. The economic viability of this area and the other gateway communities depends heavily on the recreation and tourism traffic that is generated by Yellowstone and other public recreation destinations. The flow of traffic through the park, in turn, depends on the maintenance and improvement of the park's road system.

Within the park itself, economic activity is concentrated at the Tower-Roosevelt area for the Northeast portion of the park. A wide range of services including food, gas, lodging, horse rental, and general store are provided by the private sector via concession arrangements.

The Lamar Buffalo Ranch has a ranger residence and a facility where the Yellowstone Institute operates is educational program at this location. Cabins are provided for class participants. The Northeast Entrance has housing for government employees and a maintenance facility.

Intensity Level Definitions

The following thresholds for evaluating impacts on park operations and management were defined and applied to beneficial and adverse impacts:

Negligible: No effects would occur or the effects to socioeconomic conditions would be below or at the level of detection. The effect would be slight and no long-term effects to socioeconomic conditions would occur.

Minor: The effects to socioeconomic conditions would be detectable, although short-term. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.

Moderate: The effects to socioeconomic conditions would be readily apparent and likely long-term. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.

Major: The effects to socioeconomic conditions would be readily apparent, long-term, and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed

Duration: Short-term effects would be less than one year. Long-term effects would continue beyond one year.

IMPACTS OF ALTERNATIVE A: NO-ACTION ALTERNATIVE

Analysis. Under alternative A, the continued deterioration of the Lamar River Bridge would eventually lead to reductions in tour bus access due to reduced weight loads being imposed on the bridge. Tour spending could be reduced over time for some businesses. Traffic would be maintained so long as weight load restrictions allow. Seismic events would have an increased potential of closing the bridge due to potential damage that could be inflicted.

Visitors traveling over the bridge would notice further deterioration of the bridge decking, curbs, and rails. Emergency repairs and closures of the bridge would become more frequent with time, leading to eventual closure of the bridge. Speeds on the bridge would likely be limited, and eventual limits to the number of vehicles using the bridge at a given moment may need to be utilized. Inconveniences and public safety concerns would be increase with time.

These impacts would affect the local communities, and visitors of the park. Indirect impacts would occur in proportion to the anticipated reduction of direct expenditures by tour bus users that occur within the region and the degree to which these monies are re-circulated within the regional economy.

Long-term impacts for the communities would occur from decreased visitation due to the eventual closure of the bridge. Deliveries of goods and supplies would be impacted due to increased time required for activities needed to cross the bridge with heavy loads, or re-routing of delivery vehicles. The Cooke City and Silver Gate communities would have to plan alternative routes for their transportation needs into the long-term. Long-term moderate adverse impacts would occur due to the eventual closure of the existing Lamar River Bridge

Cumulative Impacts. Road construction from past and potential future projects would continue to improve the transportation network of the park and surrounding communities. These projects both have the potential to delay regional travelers and park visitors and collectively would constitute a minor adverse impact to visitors traveling through the road reconstruction projects as the delays would occur only during construction, and they would be local in scope. Long term beneficial impacts would occur from the reconstructed roads in the vicinity of the Northeast Entrance Road.

Conclusion. Cumulative impacts combined with impacts from the no action alternative would result in long-term moderate adverse impacts on socio-economics.

IMPACTS OF ALTERNATIVE B: REPLACE EXISTING BRIDGE ON EXISTING ALIGNMENT

Analysis. Under Alternative B, possible disturbance to park visitors, park staff, concessioner employees, park residents, and businesses at the Tower-Roosevelt and Cooke City and Silver Gate areas from construction activities would be temporary and only continue during the life to the project. Tours spending is not expected to be significantly impacted. Traffic would be maintained so businesses in the affected areas should not be significantly affected economically. However, traffic may stack up due to very limited one-way traffic control measures or short-term closures. These situations may result in surges of customers arriving at business establishments at Tower-Roosevelt, Cooke city, and Silver Gate. Past experiences with road projects within the park have shown that when roads are not closed for extended periods of time, impacts on businesses and individuals outside the park are minimal or nonexistent.

Visitors traveling through construction areas would experience short-term inconveniences. Dust, fumes, noise, and rough roads would be expected. There would be some increased hazards because of construction work. The intrusion of staging areas and related work activities on visitor experiences would be mitigated by locating such areas away from centers of visitor activity and concentration.

Visitors would typically experience no more than a reduced speed limit zone through the construction zone, and across a temporary bypass bridge. There might be some limited delays or closures not usually exceeding 30-minutes which may be needed to divert traffic from existing road alignments to temporary or new road alignments. Periodic nighttime closures may be required to help facilitate the work and reduce the total time necessary to complete construction. Inconvenience and public safety concerns would be reduced by a public information program warning of any closures, delays, and road hazards.

Short-term benefits would include economic gains for businesses and individuals within the greater Yellowstone area. Direct benefits would flow from construction-related expenditures such as purchase and transport of road-building materials and employment of construction workers. Some new construction related jobs may be created with the regional economy due to this project. Some local residents may find temporary employment related to this construction. These benefits would be affected by the location of the contractor's bas of operation, sources of materials, and source of the labor supply. Indirect benefits would occur in proportion to the amount of direct expenditures that occur within the region and the degree to which these monies are re-circulated within the regional economy.

Long-term benefits for visitors would occur from the improved bridge following the project. The long-term quality of visitors experience would likely not change. Socio-economics of the surrounding communities would likely stay the same. The Cooke City and Silver Gate communities would have some of their transportation needs served by this project into the long-term.

Cumulative Impacts. Road construction projects that could potentially overlap during implementation include the Beartooth Highway reconstruction, and the Madison to Norris road reconstruction. These projects both have the potential to delay regional travelers and park visitors. A potential delay of up to one half hour for each project could cumulatively have a noticeable impact, especially if the visitor passed through all three projects within a short time frame. These delays collectively would have minor short term impacts on visitors traveling through the road reconstruction projects as the delays would occur only during construction, and they would be local in scope. In the long term reconstructed roads and a new bridge would have beneficial impacts by reducing delays due to maintenance and wildlife jams.

Conclusion. Cumulative impacts combined with impacts from the no action alternative would result in long-term minor beneficial impacts on socio-economics.

IMPACTS OF ALTERNATIVE C: (Preferred) REPLACE EXISTING BRIDGE ON NEW ALIGNMENT ALTERNATIVE

Analysis. Under alternative C, possible disturbance to park visitors, park staff, concessioner employees, park residents, and businesses at the Tower-Roosevelt and Cooke City and Silver Gate areas from construction activities would be temporary and only continue during the life to the project. There would be no appreciable change in impacts from this alternative as compared with alternative B discussed earlier.

Visitors traveling through construction areas would experience short-term inconveniences. Dust, fumes, noise, and rough roads would be expected. There would be some increased hazards because of construction work. Traffic would continue to use the existing bridge during construction of a new bridge. Traffic would not be diverted to a temporary bridge and speed would not need to be reduced to that same degree that it would in Alternative B. There might be some limited delays or closures not usually exceeding 30-minutes which may be needed to divert traffic from existing road alignments to the new road alignment and bridge. Periodic nighttime closures may be required to help facilitate the work and reduce the total time necessary to complete construction. Inconvenience and public safety concerns would be reduced by a public information program warning of any closures, delays, and road hazards.

As in alternative B, short-term benefits would include economic gains for businesses and individuals within the greater Yellowstone area. Direct benefits would flow from construction-related expenditures such as purchase and transport of road-building materials and employment of construction workers. Some new construction related jobs may be created with the regional economy due to this project. Some local residents may find temporary employment related to this construction. These benefits would be affected by the location of the contractor's bas of operation, sources of materials, and source of the labor supply. Indirect benefits would occur in proportion to the amount of direct expenditures that occur within the region and the degree to which these monies are re-circulated within the regional economy.

Long-term benefits for visitors would occur from this alternative as they did for alternative B following the project due to an improved bridge. The long-term quality of visitors experience would likely not change. Socio-economics of the surrounding communities would likely stay the same. The Cooke City and Silver Gate communities would have some of their transportation needs served by this project into the long-term.

Cumulative Impacts. Road construction projects that could potentially overlap during implementation of Alternative C would be the same as discussed for Alternative B (Beartooth Highway and the Madison to Norris). Again, these projects both have the potential to delay regional travelers and park visitors and collectively would constitute a minor impact to visitors traveling through the road reconstruction projects as the delays would occur only during construction, and they would be local in scope. Long term beneficial impacts would occur from the reconstructed roads and a new bridge as in Alternative B.

Conclusion. Cumulative impacts combined with impacts from Alternative C would result in long-term minor beneficial impacts on socio-economics.

CHAPTER 5: CONSULTATION AND COORDINATION

External Scoping

External (public) scoping was conducted to inform various agencies and the public about the proposal to prepare a plan to guide the replacement of the Lamar River Bridge in Yellowstone National Park and to generate input on the preparation of this Environmental Assessment. The scoping effort began on July 28, 2008 with a press release, mailing to interested parties, and posting of a scoping newsletter on the NPS Planning, Environment and Public Comment (PEPC) website. The 30-day scoping period ended on August 28, 2008.

A total of three written comments were received through PEPC. No comments were received from state or federal agencies. Scoping comments are discussed further in Chapter 1, *Purpose and Need*.

Federal Agencies
The U.S. Fish and Wildlife Service (USFWS) have prepared a Biological Opinion for the Yellowstone National Park Roads Program which included this bridge project. Consultation for this project was completed as part of the formal consultation with USFWS on the parkwide road program.

State Agencies
The park will submit this EA to the Wyoming State Historic Preservation Office for their review and comment for compliance with Section 106 Consultation under the National Historic Preservation Act.

Native American Groups
A letter was prepared and mailed to 165 tribal members of Yellowstone's 26 associated tribes and 47 other potentially interested tribes on July 28, 2008, to solicit concerns and comments for the proposed project. The park did not receive any responses. The park will notify the public of the availability of this EA via a news release, and will mail a copy to anyone requesting it. The EA will also be made available on the PEPC website.

National Historic Preservation Act Section 106 Consultation

In November, 2008, Yellowstone National Park issued a Notice of Adverse Effect to the Advisory Council on Historic Preservation and the Wyoming State Historic Preservation Office due to the need to replace this historic bridge. Both the Advisory Council on Historic Preservation and the Wyoming State Historic Preservation Officer concurred with the adverse effect. Both organizations were invited to join Yellowstone National Park in developing a Memorandum of Agreement (MOA) to mitigate the adverse effect of a complete replacement of the bridge. The Advisory Council determined that their participation in the consultation to resolve the adverse effect was not needed at this time. The Wyoming State Historic Preservation Officer requested that the park expand the consultation to mitigate the adverse effect to include members of the Park and Teton County, Wyoming Historic Preservation Boards, the National Trust for Historic Preservation, the alliance for Historic Wyoming, and a representative of the National Register Review Board, which was done. The expanded group began consultation in March of 2009 to develop a Memorandum of Agreement providing stipulations and processes to mitigate the adverse effect of replacement of the Lamar River Bridge. The signing of the MOA will conclude consultation of effect for the undertaking, as defined in the park's Programmatic Agreement for the road rehabilitation program, a streamlined process for completing the Section 106 of the National Historic Preservation Act requirements. The final MOA document will be transmitted to the Advisory Council on Historic Preservation for their monitoring of the stipulations.

Internal Scoping

Internal scoping was conducted by an interdisciplinary team of professionals from Yellowstone National Park. Interdisciplinary team members met regularly throughout the course of this planning process to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted individual site visits to the project site.

Environmental Assessment Review and List of Recipients

The Environmental Assessment will be released for public review in August 2009. To inform the public of the availability of the Environmental Assessment, the National Park Service will publish and distribute a letter or press release to various agencies, tribes, and members of the public on the National Park's mailing list, as well as developing a press release for publication in local newspapers. Copies of the Environmental Assessment / Assessment of Effect will be provided to interested individuals, upon request. Copies of the document will also be available for review on the internet at http://parkplanning.nps.gov/yell.

The Environmental Assessment will be on public review for a 30-day public comment period ending August 25, 2009. During this time, the public is encouraged to submit their written comments to the National Park Service at the address provided at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the Environmental Assessment, as needed. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

List of Preparers

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