United States Department of the Interior

NATIONAL PARK SERVICE
Glacier National Park
West Glacier, Montana 59936

IN REPLY REFER TO:

L76-GLAC-01-025
FES 03-024

Dear Friends:

Enclosed is the Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement for Glacier National Park. This plan identifies the National Park Service's preferred alternative to rehabilitate the road and summarizes public comment on the Draft Environmental Impact Statement. It also contains our responses to substantive public comments that were raised during the review period.

We have made several changes to the preferred alternative and impact assessment following receipt of public comments, completion of the 2002 visitor survey and information that recently became available. The basic components including schedule and traffic management remain the same. Principal modifications are to visitor use facilities for the preferred alternative. The Baring Creek Cabin Trailhead Parking Area was eliminated from consideration because of the potential impacts to grizzly bear and other wildlife in this area. Use of Logan Pit as an oversized vehicle turnaround and parking area following rehabilitation was eliminated because of the potential effect on harlequin ducks and streamside resources. Minor improvements to a few existing pullouts along the road were added. In addition transit service under the preferred alternative was expanded to provide 14 shuttle vehicles operating ½ hour intervals to improve the level of service.

Thirty days from the release of this Final Environmental Impact Statement, a Record of Decision will be issued on the preferred alternative as described in this plan. A copy of the Record of Decision will be sent to you. This Final Environmental Impact Statement is also available on the web at *www.nps.gov/glac/plans.htm*. If you have any questions or concerns please write to Superintendent, Glacier National Park, P.O. Box 128, West Glacier, Montana,59936 Attn: GTSR FEIS or email to glac_public_comments@nps.gov

Thank you for your ongoing participation in this critical effort to preserve one of Glacier National Park's national historic landmarks.

Sincerely,

/signed/ Jerry O'Neal

Authenticated by Donna Owen 5/13/03

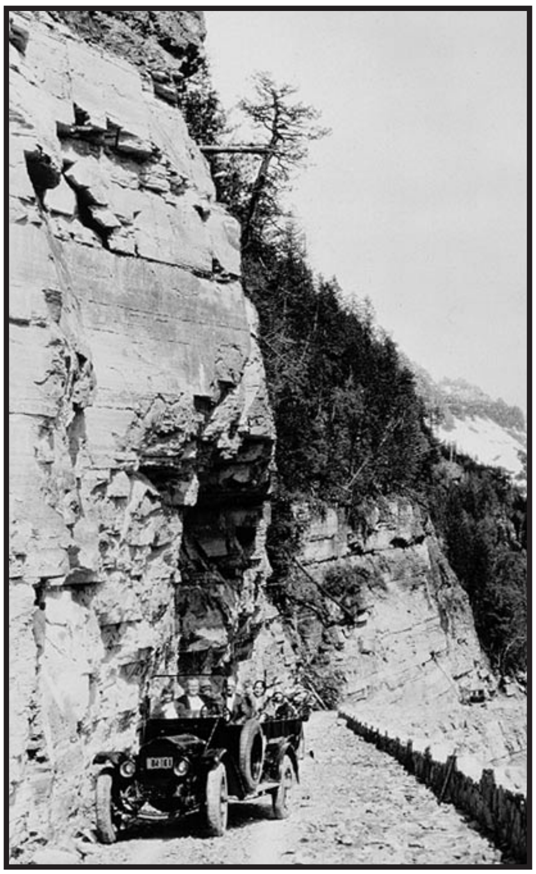
Michael O. Holm
Superintendent

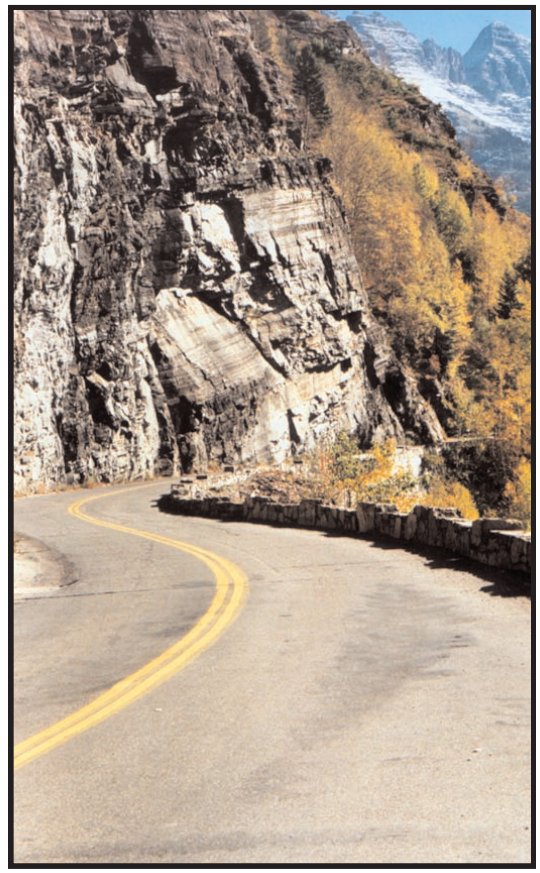
Enclosure (1)
L76-GLAC-01-025
FES 03-024

National Park Service
U.S. Department of the Interior

Glacier National Park
Montana

Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement





Glacier National Park

Waterton-Glacier International Peace Park
The World's First International Peace Park
A World Heritage Site
April 2003

Going-to-the-Sun Road
Rehabilitation Plan/Final Environmental Impact Statement

Glacier National Park

U.S. Department of the Interior
National Park Service

Federal Highway Administration
Cooperating Agency

April 2003

Going-to-the-Sun Road
Rehabilitation Plan/Final Environmental Impact Statement

Glacier National Park

Waterton-Glacier International Peace Park
The World's First International Peace Park
A World Heritage Site

April 2003

Prepared by the U.S. Department of the Interior, National Park Service
in cooperation with the
Federal Highway Administration, Western Federal Lands Highway Division

Abstract: Glacier National Park is considering the rehabilitation of the 50-mile (80-kilometer) Going-to-the-Sun Road, a National Historic Landmark. Road rehabilitation is needed to correct structural deficiencies in the deteriorating roadway, improve safety, preserve historic and cultural resources, provide a safe and pleasant driving experience, and to upgrade visitor use facilities adjacent to the Road such as parking and pullouts, and roadside trails. To fully consider the options for improvements, four alternatives including a No Action Alternative were evaluated. The National Park Service's Preferred Alternative is to rehabilitate the Going-to-the-Sun Road over a 7- to 8-year period beginning in 2004. Rehabilitation includes repairs to historic retaining walls, guardwalls, tunnels, and other structural features contributing to the historic character of the Road. The National Park Service also proposes to implement mitigation measures such as transit service during construction, additional exhibits and interpretive information, and other visitor use improvements and programs to aid visitors and businesses during rehabilitation. Under the Preferred Alternative, the Road and access to Logan Pass would remain open during the visitor season. The National Park Service concluded that the Preferred Alternative provides the best overall balance in addressing needed Road rehabilitation, protecting and preserving historic, scenic, and natural resources, while allowing continued visitor access and minimizing impacts on regional businesses.

Other alternatives considered for rehabilitation of the Going-to-the-Sun Road included: the No Action Alternative—rehabilitation of the Road over a 50-year period based on current levels of funding; Priority Rehabilitation over 20 years; or an Accelerated Completion Alternative, which would take 6 to 8 years to complete. The consequences of these actions on socioeconomic, cultural, and natural resources were initially discussed in a Draft Environmental Impact Statement released for a 60-day comment period in September 2002. Following public hearings and receipt of comments, the National Park Service has made minor revisions to the proposed action and conducted additional analysis of potential environmental and economic impacts. The Final Environmental Impact Statement includes those revisions and responses to substantive comments received on the Draft EIS.

The Final Environmental Impact Statement will be available 30 days prior to issuance of a Record of Decision by the National Park Service.

List of Abbreviations and Acronyms

BMP	Best Management Practice
CAC	Citizens Advisory Committee
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FWS	U.S. Fish and Wildlife Service
GMP	General Management Plan
GNP	Glacier National Park
HAER	Historic American Engineering Record
IMPROVE	Interagency Monitoring of Protected Visual Environments
MP	Mile Post
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
Park	Glacier National Park
Road	Going-to-the-Sun Road
ROD	Record of Decision
SHPO	State Historic Preservation Office
TMDL	Total Maximum Daily Load

SUMMARY

GOING-TO-THE-SUN ROAD

REHABILITATION PLAN/FINAL ENVIRONMENTAL IMPACT STATEMENT

GLACIER NATIONAL PARK

WATERTON-GLACIER INTERNATIONAL PEACE PARK
THE WORLD'S FIRST INTERNATIONAL PEACE PARK
A WORLD HERITAGE SITE

APRIL 2003

Introduction

Capturing a scenic view in the 1930s

In 1999, the National Park Service concluded that the Going-to-the-Sun Road would be rehabilitated to preserve a National Historic Landmark and premier visitor experience in Glacier National Park. The focus of this Rehabilitation Plan/Environmental Impact Statement is how best to conduct the Road rehabilitation while minimizing impacts on the cultural, natural, and socio-economic resources. Studies and investigations have been conducted over the past 18 years on the condition of the Road. Engineering, socio-economic, visitor use, cultural resource, and other studies completed in 2001 and 2002 have further established the need to rehabilitate the Road. From February 2000 to December 2001, a Citizens Advisory Committee was established to help guide these studies and advise the National Park Service on how best to accomplish rehabilitation. Public input and recommendations from the Citizens Advisory Committee have contributed greatly to the development of rehabilitation alternatives and mitigation measures to reduce impacts on the resources and region. The Federal Highway Administration has been involved throughout this process as a cooperating agency in the development and evaluation of alternatives.

Purpose and Need for Road Rehabilitation

Completed in 1932, the Road is a National Historic Landmark defined by outstanding historic structural features and access to some of the most spectacular scenic landscapes in the United States. Today, the Road is in immediate need of repair to protect those characteristics for which the Road was designated a Historic Landmark and to maintain a world-class visitor experience. The Road is an

Original construction of the Going-to-the-Sun Road

integral component of the regional economy. Numerous tourist-related businesses are supported by visitors drawn from throughout the United States, Canada, and the world to visit Waterton-Glacier International Peace Park and enjoy the natural, cultural and scenic resources present along the Road.

Construction of the Going-to-the-Sun Road was a monumental undertaking. The Road was first opened to public travel over Logan Pass in the fall of 1932. During its first year of full operation in 1933, about 40,000 vehicles traveled the Road. Currently about 475,000 vehicles annually travel the Road from June to October and 1.7 million visitors enjoy the Park each year.

Since the Road's original construction, traffic volume, avalanches, harsh weather conditions, and inadequate maintenance from a lack of funding and trained staff have all contributed to deterioration of the structural and historic features of the Road. Studies since 1984 by the Federal Highway Administration and a recently completed *Engineering Study* by Washington Infrastructure Services have evaluated in detail the condition of the Road and priorities for repair. These condition assessments indicate that the Road and its structures will continue to deteriorate unless corrective action is taken. If corrective actions are not taken, historic structures will be lost and adjacent environmental resources may be adversely affected. The risk of a catastrophic Road failure increases the longer repairs are delayed.

Rehabilitation is to be completed in a manner that accomplishes the following objectives:

- Preserving its historic character, fabric, width, and significance
- Rehabilitating the Road to a quality condition in a cost-effective manner
- Minimizing effects on natural, cultural, and scenic resources
- Maintaining a world-class visitor experience
- Providing for visitor and employee safety
- Minimizing impacts to the local and regional economies

The entire 50-mile (80-kilometer) Going-to-the-Sun Road needs to be rehabilitated. In order to evaluate the Road's condition and develop feasible alternatives, the *Engineering Study* divided the Road into five segments, each with special characteristics and different rehabilitation requirements. Rehabilitation priorities by Road segment are shown in Figure S-1 and listed in Table S-1.

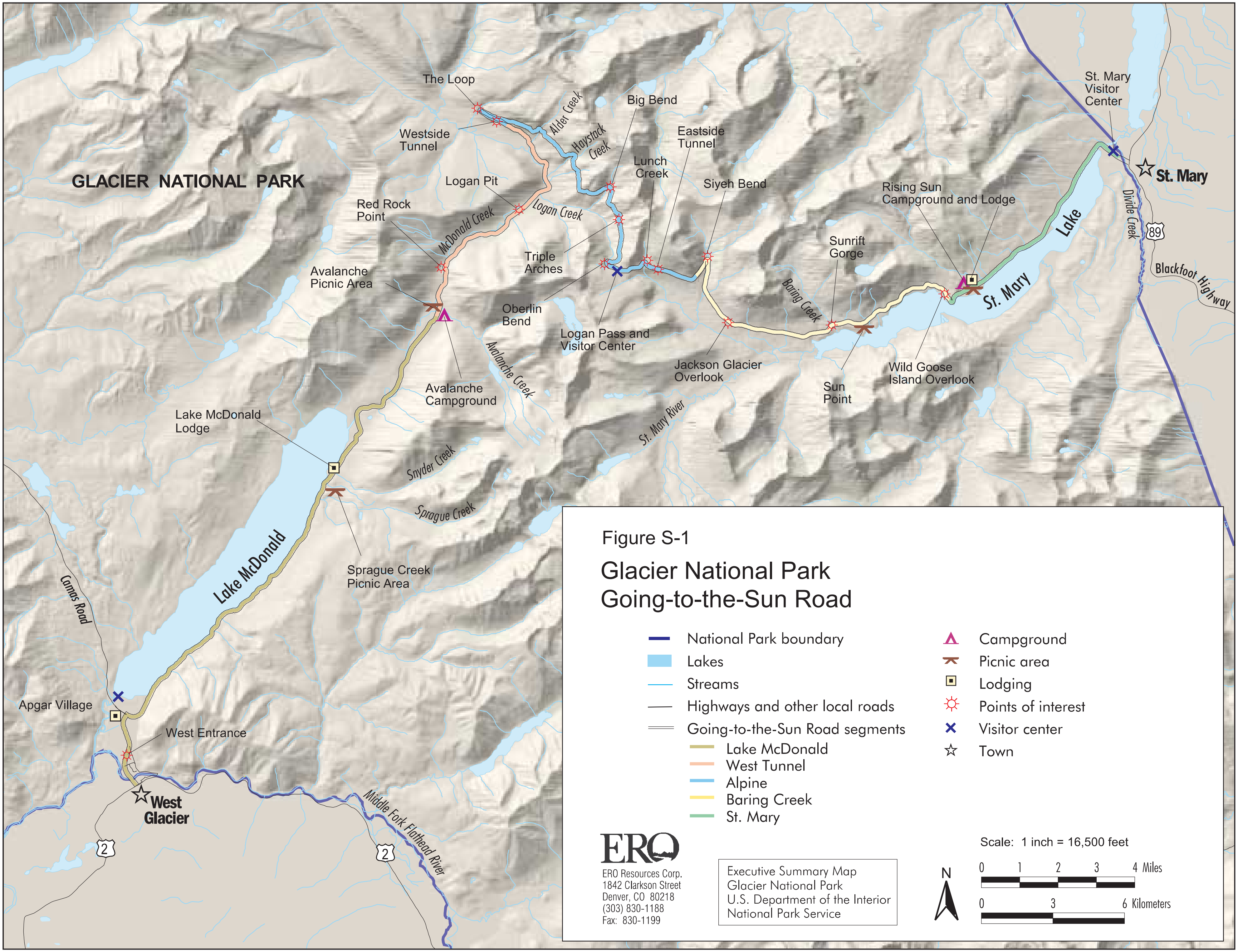

GLACIER NATIONAL PARK
The Loop
Westside Tunnel
Alder Creek
Haystack Creek
Big Bend
Eastside Tunnel
Lunch Creek
Siyeh Bend
Logan Pit
Logan Creek
Red Rock Point
McDonald Creek
Triple Arches
Avalanche Picnic Area
Oberlin Bend
Logan Pass and Visitor Center
Avalanche Creek
Avalanche Campground
Jackson Glacier Overlook
Baring Creek
Sunrift Gorge
Sun Point
Wild Goose Island Overlook
Rising Sun Campground and Lodge
St. Mary Lake
St. Mary Visitor Center
St. Mary
Divide Creek
89
Blackfoot Highway
St. Mary River
Lake McDonald Lodge
Snyder Creek
Sprague Creek
Sprague Creek Picnic Area
Lake McDonald
Camas Road
Apgar Village
West Entrance
West Glacier
2
Middle Fork Flathead River
Figure S-1
Glacier National Park
Going-to-the-Sun Road
National Park boundary
Lakes
Streams
Highways and other local roads
Going-to-the-Sun Road segments
Lake McDonald
West Tunnel
Alpine
Baring Creek
St. Mary
Campground
Picnic area
Lodging
Points of interest
Visitor center
Town
ERO
ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: 830-1199
Executive Summary Map
Glacier National Park
U.S. Department of the Interior
National Park Service
Scale: 1 inch = 16,500 feet
N
0 1 2 3 4 Miles
0 3 6 Kilometers

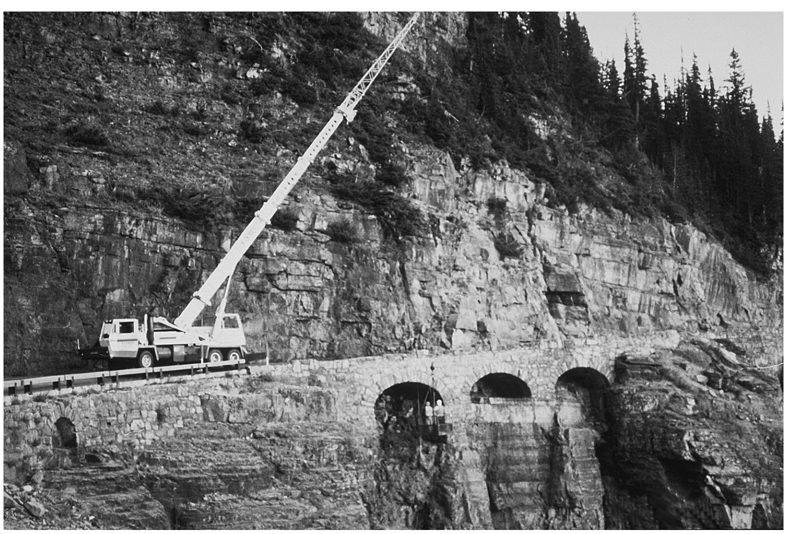
Table S-1. Rehabilitation priority by Road segment and milepost (MP).

Rehabilitation Work	Lake McDonald MP 0.0-16.2	West Tunnel MP 16.2-23.4	Alpine MP 23.4-34.2	Baring Creek MP 34.2-43.2	St. Mary MP 43.2-49.7
Drainage	5	2	1	4	3
Slope stability	5	3	1	2	4
Retaining walls, arches, and tunnels	4	2	1	3	5
Guardwalls	4	2	1	3	5
Roadway pavement	4	2	1	3	5

Note: 1 = highest priority; 5 = lowest priority.

The most critical repair needs are located on the 11-mile alpine section of the Road where the terrain is steep, the pavement is narrow, and there is little to no shoulder. Part of the difficulty in implementing needed repairs is that the majority of rehabilitation can only be conducted 4 to 6 months out of the year in the late spring, summer, and early fall. This construction season also coincides with the time that most visitors come to the Park. One of the challenges is to maintain visitor access, while implementing rehabilitation work. Also of great concern is the potential impact during rehabilitation to local and regional businesses and communities that rely on summer tourism. Thus, the rehabilitation alternatives considered the need to balance implementing needed repairs while preserving the Road's National Historic Landmark status and maintaining visitor use during construction.

Serious safety concerns have surfaced due to the condition of the Road. Deterioration has resulted in drainage problems, cracked and uneven road surfaces, missing or low guardwalls, and damaged retaining walls. Pedestrian crossings and traffic circulation at pullouts, overlooks, and parking areas are often deficient, which puts motorists, bicyclists, and pedestrians at risk. Many of the pullouts and parking areas adjacent to the Road have likewise deteriorated or were not designed for today's larger vehicles. Overuse at some pullouts has resulted in erosion, vegetation trampling, soil compaction, and development of informal social trails. A lack of interpretive exhibits, orientation information, and signs often leads to visitor confusion and congestion at popular sites.



Repair work on Triple Arches

Public Involvement After Release of the Rehabilitation Plan and Draft EIS

The Rehabilitation Plan/Draft EIS was released in September 2002 for a 60-day public review and comment period. During that period, the National Park Service hosted five public hearings/open houses in October 2002 to receive comments and answer questions about the proposed project. The hearings/open houses were held in Missoula, Great Falls, Kalispell, and Browning, Montana and Lethbridge, Alberta, Canada.

The NPS received over 250 written comments from government agencies, organizations, businesses, and individuals in addition to testimony given at the public hearings. Approximately 175 of the written comments were form letters with similar concerns about transit service. Several commenters expressed concern about the need to complete rehabilitation work as quickly as possible and suggested completely closing one side of Logan Pass and then the other to facilitate construction. Some were concerned that additional provisions should be made for biking along the Road. Others suggested that traffic on the Road should be limited to transit vehicles or perhaps a rail system. The Park also received comments emphasizing the need to expand transit operations in the Park and to the Park. Others suggested additional mitigation measures that could be used to offset impacts to visitors and businesses during construction. Several of the suggested modifications to the alternatives were previously analyzed and/or considered and were dismissed in the General Management Plan. The NPS concludes that the range of alternatives considered in the Draft EIS is adequate.

Appendix D to the Final EIS includes a summary of substantive comments on the Draft EIS and National Park Service responses to those comments.

Changes in the Proposed Action Since Release of the Draft EIS

The NPS has made several minor adjustments to the Preferred Alternative and impact assessment following receipt of public comments, completion of the 2002 visitor survey, and additional information recently available. The basic components, including schedule and traffic management for each of the four alternatives, remain essentially the same. Principal modifications are to visitor use facilities for the Preferred Alternative. The Baring Creek Cabin Trailhead Parking area was eliminated from consideration because of the potential impact to grizzly bear and other wildlife in this area. Use of Logan Pit as an oversized vehicle turnaround and parking area following rehabilitation was eliminated because of the potential effect on harlequin ducks and streamside resources, although this site would still be used for construction staging. Minor improvements to existing pullouts at Gunsight Pass Stock Trail, Triple Divide, and the Big Drift were added to the proposed action. Transit service for the Preferred Alternative was expanded to provide 14 shuttle vehicles operating at one-half hour intervals to improve the level of transit service. In addition, transit parking at the West Side Discovery Center near Apgar would be expanded to accommodate 110 to 120 vehicles.

> ***"Viewed as an engineering feat alone it is a remarkable example of American road building, but when we add to this the gorgeous panorama that unrolls before the beholder as he passes up and up until he feels that he may almost literally pick cotton out of the clouds that surround him…"***
>
> Senator Burton K. Wheeler of Montana at the dedication of the Going-to-the-Sun Highway, July 15, 1933

Results of the 2002 visitor survey were used to refine previously available information on how visitors are likely to respond to traffic delays and restrictions during Road rehabilitation. The new visitor survey also provided additional information

West tunnel in the 1930s

on visitor expenditures, party size, and residency. This information was used to update the estimated economic impacts to the local and regional economy for each of the alternatives. Construction costs and economic impacts were updated to 2002 dollars.

Alternatives Considered

In 1999, federal legislation was passed to reallocate $1 million of transportation funds to conduct an *Engineering Study* and a *Socio-economic Study* that included visitor use and business surveys. Establishment of a Citizens Advisory Committee also was authorized by the legislation. In addition, a *Transportation and Visitor Use Study* for the Park and cultural resource inventories of the Road were conducted to assist in the development of alternatives.

The development of alternatives was a multi-disciplined effort spanning several years and involving input from the public, a Citizens Advisory Committee, the Federal Highway Administration, the National Park Service, and private consultants. The National Park Service began seeking public input on the proposed project in June 2000 with a notice in the *Federal Register* and a newsletter sent to interested citizens. In December 2000, the National Park Service and Citizens Advisory Committee conducted a series of five open houses in Kalispell, Missoula, Great Falls, and Browning, Montana and one in Lethbridge, Alberta, Canada to discuss the issues and obtain public comments and concerns.

The Citizens Advisory Committee, which began its meetings on Road rehabilitation in February 2000, was composed of: a diverse group of local business leaders from the east and west sides of the Park; state and local government officials; representatives from the Blackfeet Tribe and the Confederated Salish and Kootenai Tribes; tourism representatives from Montana and Canada; and local and national experts on the environment, economics, historic preservation, and highway engineering. Following almost 2 years of discussion, including numerous beneficial comments from the public, and review of studies and reports, the Citizen's Advisory Committee submitted recommendations to the National Park Service including rehabilitation alternatives to consider in an Environmental Impact Statement. Following receipt of the Citizen's Advisory Committee's "Final Advice," the National Park Service initiated a final refinement of alternatives for consideration in the Environmental Impact Statement. The Preferred Alternative and other alternatives that were considered are briefly described below and compared in Table S-2.

Preferred Alternative (Shared Use)

The Preferred Alternative selected by the National Park Service is referred to as the Shared Use with Extended Rehabilitation Season Alternative (Shared Use). The Shared Use Alternative was the Citizen's Advisory Committee's recommended alternative. Rehabilitation of the Road under this alternative would be completed over 7 to 8 years. The cost to implement proposed Road rehabilitation and visitor use improvements and mitigation for the Preferred Alternative is estimated to range from $140 million to $170 million. This alternative seeks to implement road repairs while maintaining visitor use and access to the Going-to-the-Sun Road similar to current conditions. The National Park Service concluded that the Shared Use Alternative meets the project objectives and provides the best overall balance in addressing needed Road rehabilitation, protecting and preserving historic, scenic, and natural resources, while allowing continued visitor access and minimizing impacts to local businesses.

Guardrail damage, June 2002

Under this alternative, roadwork would be conducted from spring to fall with the most extensive work conducted during the shoulder seasons prior to Independence Day (July 4) and after September 15. During the shoulder season, when visitation is typically lower, traffic would be suspended within discrete work zones, while Logan Pass and the remainder of the Road remain open (at least 40 miles; 65 kilometers). Between Independence Day and September 15, a maximum cumulative traffic delay of 30 minutes over the length of the Road would occur during peak visitor hours, similar to the traffic delays used for the last 3 years for roadwork. Longer delays would be used during the early morning, evening, and at night (Table S-2).

At the same time Road rehabilitation is occurring, the National Park Service proposes to include improvements and upgrades to visitor use facilities located adjacent to the Road within the visitor service zone. Visitor use improvements for this alternative include: improved vehicle parking and pedestrian circulation at existing pullouts; selective vegetation clearing to restore scenic vistas; rehabilitation of existing toilets and the addition of new toilets; construction of five new short turnouts for slow-moving vehicles; construction of a few new short roadside trails and rehabilitation of social trails; designation of transit stops at popular locations along the Road; and improved information, orientation and interpretive information for visitors.

To ensure that the Road remains in excellent condition following this rehabilitation effort, the Park is seeking funding for operations and maintenance of the Road. In the past, the annual operating budget for Road maintenance has not been adequate to keep up with necessary Road repairs. Sufficient annual funding is needed to protect the investment in proposed Road rehabilitation and visitor use improvements.

Due to the potential impacts to visitors, businesses and tourism from the Going-to-the-Sun Road rehabilitation, the National Park Service is proposing several visitor development strategies to offset impacts. The Park would work with public, commercial, private, non-profit, and tribal organizations to create proactive public information, special events and gatherings, and marketing programs before and during Road repairs. The existing transit fleet would be expanded to 14 vehicles with shuttle service throughout the length of the Road operating at 30-minute intervals. This service would provide visitors with an alternative method of traveling the Road and an opportunity to stop at about 17 popular destinations. A West Side Discovery Center near Apgar is included in the General Management Plan. This facility would provide a quality visitor center and museum, and would

Table S-2. Comparison of alternative features.

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
SCHEDULE				
Road rehabilitation duration	50 years	20 years	7 to 8 years	6 to 8 years
FUNDING (cost updated to millions of year 2002 dollars)				
Road rehabilitation cost	$102 - $122	$94 - $111	$84 - $112	$75 - $87
Visitor use improvement cost	0	$1.6	$10.4	$10.4
Total transit system cost over rehabilitation period†	0	$9.1	$9.4	$8.3
Visitor development mitigation	0	0	$17.7	$17.7
TOTAL COST • 2002 dollars • Inflation adjusted (4%/year)‡	 $102 - $122 $328 - $394	 $104.7 - $121.7 $157 - $186	 $121.5 - $149.5 $140 - $170	 $111.4 - $123.4 $126 - $144
Yearly funding required	$1 - $2	$5	$10 - $18	$9 - $16
Annual road operation and maintenance cost following rehabilitation	$0.56	$1.5 - $1.9	$1.5 - $1.9	$1.5 - $1.9
TRAFFIC MANAGEMENT ON THE GOING-TO-THE-SUN ROAD DURING REHABILITATION				
Up to 30-minute delays, everyday, all season	Yes	Yes	Yes	Yes
Up to 1-hour delays	No	No	Mornings[1] and evenings[2] (Monday through Thursday)	No
Up to 2-hour delays	No	Nights[3] (Monday through Thursday)	No	No
Variable scheduled traffic delays for night construction with advance notice	Nights[3] (all week)	Nights[3] (Monday through Thursday) after third Monday in September	Nights[3] (Monday through Thursday)	No
Traffic suspensions on road segments under rehabilitation	No[4]	No	Prior to Independence Day and after mid-September	Monday through Thursday, all season
Access to Logan Pass	Yes	Yes	Yes	Yes

1 Mornings = 8 A.M. to 10 A.M.
2 Evenings = 3 P.M. to 8 P.M.
3 Nights = 8 P.M. to 8 A.M.
4 Traffic delays or suspensions may be necessary in the event of road failure.
† Includes start-up cost and annual operating costs.
‡ Inflation-adjusted cost reflects the estimated actual cost over the period of construction.

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
TRANSIT SERVICE DURING REHABILITATION				
Schedule	Existing operation, 2½ to 5 hour intervals	Existing operation, 2½ to 5 hour intervals plus destination transit	30-minute intervals	30-minute intervals
Vehicles — vans or buses	3 (2 active; 1 backup)	5 (4 active; 1 backup)	14 (12 active; 2 backup)	14 (12 active; 2 backup)
New transit staging areas	No, existing parking areas would be used	No, existing parking areas would be used	Staging area parking at Apgar (110 to 120 spaces) and St. Mary (25 to 30 spaces)	Staging area parking at Apgar (110 to 120 spaces) and St. Mary (25 to 30 spaces)
Shoulder season service	No	No	Yes	Yes
OPERATIONS AND MAINTENANCE				
Increased annual funding for operations and maintenance	No	Yes	Yes	Yes
VISITOR USE IMPROVEMENTS				
Parking and Pullouts				
Move, add, or reconfigure parking and pullouts to improve safety and traffic flow	No	No	Yes	Yes
Remove or formalize social pullouts	Yes	Yes	Yes	Yes
Add slow-moving vehicle turnouts	No	Yes	Yes	Yes
Vegetation Management				
Vista and roadside vegetation clearing	Yes	Yes	Yes	Yes
Trail Improvements				
Rehabilitate existing roadside trails and add new short trail segments	No	No	Yes	Yes
Toilets				
Rehabilitate existing vault toilets	No	Yes	Yes	Yes
Replace portable toilets with vault toilets and add new toilets	No	Yes	Yes	Yes

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
Visitor Orientation, Information, and Interpretation				
Install orientation and information facilities	No	No	Yes	Yes
Provide interpretive wayside exhibits along the Road	No	No	Yes	Yes
Develop Intelligent Transportation System, update roadside signage, and provide communication material to visitors	No	No	Yes	Yes
Activate public information program to aid visitors and local businesses	Yes	Yes	Yes	Yes
Implement visitor use mitigation measures	No	No	Yes	Yes

replace an existing small visitor contact station in Apgar Village. A portion of the Discovery Center would focus on transit staging, as well as information and orientation for visitors, and is included in the Rehabilitation Plan. Rehabilitation of the St. Mary Visitor Center is proposed to provide transit staging and improve the quality of exhibits and interpretive information. Both of these improvements are included as mitigation to improve transit and provide a high quality visitor experience. To improve the quality of communications and timeliness of information to Park visitors, the National Park Service proposes to implement an Intelligent Transportation System, which includes a computerized network linking information sources and providing real-time information to visitors on road conditions, traffic delays, weather, transit schedules, and interpretive information. It would also help in accomplishing maintenance activities such as snowplowing and opening the Road each spring.

Priority Rehabilitation Alternative

The Priority Rehabilitation Alternative allows for planning and design ahead of time, rather than in response to roadway failure or emergencies. Road rehabilitation would be implemented over 20 years, but this would still allow deterioration of historic, natural, and scenic resources. This alternative would address current structural deficiencies in the Road with only a few improvements to visitor use facilities and no visitor development mitigation funding. The estimated cost is $157 million to $186 million.

Accelerated Completion Alternative

The objective of the Accelerated Completion Alternative is to complete rehabilitation of the Road as quickly as possible by using isolated traffic suspensions Monday through Thursday (May through October) and maintain visitor access on the weekends from Friday to Sunday. This alternative would implement Road repairs over 6 to 8 years at a cost of $126 million to $144 million. The rapid completion of rehabilitation would minimize further Road deterioration and damage to historic, cultural, and environmental resources. Although the Accelerated Completion Alternative would reduce the period of construction, it would require restrictions in visitor access during the week. This alternative includes the same visitor use improvements and visitor development mitigation funding as the Preferred Alternative.

Repair as Needed Alternative (No Action)

The Repair as Needed Alternative or No Action Alternative represents baseline existing conditions. Under this alternative, rehabilitation work on the Road would continue as funding allows, but work would be limited to critical and emergency repairs. This alternative focuses only on rehabilitating the Road. No funds would be available for visitor use or mitigation of construction activities. Road rehabilitation is estimated to take about 50 years at current levels of funding and cost between $328 million and $394 million. During that time, it is expected that further deterioration of the Road would occur and significant historic resources would be lost. This alternative would not meet National Park Service goals and objectives to correct safety issues, protect resources, and maintain a world-class visitor experience.

Potential Environmental Effects

For each of the four alternatives considered, an evaluation was made of the potential effects to socioeconomic, cultural, and natural resources from proposed Road rehabilitation. The analysis of impacts was based on a variety of factors including previous studies, surveys of Park visitors, economic modeling, impacts from similar projects, information provided by the public and the Citizen's Advisory Committee, and the professional knowledge and experience of the National Park Service, Federal Highway Administration, and various consulting firms. A summary of impacts for each resource is provided below.

Cultural Resources

The Going-to-the-Sun Road is one of the most spectacular and significant linear cultural resources in the United States. The Road provides access to exceptional scenery, but is equally famous for the careful craftsmanship and design features that were required to carve the Road into the steep mountainside. The Road's narrow alignment hugs lakeshores, mountain streams, and massive cliffs, and its design reflects a strong sensitivity to these dramatic natural features. The masonry features along the Road—including guardwalls, retaining walls, bridges, and culvert headwalls—are vital in defining the Road's historic, visual, and engineering character. Most of these structures were designed to harmonize with the natural setting by using native materials and by blending with the landform as much as possible.

The construction of the Going-to-the-Sun Road marked a dramatic shift in the patterns of visitor use in Glacier National Park. The completion of the Road through the heart of the Park encouraged the use of private automobiles as the means to see the Park. Since the entire Road opened to the public in 1932, driving the Road has been one of the primary ways that visitors see and experience the Park. The extraordinary qualities of the Road have made it one of the principle attractions for Glacier visitors, and it has become perhaps the most noted highway in the entire National Park system.

The historic significance of the Road has been recognized by its listing in the National Register of Historic Places in 1983; its designation as a National Historic Civil Engineering Landmark by the American Society of Civil Engineers in 1985; its documentation by the Historic American Engineering Record in 1990; and its designation as a National Historic Landmark in 1997. The

Clearing the Road
Hungry Horse News Online, June 27, 2002

significance of the Road is exemplified by the National Historic Landmark designation, for which only two roads in the United States have been so designated. National Historic Landmarks are designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States.

The National Historic Landmark designation, the most recent of these recognitions, encompassed the 48.7-mile portion of the Road from the foot of Lake McDonald to St. Mary. The nomination describes and analyzes the Road's contributing resources within the parameters of five categories: spatial organization, circulation, topography, vegetation, and structures. The nomination lists fourteen principle structures as contributing to its significance. In addition to the Road itself, these include features such as bridges, tunnels, a horse trail underpass, and culverts. Retaining walls and guardwalls also are included in the National Historic Landmark designation. Currently there are about 2.4 miles of historic retaining walls, most of which are contributing to the significance of the Road. There were about 8 miles of guardwalls built between 1922 and 1937, of which almost 7 miles still maintain their historic integrity. A recent comprehensive inventory has recorded over 1,300 individual historic structural features along the Road. Preservation and rehabilitation of these historic features is a key component of proposed rehabilitation.

The National Historic Preservation Act of 1996 requires Glacier National Park to minimize harm to the National Historic Landmark designated Road. The Secretary of Interior's *Standards for the Treatment of Historic Properties* provide direction for the Park in promoting responsible preservation practices during rehabilitation. Standards particularly relevant to Road rehabilitation include:

- The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
- Most properties change over time. Those changes that have acquired historic significance in their own right shall be retained and preserved.

"The Going-to-the-Sun Road possesses extraordinary integrity to the period of its construction…[the Road] provides nearly the same experience for visitors that it did during the historic period."

National Historic Landmark Nomination

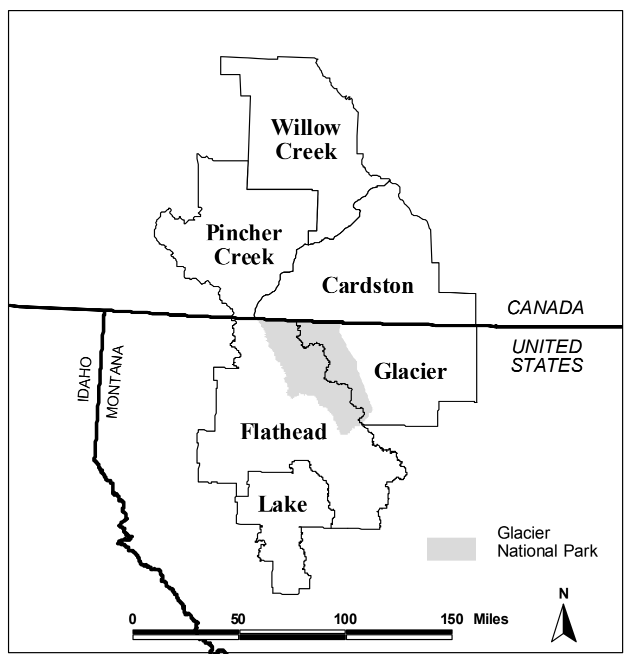
- Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.
- Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities, and where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

The alternatives for Road rehabilitation considered the historic designations and the Secretary of the Interior's *Standards for the Treatment of Historic Properties* in the development of measures to protect and repair existing historic cultural resources. All of the alternatives would adhere to these standards. However, because of the different duration for rehabilitation, some alternatives provide better protection of cultural resources. The Repair as Needed Alternative would require 50 years to complete rehabilitation and during that time, it is likely that many of the existing historic features would continue to deteriorate or would be permanently lost. The preservation of historic resources would be somewhat better under the Priority Rehabilitation Alternative; however, further deterioration and damage to historic features such as guardwalls and retaining walls is expected to continue if rehabilitation is extended over 20 years. The Shared Use (Preferred) and Accelerated Completion Alternatives would complete rehabilitation work in less than 8 years and, thus, provide the best opportunity to preserve the historic features before further significant deterioration occurs.

Socioeconomic Resources

Visitor Use and Expenditures

Baseline projections of Park visitation without rehabilitation indicate an average annual growth rate of 0.6 percent from 2001 to 2006, then remaining constant to 2020. A change in the number of visitors to Glacier National Park during rehabilitation is expected. Responses from visitor use surveys conducted in 2000 and by request of the Citizen's Advisory Committee in 2002, indicate that a portion of Park visitors would shorten their visit or not come if the rehabilitation effort limits access or results in substantial delays. The number of visitors that indicate they would change their travel plans to the Park varies both by visitor type (day visitors versus those staying overnight) and the nature of the traffic interruption. Survey responses indicate visitors are likely to be more sensitive to traffic suspensions than to relatively short delays. The study area for the evaluation of socioeconomic impacts includes Flathead, Glacier, and Lake counties in Montana and the Willow Creek, Pincher Creek, and Cardston municipal sub-districts in Alberta, Canada.



Economic study area

Under the Repair as Needed Alternative (No Action), annual Park visitation is expected to be about 1.9 million by the year 2020 (Table S-3). If current visitation trends continue over the 50-year rehabilitation period for this alternative, average annual visitor expenditures in the economic study area are projected at nearly $135 million (Table S-4). This includes projected annual visitor expenditures of almost $117 million for Flathead, Glacier, and Lake counties in Montana and $18 million for southwest Alberta. Baseline visitor expenditures are estimated to directly and indirectly support about 4,000 jobs in the three Montana counties, 250 jobs elsewhere in Montana and 500 jobs in southwest Alberta (Table S-4). Although the Repair as Needed Alternative represents the socioeconomic baseline for current Road maintenance and repair activity, it is possible that in the absence of timely rehabilitation, the Road will suffer one or more catastrophic failures during the 50-year period it would take to complete repairs. If a segment of the Road should fail, access to Logan Pass (and passage across the Park) could be cut off altogether from at least one direction for an indeterminate period. In such an event, impacts on visitation could be greater than the estimated effects under any of the other alternatives. The Repair as Needed Alternative represents the baseline condition for which the economic impact of other alternatives is compared in the following discussion.

Implementation of the Priority Rehabilitation Alternative, which would require 20 years to repair the Road, is projected to reduce annual visitation by about 4 percent or 72,000 visitors (Table S-3). This would result in an annual reduction in visitor expenditures of about $6 million and a decrease of about 200 direct and indirect jobs (Table S-4).

Table S-3. Average annual change in visitation during Road rehabilitation for each alternative.

Alternative	Number of Visitors	Change in Visitors	Percentage Change in Number of Visitors
Repair as Needed (Baseline)	1,868,000	NA	NA
Priority Rehabilitation	1,796,000	-72,000	-3.8%
Shared Use (Preferred)	1,749,000	-119,000	-6.4%
Accelerated Completion	1,660,000	-208,000	-11.0%

Under the Shared Use Alternative (Preferred), visitation during rehabilitation is estimated to decrease over 6 percent or 119,000 visitors annually, during the 7- to 8-year construction period (Table S-3). Direct visitor spending is estimated to decrease by about $9 million annually for the Shared Use Alternative and the number of direct and indirect jobs would decrease by 330 (Table S-4). This is a decrease of about 6 percent in annual visitor expenditures compared to the baseline. Implementation of visitor use improvements and mitigation measures under this alternative are expected to minimize the impact to visitation during rehabilitation.

The Accelerated Completion Alternative would complete rehabilitation in 6 to 8 years, but would result in the largest decrease in visitors because of traffic suspensions during weekdays. An 11 percent reduction in visitors, or about 208,000 fewer annual visitors, would visit the Park under this alternative (Table S-3). Direct visitor expenditures would decrease about $16 million and direct and secondary jobs would decrease by 590 annually (Table S-4). Visitor use improvements and mitigation measures were also included in this alternative.

Table S-4. Average annual changes in direct visitor expenditures and employment for each alternative.

Alternative	Direct Visitor Expenditures ($ millions)	Change in Direct Visitor Expenditures ($ millions)	Visitation-Related Employment	Change in Employment
Repair as Needed (Baseline)	$135	NA	4,750	0
Priority Rehabilitation	$129	-$6	4,550	-200
Shared Use (Preferred)	$124	-$9	4,420	-330
Accelerated Completion	$119	-$16	4,160	-590

Construction Expenditures

All alternatives would result in construction-related expenditures and associated jobs; however, the Repair as Needed Alternative provides the baseline for comparing the incremental increase with other alternatives. Construction expenditures include materials, equipment, labor, and engineering services. For simplicity, visitor development and transit expenditures are not included as part of construction expenditures, but it is anticipated that expenditures for these mitigation measures could provide an additional source of local spending and employment, partially offsetting a reduction in visitor-related expenditures. It is assumed that about one-half of the new jobs would be hired locally and the remaining would be filled by non-local workers. Annual expenditures vary with the intensity of construction as shown in Table S-5. For all alternatives, about 65 percent of the construction expenditures within the Montana study area would be in Flathead County, 33 percent in Glacier County, and about 2 percent in Lake County. Other areas in the State of Montana also would benefit from direct and secondary economic effects from construction spending for all of the alternatives.

Table S-5. Construction expenditures and jobs.

Alternative	Annual Construction Expenditures (millions)	Jobs Created
Repair as Needed (Baseline) (2004 – 2053)	$1 to 2	30
Priority Rehabilitation (2004 – 2023)	$5	40
Shared Use (Preferred) (2004 – 2011)	$10 to $18	70 to 150
Accelerated Completion (2004 – 2010)	$9 to $16	60 to 150

Net Economic Effects

Net direct and indirect impacts on the study area economy are calculated by combining the anticipated reduction in tourism-related spending with the expected increases in construction spending (Table S-6). The net annual effect on study area economic output is smallest under the Priority Rehabilitation Alternative, averaging about $6.2 million per year. The net impact for the Shared Use Alternative (Preferred) is slightly greater at $6.6 million per year, and the greatest impact is with the Accelerated Completion Alternative with a decrease in economic output of about $16.6 million per year.

Table S-6. Summary and comparison of average annual direct and indirect effects of Road rehabilitation alternatives on study area economic output (2002 dollars).

Economic Sector	Repair as Needed (Baseline)	Priority Rehabilitation	Shared Use (Preferred)	Accelerated Completion
Tourism-related economic output	$181,000,000	$172,500,000	$167,500,000	$157,600,000
Change from the baseline	NA	- $8,500,000	- $13,500,000	- $23,400,000
Construction-related economic output	$2,100,000	$4,400,000	$9,000,000	$8,900,000
Change from the baseline	NA	+ $2,300,000	+ $6,900,000	+ $6,800,000
Net Annual Total Impact	**$183,100,000**	**- $6,200,000**	**- $6,600,000**	**- $16,600,000**

It is important to recognize that the effects on visitation and construction do not exactly offset one another. Economic stimulus to the local construction sector does not necessarily reduce the impact on local tourism-related business. In addition, these values represent the annual effects, which would extend over the different rehabilitation periods for each alternative. For example, the $6.2 million annual decrease in economic output for the Priority Rehabilitation Alternative would extend over 20 years, whereas the $6.6 million decrease in economic output for the Shared Use Alternative would extend over 8 years. Annual economic effects are estimated to be greatest under the Accelerated Completion Alternative. This is due primarily to traffic suspensions four days of the week and the estimated reduction in visitors compared to the other alternatives.

Future adverse impacts on visitation and the economy are possible if segments of the Road fail. The timing and magnitude of these impacts cannot be projected, but the Repair as Needed and Priority Rehabilitation Alternatives have the greatest potential for adverse impacts because of the extended period for rehabilitation. For all alternatives, Road rehabilitation would continue throughout the Lewis & Clark Bicentennial Commemoration in 2005 and 2006. Potential increases in Park visitation during this period may partially offset rehabilitation-related impacts on visitation.

From a broader perspective, it is estimated that the annual tourism-related economy in the study area is about $250 million to $300 million, while total economic output across all sectors is about $5 billion. Consequently, the estimated impact from changes in visitation range from about a 2 percent reduction in tourism-related economic activity in the study area for the Priority Rehabilitation Alternative to about 3 percent for the Shared Use Alternative (Preferred), to about a 5 percent reduction for the Accelerated Completion Alternative. Relative to the size of the local economy, all of the alternatives would have a modest effect on the economy as a whole.

Natural Resources

Glacier National Park supports some of the most biologically rich and scenic resources in the western United States. In fact, because of the Park's biological diversity and significance, it has been designated as a Biosphere Reserve and a World Heritage Site. Natural resources are managed in accordance with National Park Service policy to maintain the components and processes of the natural ecosystems, including the natural abundance, diversity, and ecological integrity of the plant and animal species native to those ecosystems.


Weeping wall in the 1950s

Potential impacts to natural resources from rehabilitation of the Road are similar for the four alternatives because each of the alternatives would maintain the existing road width and alignment and use the same construction techniques. However, the delay in implementing Road rehabilitation under the Repair as Needed and Priority Rehabilitation alternatives would allow existing damage to soil, vegetation, and water resources from erosion and poor drainage to continue. No new long-term ground disturbances are anticipated for the Repair as Needed Alternative. The Priority Rehabilitation Alternative would impact about 0.2 acres (0.08 hectares) from construction of five short slow-moving vehicle turnouts. For the Shared Use (Preferred) and Accelerated Completion Alternatives, ground-disturbing activities would occur from implementation of additional visitor use improvements, including pullout upgrades, slow-moving vehicle turnouts, short trails, and a new transit parking area located near Apgar. These new visitor use improvements would result in a long-term disturbance of about 7.4 acres (3.0 hectares) of land. All visitor use improvements would occur within the existing visitor service zone adjacent to the Road.

Rehabilitation of the Road would be conducted primarily within the existing roadway prism, which includes the existing pavement and adjacent fill and cut slopes created by original Road construction. As a result, substantial areas of new disturbance are not anticipated. Construction-related disturbance within the Road corridor includes disturbance to soils and native vegetation. Minimal removal of trees would occur at visitor use areas and along the Going-to-the-Sun Road for vistas, safety, and other identified project objectives including comfort stations, parking, utilities, fiber optics, and trails. Wetlands would be avoided to the extent possible and where temporary impacts occur, wetlands would be restored to maintain their original functions and value. Most of the soil and vegetation disturbances would be temporary and, for all alternatives, extensive reclamation and revegetation measures would be implemented following rehabilitation of each Road segment.

The Going-to-the-Sun Road parallels several important water resources including Lake McDonald, St. Mary Lake, McDonald Creek and other streams that support fish and aquatic life. Ground-disturbing activities also have the potential to impact water and aquatic resources from erosion and sediment transport. Direct disturbances to water features are expected to be limited to bridge, culvert, and drainage repairs. While these activities may result in short-term disturbances to water resources, proposed drainage improvements are expected to result in a long-term beneficial effect to water and

McDonald Creek

aquatic resources. Implementation of erosion and sediment control measures during rehabilitation would be used to protect water resources, as well as soil and vegetation for all alternatives. Provisions for fish passage in drainages also would be incorporated into rehabilitation.

Glacier National Park supports over 300 species of wildlife, many of which are found near the Going-to-the-Sun Road. Proposed rehabilitation for all alternatives and visitor use improvements for the Shared Use and Accelerated Completion Alternatives would result in a minor loss of wildlife habitat, but construction-related noise, lighting, and human activity may displace some wildlife activity near work zones. Proposed rehabilitation could create additional habitat fragmentation and may reduce the connectivity for wildlife movement. Road improvements would not affect design speeds or posted speed limits, so the potential for wildlife/vehicle collisions would not change.

The Park provides habitat for five federally listed threatened and endangered species—bald eagle, grizzly bear, gray wolf, lynx, and bull trout. Direct impact to habitat for these species is expected to be minor for all of the alternatives. Construction activities near bald eagle territories at Lake McDonald and St. Mary may disturb bald eagles; therefore, roadwork near Lake McDonald would be restricted from March 1 to May 15, and near St. Mary, restrictions would extend to June 15. Construction activity could adversely affect grizzly bear behavior, foraging, and movement near the Road, particularly where night construction occurs. Gray wolf use near the Road is limited, but construction disturbance could deter their activity near work zones. Although lynx are present in the Park, their distribution and abundance are not well known. Proposed roadwork would not create additional barriers to lynx movement, but temporary disturbance during construction may affect their activity near the Road. Bull trout are found on the east and west sides of the Continental Divide. The potential introduction of sediment into streams may temporarily affect bull trout, but impacts are expected to be minor. Under the Endangered Species Act, the NPS has determined that proposed Road rehabilitation may affect, but is not likely to adversely affect bald eagle, lynx, gray wolf, or bull trout and is likely to adversely affect grizzly bear. There would be no effect on federally listed plant species, since none are known to occur along the Going-to-the-Sun Road corridor. The NPS intends to implement a number of conservation measures to minimize impacts to threatened, endangered, and sensitive species and will consult annually with the U.S. Fish and Wildlife Service to ensure appropriate measures are being taken to reduce impacts including additional rare plant surveys.

There are 63 wildlife and aquatic species and 64 plant species of concern to the state present in Glacier National Park. Rocky Mountain bighorn sheep and mountain goats between The Loop and Siyeh Bend may be affected by construction-related disturbance, but these species have historically acclimated to traffic and human activity. Several golden eagle nests are present near the Road, but they also have been tolerant of other construction projects on the Road and measures to limit construction activity near active nest sites are incorporated into the Rehabilitation Plan. Harlequin duck breeding habitat is found on McDonald Creek and other drainages. Use of Logan Pit as a construction staging area could affect harlequin duck breeding and brood rearing, but a buffer area would be established to protect suitable habitat. Wolverine is a wide-ranging species that may be susceptible to night construction and human activity. Westslope cutthroat trout may be temporarily affected by sedimentation near localized construction sites, but the conservation measures established for bull trout should minimize impacts to westslope cutthroat trout. For other species of concern, only negligible to minor effects are anticipated. Park biologists monitoring construction activities may introduce restrictions in construction activities, location, or timing to minimize impacts to species of concern as appropriate.

Mountain goat

Potential impacts to air quality and visibility would be minor and temporary for all alternatives. Only a short-term increase in construction vehicle emissions and dust is anticipated. A temporary local increase in air pollutants would not result in exceedances of applicable air quality standards.

Road rehabilitation would result in the temporary introduction of disturbances to the visual quality of the Road from equipment, traffic, material storage, and construction activity. Over the long term, all of the alternatives would improve and restore the scenic quality and character of the Road as damaged historic features are rehabilitated, drainage deficiencies corrected, and eroding slopes revegetated. The Shared Use (Preferred) and Accelerated Completion Alternatives would best restore the scenic quality of the Road because improvements would be implemented before significant new deterioration would occur.

Each of the alternatives would introduce additional noise into the environment from construction equipment, machinery, and traffic. This would temporarily impact the natural quiet typically present in the Park and may affect the quality of the visitor experience and some wildlife. The significance of the impacts would be minimal because work would be conducted within the roadway where current traffic volumes are often high during the peak visitor season. The introduction of artificial light for night work would affect the night sky and possibly wildlife and visitor enjoyment near these work zones; however, night work would be limited primarily to low elevation sites and would be used selectively for specific rehabilitation tasks.

Scenic pullout west of Logan Pass

There would be no direct disturbance to proposed wilderness or Wild and Scenic Rivers in the Park. Noise from construction activities may carry into proposed wilderness areas, but this would be a short-term effect. No impact to the values for which the Middle Fork of the Flathead River was designated Wild and Scenic would occur for any of the alternatives.

Conclusion

Year 2010 will mark the 100th anniversary of the establishment of Glacier National Park. The goal of the NPS is to have the majority of the rehabilitation on the Going-to-the-Sun Road and associated visitor use improvements and mitigation measures completed by the Park's Centennial celebration.

The National Park Service is committed to making the final decision for the preservation and rehabilitation of the Going-to-the-Sun Road through the continuation of the public process already begun and the previous efforts of the Advisory Committee and others who helped develop this Plan and EIS. We appreciate the thoughtful comments on the Draft EIS and have responded to those comments and concerns in this Final EIS. The NPS, in cooperation with FHWA, is pursuing funding to implement this Rehabilitation Plan as soon as possible after the Record of Decision is signed.

Going-to-the-Sun Mountain

Contents

Figures

Tables

Appendices

Chapter 1
Purpose And Need

Dedication of the Going-to-the-Sun Road at Logan Pass, July 15, 1933

Photo by R.E. Marble, GNPA #8137

"…we may confidently declare that there is no highway which will give the sightseer, the lover of grandeur of the Creator's handiwork, more thrills, more genuine satisfaction deep down in his being, than will a trip over this road."

Senator Burton K. Wheeler of Montana at The Dedication of the Going-to-the Sun Highway, July 15, 1933

INTRODUCTION

The National Park Service (NPS) is planning to rehabilitate the 50-mile (80-kilometer) Going-to-the-Sun Road in Glacier National Park (GNP or Park). The purpose of this project is to protect and preserve the Road's status as a National Historic Landmark. Rehabilitation is needed because of the deterioration of the 70-year old Going-to-the-Sun Road (Road) and associated resources. If not rehabilitated, the Road will continue to deteriorate, resulting in further damage to natural, historic, and cultural resources and potential safety issues for Park visitors. In addition to addressing deficiencies in the Road condition, the NPS proposes to improve inadequate roadside visitor use facilities and services.

Although previous Road repairs have been conducted, inadequate funding and staff has not allowed repairs to keep up with roadway deterioration. The difficulty in implementing needed repairs is that the majority of rehabilitation can only be conducted in the late spring, summer, and early fall, which is also the time that most visitors experience the Road. The challenge is to continue private vehicle use while ensuring that needed Road repairs are made, and to reduce the potential economic impact during rehabilitation on local and regional businesses and communities that rely on summer tourism.

This Final Environmental Impact Statement (FEIS) for the Going-to-the-Sun Road Rehabilitation Plan documents the analysis of the potential environmental consequences of the alternatives for rehabilitation of the Road. Chapter 1 provides supporting background material, information on the purpose and need for the proposed action, scoping and public involvement, key issues, impact topics considered in the FEIS and those dismissed from further consideration, relationship to other planning projects, and the decision process. Four alternatives were developed for analysis, including the Preferred Alternative and a No Action Alternative. These alternatives are discussed in Chapter 2. Baseline information on socioeconomic, cultural, and natural resources in the project area is provided in Chapter 3. An analysis of the potential environmental consequences for each of the alternatives is included in Chapter 4. Chapters 5, 6, and 7 provide information on compliance with federal and state regulations, consultation and coordination, and references.

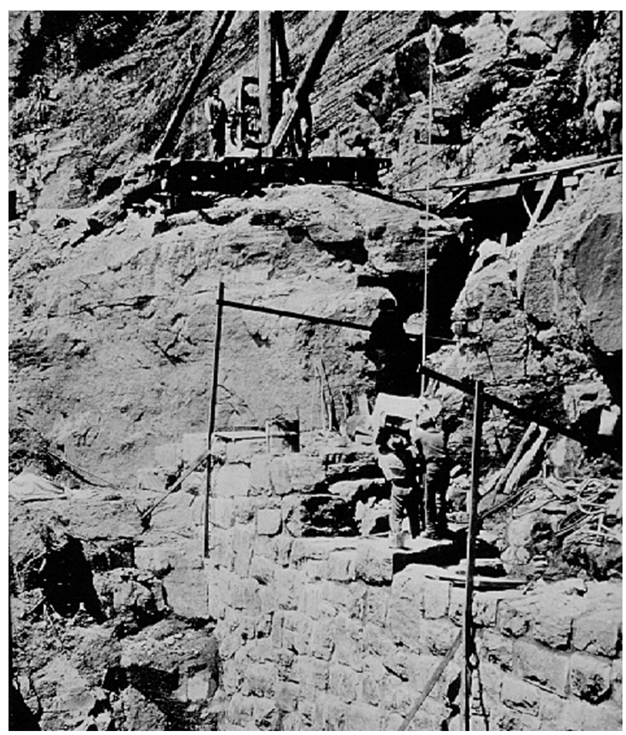
BACKGROUND

Road Construction

GNP was established on May 11, 1910. At that time, there were few formal roads or trails into the Park. Tourists would often arrive by train at Belton Station in West Glacier and take a stagecoach to Lake McDonald or multi-day horseback trips into the Park's interior. Boat rides on Lake McDonald provided access to Lake McDonald Lodge, which was completed in 1914. The lack of access into the Park spurred efforts to begin planning for a road across the Continental Divide linking the east and west sides of the Park. Construction of the Road was a monumental undertaking between 1922 and 1932. The Road was the first product of the 1926 NPS/Bureau of Public Roads (now Federal Highway Administration [FHWA]) interagency agreement prepared to facilitate cooperative construction of Park roads. The Road was opened to travel over Logan Pass from both directions in October 1932. Since that time, the Road and the attractions along the route have proven extremely popular and have drawn people to the Park from all over the world.

During the first full year of operation in 1933, the NPS estimated that 40,000 cars traveled the road. Currently, about 475,000 vehicles annually travel the Road. Traffic volume, avalanches, harsh climatic conditions, and inadequate repairs and maintenance of the Road due to limited funding and staff have led to the deteriorating condition of this historic roadway.

During the 1930s, several realignments were constructed and improvements to earlier constructed segments added retaining walls and guardwalls, stabilized slopes, widened narrow sections, and improved drainage. Paving of portions of the Road began in 1938. Roadwork was interrupted by World



Original road construction

War II and it was not until the 1950s that substantial reconstruction and improvements to the Road were resumed. From 1957 to the early 1980s, reconstruction and rehabilitation work on the Road was infrequent and limited in scope. In part due to funding limitations, efforts were concentrated on routine maintenance and repair of damaged areas.

Prior to 1982, funding for GNP road repairs was minimal and came entirely from the Park's annual operating budget. The passage of the Surface Transportation Assistance Act in 1982, which included funding for federal road reconstruction projects, allowed the Park and FHWA to establish a road improvement program. Between 1984 and 2001, 13 road rehabilitation projects have been funded in the Park. About $28.5 million was spent to reconstruct about 24 miles of the Road. The completed sections are mostly at lower elevations, with less than 1 mile of the high-mountain sections of the Road rehabilitated. Since 2000, the focus of construction has been on emergency stabilization of the highest priority retaining walls. Eleven high priority work sites requiring wall repair were evaluated in an Environmental Assessment (NPS 1999a) and work on these sites was initiated in 2000 and continues to date. The remaining rehabilitation work is contingent on the reauthorization of TEA-21.

Historic Significance

The Going-to-the-Sun Road is a spectacular scenic road that spans the Continental Divide and links the east and west sides of the 1.1-million acre (408,700-hectare) Glacier National Park (Figure 1). The Road is considered an engineering marvel because of the remarkable construction effort that was needed to carve the Road into the steep mountainous terrain. Because of the Road's unique character and historic significance, it was placed in the National Register of Historic Places (NRHP) in 1983. In recognition of the Road's outstanding example of careful design and engineering talent, it was declared a National Civil Engineering Landmark in 1985. It then received the highest recognition as a National Historic Landmark (NHL) in 1997. The Road meets NHL Criterion 1 for its association with the American Park Movement and Criterion 4 as an exceptionally valuable example of American landscape engineering, which blends the practices of civil engineering and landscape architecture.

The recognized historic significance of the Going-to-the-Sun Road considers the Road both as a single, linear entity and as a collection of individual structural and engineering resources, many of which are significant in their own right. These individual features include major, highly visible elements such as bridges and tunnels, as well as smaller scale components such as culverts, retaining walls, and segments of stone guardwall. Currently there are about 2.4 miles of historic retaining walls, most of which are contributing to the significance of the Road. About 8 miles of guardwalls were built between 1922 and 1937, of which almost 7 miles still maintain their historic integrity. A recent comprehensive historic inventory has recorded over 1,300 individual structural features along the Road. Preservation and rehabilitation of these historic features is a key component of proposed rehabilitation.

Various documentation projects for the Road conducted for the NRHP, Historic American Engineering Record (HAER), and NHL all provide slightly differing lists of the major, historically significant individual features along the Road. Table 1 lists the individual contributing features specified in each of these three documents. For additional information, see the *Cultural Landscape Inventory* (RTI 2001) and the *Cultural Landscape Report* (RTI 2002 and 2003).

Figure 1. Vicinity Map.

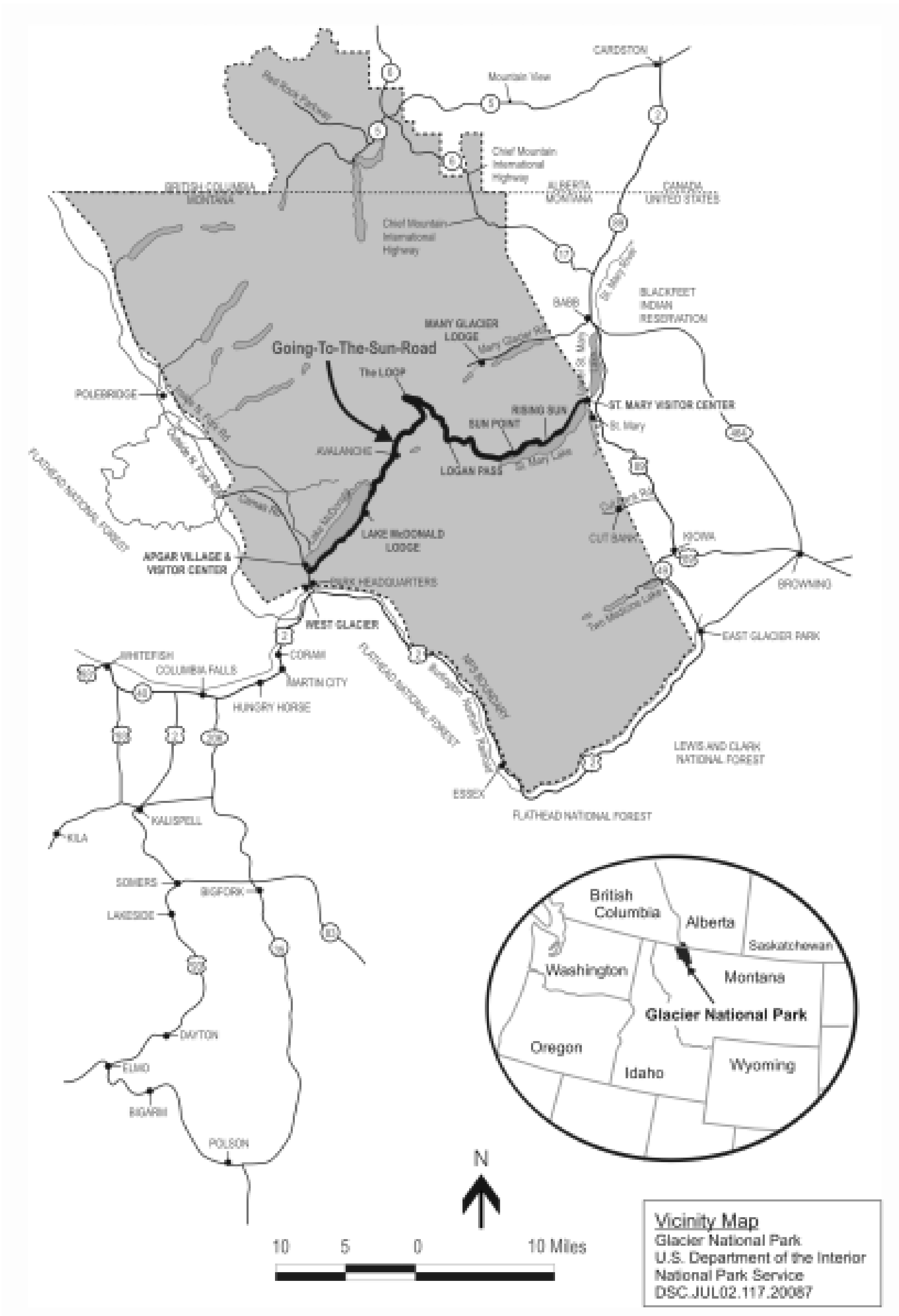


Table 1. Contributing features specifically identified in prior historic significance documentation, Going-to-the-Sun Road.

Feature	NRHP[1]	HAER[2]	NHL[2]
Going-to-the Sun Road	X	X	X
Belton Bridge		X	
Sprague Creek Culvert		X	X
Snyder Creek Bridge	X	X	X
Horse Trail Underpass (west side)		X	X
Avalanche Creek Bridge	X	X	X
Logan Creek Bridge	X	X	X
West Side Tunnel	X	X	X
Granite Creek Culvert		X	X
Haystack Creek Culvert[4]	X	X	X
Triple Arches	X	X	X
East Side Tunnel	X	X	X
Siyeh Creek Culvert		X	X
Baring Creek Bridge[5]	X	X	X
Golden Stairs Retaining Wall		X	
St. Mary River Bridge	X	X	X
Divide Creek Bridge	X	X	X
"Typical Drainage Culvert"		X	
"No Name Creek Culvert"		X	

[1]National Register of Historic Places listing (1983)
[2]Historic American Engineering Record documentation (1990)
[3]National Historic Landmark designation (1997)
[4]Listed as "Haystack Butte/Amphitheater Bridge" in NRHP
[5]Listed as "Sun Rift Gorge Bridge" in NRHP

Visitor Use and Experience

People travel from throughout the United States and the world to experience the majesty and beauty of Glacier National Park. The Park's unique treasures and natural and cultural heritage have earned the Park designation as the world's first International Peace Park, as well as a Biosphere Reserve and a World Heritage Site. One spectacular feature of the Park is the Going-to-the-Sun Road.

The Road is the Park's primary automotive route providing the principal access to trailheads, campgrounds, scenic vistas, the Logan Pass Visitor Center, Lake McDonald Lodge, shoreline access to Lake McDonald and St. Mary Lake, and other Park historic and natural features. The Road itself is a major attraction as people enjoy the historic structures, design, and driving experiences associated with it.

Annual visitation to GNP has grown from 53,000 visitors in 1932 to about 1.7 million visitors in 2001, most of who spend some time on the Road. Maintaining the quality of Park resources and the visitor experience is a key component of Park management. The NPS proposes to incorporate needed improvements to visitor facilities such as pullouts, parking, toilets, visitor orientation, and other amenities adjacent to the Road.

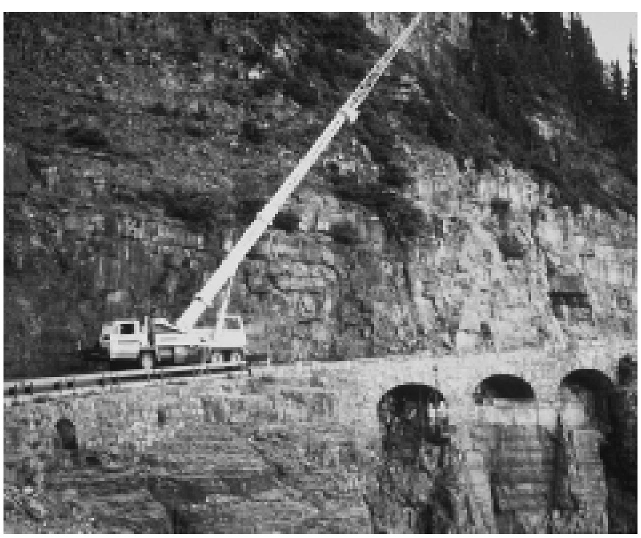
Previous Studies

A number of studies evaluating the condition and needs associated with the Road have been conducted over the last 18 years. In 1984, the FHWA conducted a *Road Rehabilitation Planning Study* to identify problem locations and needed repairs. Subsequent FHWA *Road Inventory Program* investigations in 1998 and 2002 evaluated the condition of the Road and structural features (FHWA 1998a, 2002). A *Traffic Safety Study* conducted in 1994 (Robert Peccia and Associates 1994) and a *Vehicle Movement and Traffic Study* conducted in 1997 (Robert Peccia and Associates 1997) documented safety and traffic concerns. In 1998, FHWA completed an assessment of stone retaining walls along the Going-to-the-Sun Road (FHWA 1998b). This study identified structural problems at 76 of the 126 walls inventoried. All of these studies have indicated the need to implement repairs to the Going-to-the-Sun Road to prevent further deterioration, improve safety, and protect Park resources.

Management Direction

In 1999, a *General Management Plan* (GMP) for the Park was completed (NPS 1999b). The GMP identified the need to rehabilitate the Road to preserve its historic character and significance, protect natural and scenic resources, and provide a continual high quality visitor experience. The NPS determined that rehabilitation of the Road was necessary to maintain the goals and objectives for management of the Park.

The GMP did not determine how to accomplish Road rehabilitation, but recommended that the work should be conducted in a manner that completes repairs prior to road failure at a reasonable cost, while minimizing impacts on natural resources, visitors, and the local economy. Additional details on the GMP are discussed later in this chapter in the *Relationship to Other Planning Projects* section.



Repair work on Triple Arches

Recent Studies

In 1999, federal legislation was passed to reallocate $1 million of transportation funds to conduct engineering studies, socioeconomic analysis, and to establish a Citizens Advisory Committee (CAC) to advise the NPS on rehabilitation of the Road. The CAC was authorized under the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, Public Law 105-277.

A series of studies were initiated in 2000 to assist the CAC and the NPS in the analysis and development of alternatives for the Going-to-the-Sun Road rehabilitation. One of these studies was an *Engineering Study* (WIS 2001a) with the objectives of:

- Verifying the condition of the Road
- Developing feasible alternatives, costs, and schedules for Road rehabilitation
- Recommending operations and maintenance measures to protect the capital investment in the Road

A *Socioeconomic Study* (WIS 2001b) was prepared to evaluate the potential impacts to visitors and the economy from rehabilitation of the Road. Objectives for the study included:

- Collecting baseline information about businesses in the GNP area
- Identifying visitor development actions to encourage visitation to the Park and reduce potential impacts during Road rehabilitation
- Conducting a survey of visitors to evaluate travel characteristics and in-Park visitor activities
- Conducting a survey of potential visitors to evaluate how possible travel limitations during road rehabilitation may affect tourism
- Conducting a survey of local businesses

- Forecasting future visitation to GNP to help assess socioeconomic impacts
- Estimating direct economic impacts from the alternatives identified in the *Engineering Study*

A *Transportation and Visitor Use Study* (WIS 2001c) was prepared to help develop and analyze options to improve the quality of the visitor experience along the Road during and after rehabilitation. Elements of the study included:

- Analysis of the existing transportation and visitor use facilities along the Road
- Development of visitor use improvements including programs and facilities
- Assessment of transportation improvement options including transit service
- Identification of options for short-term improvements during Road rehabilitation and long-term improvements following completion of roadwork

Cultural resource investigations also were conducted to provide a detailed assessment of the historic features of the Road. The cultural resource investigations were conducted in two phases. The first phase is documented in the *Cultural Landscape Inventory* (RTI 2001). The inventory resulted in the identification and recordation of over 1,300 individual structural features associated with the Road. Culverts and other small drainage structures were by far the most common historic features observed during the inventory; a total of 453 such structures were located and mapped. Other common historic feature types included guardwall segments, turnouts, and retaining walls. Additional inventoried resources included bridges, buildings, fences, curbs, gates, trailheads, and road intersections. The inventory also provides NRHP eligibility information for those resources large enough to warrant a determination.

The second phase is documented in a *Cultural Landscape Report*, which evaluated cultural resources and recommended management strategies for the NPS to consider in protecting them during rehabilitation (RTI 2002). Information in the *Cultural Landscape Report* was updated with a Volume II supplement in 2003 (RTI 2003).

The findings of the *Engineering Study*, *Socioeconomic Study*, and *Transportation and Visitor Use Study* were used by the CAC to develop advice to the NPS on alternatives to include in this EIS as described in Chapter 2. The *Cultural Landscape Report* provided recommendations for the *Engineering Study* and supplemental information to the CAC for use in developing their advice.

All of the recent engineering, socioeconomic, transportation, and visitor use and cultural studies were conducted specifically to address issues associated with rehabilitation of the Road. These documents and the recommendations of the CAC were used as the basis for the discussion in the Purpose and Need sections later in this chapter and in development of the alternatives.

Recommendations for Rehabilitation

As previously described, studies conducted by the FHWA and others have documented the deficiencies in the condition of the Road. An extensive conditions assessment was conducted in 2000 and 2001 as part of the *Engineering Study*. This study identified the work necessary to repair the Road and associated structures (WIS 2001a). The result of the recent conditions assessment supports previous FHWA and other studies indicating the immediate need to rehabilitate the Going-to-the-Sun Road before further deterioration or catastrophic failures occur.

In February 2000, the CAC began discussion on the condition of the Road and identification of opportunities and issues regarding potential cultural, environmental, visitor use, and economic impacts from Road rehabilitation. Following almost 2 years of public discussion, comment, and review of the *Engineering Study* and other reports, the CAC also recommended that the Road be rehabilitated (NPS 2001a).

PURPOSE AND OBJECTIVES

The purpose of this project is to rehabilitate the Going-to-the-Sun Road between West Glacier and St. Mary, Montana to protect and preserve a National Historic Landmark and premier visitor experience in Glacier National Park (Figure 2). Additionally, the purpose is to prevent further loss or damage to natural and cultural resources and to protect visitors and employees.

Management direction for the Road is provided by the GMP developed for the Park. GMP management goals for the Road include continuing to provide Park visitors with an opportunity to experience the scenic majesty and historic character of the Park through a wide range of visitor activities, services and facilities, with an emphasis on the cultural significance, scenic values, and traditional uses. Rehabilitation is to be completed in a manner that preserves the historic character, significance and width of the Road, while minimizing impacts on visitors, the local economy, and natural resources at a reasonable cost in accordance with the decision reached in the GMP.

Objectives for Road rehabilitation include:

- Preserving its historic character, fabric, width, and significance
- Rehabilitating the Road to a quality condition in a cost-effective manner
- Minimizing effects on natural, cultural, and scenic resources
- Maintaining a world-class visitor experience
- Providing for visitor and employee safety
- Minimizing impacts to the local and regional economies

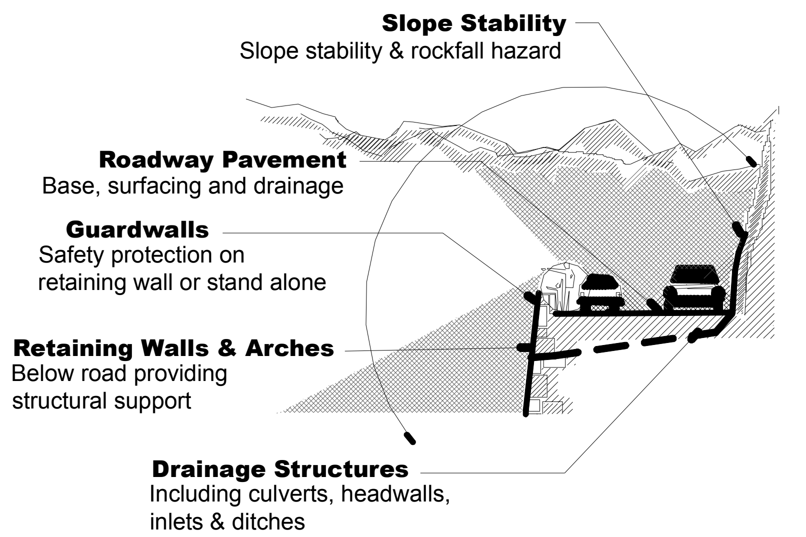
NEED FOR THE PROJECT

The proposed rehabilitation of the Road is under consideration because of the need to address deficiencies in the Road's condition and visitor use facilities adjacent to the Road. Immediate attention to Road rehabilitation is needed to prevent further deterioration and damage to historic features, environmental resources, and scenic quality. Various rehabilitation projects on the Road have occurred since its original construction in the 1920s and 1930s; however, the majority of these improvements are located at lower elevations. Due to funding limitations, very little work has been conducted on the steep narrow portions of the Road at higher elevations. These upper sections have deteriorated badly along with the associated historic road features like walls and stone culverts.

Rehabilitation of the Going-to-the-Sun Road is of vital concern to the NPS, local and regional businesses and communities, and the public. The Road is a major tourist attraction for northwest Montana and Alberta, Canada, and provides access to scenic, natural, and historic resources. Rehabilitation is needed for the Park to continue providing a world-class visitor experience and to protect this National Historic Landmark. To meet the objectives and management goals for the Road, proposed rehabilitation work needs to be initiated soon to prevent further deterioration, protect resources, and minimize cost. Specific problems that need to be addressed with Road rehabilitation are discussed below.

Problems Associated with the Road's Structure

The following overview of Road conditions highlights the existing structural and maintenance deficiencies of the Road. The *Engineering Study* (WIS 2001a) prioritized rehabilitation needs for each of the five Road segments and determined that the Alpine segment of the Road is in most critical need of repairs (Figure 2). The West Tunnel and Baring Creek segments of the Road also have substantial repair requirements. Lower elevation Road segments along Lake McDonald and St. Mary have lower priority rehabilitation needs.



Road Structures Requiring Rehabilitation

GOING -to-the-SUN ROAD

Drainage

Inadequate drainage from the road surface and subsurface, compounded by malfunctioning drainage structures have contributed to the deterioration of the roadway pavement, road base, retaining walls, guardwalls, and drainage structures and, if not corrected, further significant deterioration would occur. Most of the runoff from melting snow occurs over a short time period in the spring. Narrow and shallow ditches, undersized culverts, and a general lack of drainage features along the Road, particularly in the vicinity of guardwalls and retaining walls, cannot adequately convey the volume of runoff water. This results in water flowing over the roadway surface and infiltrating into the subbase under the pavement. Frequent freezing and thawing of the subsurface moisture results in frost heaving and damage to the Road's pavement and structures.

Inadequate roadway drainage

Significant drainage deficiencies are present between The Loop and Siyeh Bend (Figure 2). Inadequate cross drains, plugged culverts, lack of drop inlets and drainage ditches, and other drainage deficiencies have contributed to deterioration of this section of the Road.

Sediment deposition at Divide Creek Bridge

Numerous culverts and smaller bridges along the Road are clogged with debris, have scoured channel bottoms, and have deteriorated mortar in the stone walls. In many locations, the roadway subgrade is saturated and weakened by water intrusion, which contributes to slump failures and slope damage. Stone guardwalls and retaining walls have shifted and weakened or failed in some locations due to water intrusion and slumping. In several locations, such as above Crystal Point Arch, drainage flow is trapped against the retaining walls because there is no outlet. This water enters cracks in the asphalt above the wall, undermining the wall. It also results in running or standing water on the roadway, which is a safety hazard for motorists. Erosion of slopes below the Road is occurring from unprotected culvert outlets.

Several drainages that cross the Road, including Divide Creek, carry high amounts of rock and gravel (Figure 2). The deposition of this material at the bridges restricts flow during large runoff events, which can adversely affect the integrity of the bridge structures and the adjacent roadway. Divide Creek is of particular concern because of the potential for flooding. Previous floods have frequently resulted in impacts to the Road, the historic Divide Creek Bridge, Park residential and maintenance facilities, the St. Mary Visitor Center, and other adjacent lands near the town of St. Mary. The streambed of Divide Creek is at about the same elevation as the floodplain and, as a result, any deposition of material in the streambed encourages the stream to change course into a lower portion of the floodplain and reduces the capacity for flood flow under the bridge (Smillie and Ellerbroek 1991).

Slope Stability and Rockfall Hazard

Slope stability problems include slump failures, slope undercutting, unstable slopes, rockfall hazards, and avalanche chutes. Slump failures are present in several locations where weakened fill sections are slowly moving and impacting the roadway pavement. Ongoing fill slope erosion between the Road and Lake McDonald (MP 6.3 and 9.1) and an active slide has resulted in subsidence or sinking of the pavement (Figure 2). Slope undercutting of the roadway due to erosion occurs in a number of locations on steep slopes and contributes to the weakening or failure of guardwalls and retaining wall foundations and to a loss in pavement and roadway width. Portions of the Road near the West Tunnel are subject to shallow movement of the foundation material supporting the Road. Near the East Tunnel, substantial rockfall creates a safety hazard that has damaged retaining walls.

Eroding cut slope

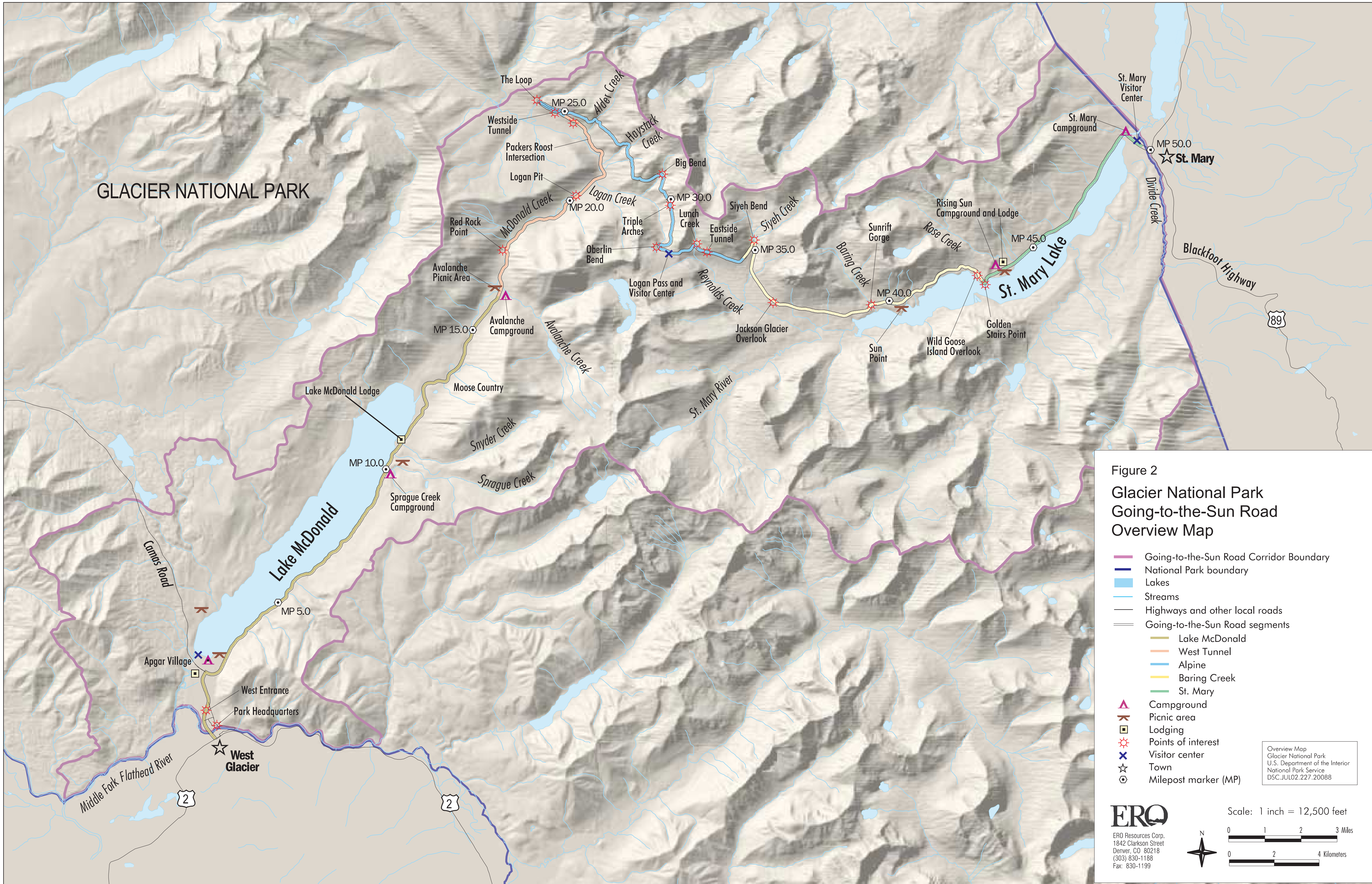
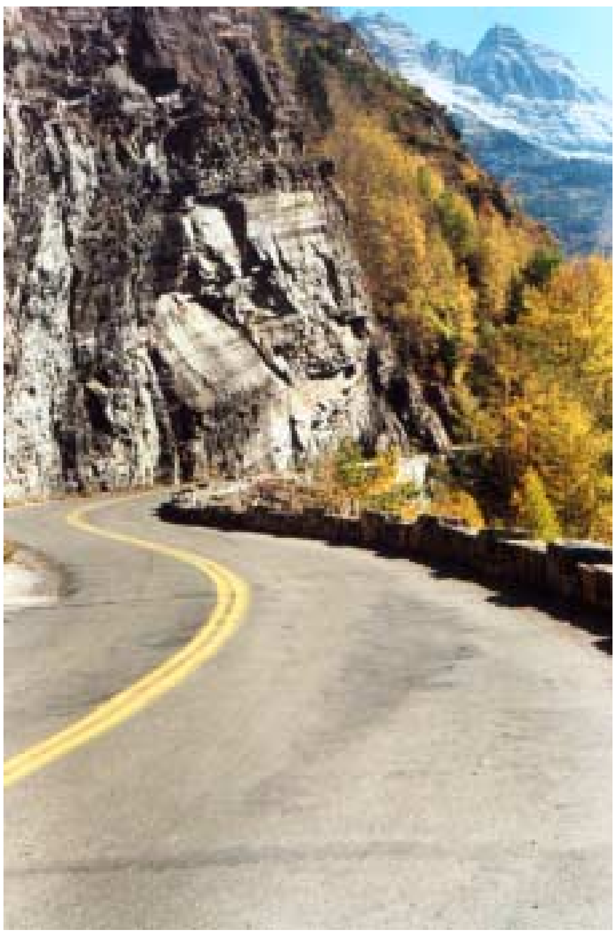


Figure 2
Glacier National Park
Going-to-the-Sun Road
Overview Map
Going-to-the-Sun Road Corridor Boundary
National Park boundary
Lakes
Streams
Highways and other local roads
Going-to-the-Sun Road segments
Lake McDonald
West Tunnel
Alpine
Baring Creek
St. Mary
Campground
Picnic area
Lodging
Points of interest
Visitor center
Town
Milepost marker (MP)
Overview Map
Glacier National Park
U.S. Department of the Interior
National Park Service
DSC.JUL02.227.20088
ERO
ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: 830-1199
N
Scale: 1 inch = 12,500 feet
0 1 2 3 Miles
0 2 4 Kilometers
GLACIER NATIONAL PARK
The Loop
MP 25.0
Alder Creek
Westside Tunnel
Haystack Creek
Packers Roost Intersection
Big Bend
Logan Pit
Logan Creek
MP 30.0
MP 20.0
McDonald Creek
Red Rock Point
Triple Arches
Lunch Creek
Siyeh Bend
Siyeh Creek
Eastside Tunnel
Oberlin Bend
MP 35.0
Logan Pass and Visitor Center
Reynolds Creek
Avalanche Picnic Area
Avalanche Campground
MP 15.0
Avalanche Creek
Jackson Glacier Overlook
Baring Creek
Sunrift Gorge
Rose Creek
Rising Sun Campground and Lodge
MP 40.0
MP 45.0
St. Mary Lake
Sun Point
Wild Goose Island Overlook
Golden Stairs Point
St. Mary Visitor Center
St. Mary Campground
MP 50.0
St. Mary
Divide Creek
Blackfoot Highway
89
Lake McDonald Lodge
Moose Country
St. Mary River
Snyder Creek
MP 10.0
Sprague Creek
Sprague Creek Campground
Lake McDonald
Camas Road
MP 5.0
Apgar Village
West Entrance
Park Headquarters
West Glacier
Middle Fork Flathead River
2
2

This page intentionally left blank.

In several locations steep, unstable cut slopes above the Road are actively eroding. This leads to further erosion of the cut slope, loss of soil material, and the loosening of large rocks that roll down the slope onto the roadway. Rockfall hazards are a safety concern on portions of the steep high elevation Road between The Loop and Golden Stairs Point (Figure 2). Through natural freeze/thaw processes and erosion, loose rocks periodically break free and land on the roadway. Approximately 70 avalanche chutes are present throughout the high elevation portions of the Road and although not readily controllable, they continue to damage Road guardwalls and other appurtenances. Debris flows along gullies and drainages contribute to Road deterioration from erosion of the roadbase or deposition of materials on the Road.



Rockfall hazard area

Inadequate guardwall height due to settling and successive pavement overlays

Retaining Walls, Arches, Guardwalls, and Tunnels

Stone retaining walls, primarily between The Loop and Siyeh Bend, are in various states of disrepair (Figure 2). The upper 3 to 8 feet (1 to 2.4 meters) of many of the walls are in distress, with loose or missing stones and crumbling mortar. In some locations, the original retaining walls were replaced with concrete walls and stone-veneer work has not been completed. Stone arch half-bridges have minor to moderate levels of mortar deterioration, except Crystal Point Arch and Triple Arches, which have significant and potentially dangerous deterioration.

Guardwalls include stone masonry guardwalls, removable timber rails, large barrier rocks, and temporary concrete barriers. Many of the historic stone masonry guardwalls are missing, leaning away from the Road, or have been displaced due to poor drainage, lack of adequate foundations, avalanche and snow weight pressures, vegetation and root damage, and in some cases insufficient maintenance practices. In some locations, guardwalls have settled and/or their height has been encroached upon by pavement overlays or patching that reduces their effectiveness as a safety barrier. Temporary concrete barriers (Jersey barriers) are used as an interim safety measure until historically appropriate barriers can be re-established.

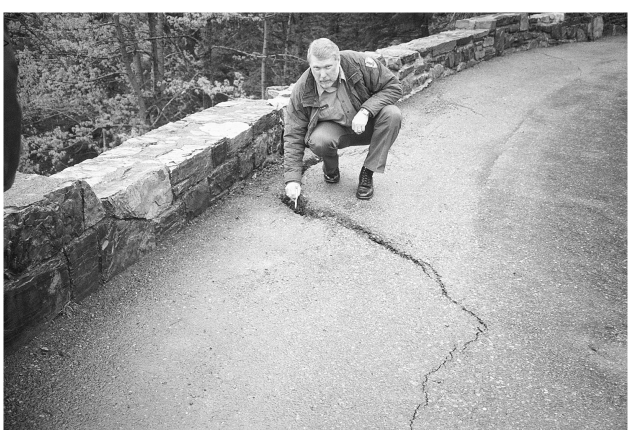
The inside of the West and East Tunnels are in generally good structural condition. No repairs are needed for the East Tunnel. The north portal of the West Tunnel has experienced water seepage across the stone veneer on the outside of the tunnel, which has eroded the mortar. The rock veneer needs to be removed and reset. In addition, a rockfall hazard is present on the side portals of the West Tunnel. Original blasting of the tunnel has fractured the rock above the tunnel and subsequent drainage and freeze-thaw action frequently loosens the rock. This condition creates a safety concern for visitors to this site.

Roadway Pavement

The original Road was not constructed to handle the over 10-fold increase in traffic that has occurred over the last 70 years. The additional traffic, water penetrating into the roadbase, and age have all contributed to pavement deterioration. Excessive voids have occurred in base course material, with subsequent settling and failure of the roadway and shoulders. Various stages of road distress are present including potholes, cracks, ruts, erosion of shoulders, and sinking and raveling of the pavement's edge. Although many cracks have been filled and damaged areas patched, the underlying conditions that caused roadway damage have not been corrected. In many locations, permanent repair and adequate structural capacity can only be accomplished by rehabilitation of the roadbed and pavement structure.

Operation and Maintenance

Reliable estimates on the amount of deferred maintenance associated with the Road are not readily available. The NPS has not had a reliable method to assess the condition of Park assets, although new condition assessment techniques are currently being developed. However, many of the Road's structural features and facilities have not been adequately maintained due to a lack of funding. Because of the extensive and expanding deterioration of the Road, Park staff is unable to keep up with increasingly difficult and expensive maintenance work.



Pavement cracks

Damaged guardwall

Problems Associated with Safety

The deteriorating condition of the Road and other deficiencies in design of adjacent facilities are a safety concern for motorists, bicyclists, and pedestrians. Primary safety concerns include:

- In several locations, there is no barrier to prevent vehicle entry into roadside drainage inlets.
- Low guardwalls do not provide an adequate barrier for vehicles and pedestrians.
- Missing sections of protective guardwall.
- Poor drainage results in standing water or icing, which creates a hazard for motorists and cyclists.
- Large barrier rocks on the Road shoulder do not provide a continuous smooth transition through constricted areas, which presents a safety hazard for motorists.
- In some locations, deteriorating pavement such as cracks, potholes, and uneven or rough surfaces creates a safety hazard for motorists and cyclists.
- Unstable slopes above the Road in several steep mountainous areas create a rockfall hazard.
- Pedestrian crossing locations at several pullouts, overlooks, and parking areas are often missing, poorly located, and/or improperly designed.
- Some pulloffs are too small to accommodate the size of vehicles on the Road.
- Pavement on curves at lower elevations is too narrow to accommodate vehicles over 8 feet wide and 21 feet long.
- Attractions often are located on the side of the Road opposite from parking, which requires pedestrians to cross the Road.
- Vegetation encroachment along portions of the Road reduces sight distance and obscures signs.

Problems Associated with Deterioration of Cultural Resources

As previously discussed, many of the engineering features of the Going-to-the-Sun Road have deteriorated and are in need of repair and rehabilitation. Many of these same engineering and structural features are of historic significance and contribute to the designation of the Road as a National Historic Landmark. Segments of historic guardwall and retaining walls no longer exist, have shifted or fallen, have been damaged by rockfall or avalanche, and have been inadequately maintained or repaired. In some Alpine locations, layers of built-up asphalt are obscuring the guardwalls. The use of modern exposed concrete for retaining walls and other modern temporary repairs have seriously affected the historic character of the Road. Historic stonework at culverts and drainages has been damaged and some historic bridges are at risk from sediment deposition and stormflow.

Problems Associated with Damage to Environmental Resources

Damage to natural resources adjacent to the Road has occurred from on-going deterioration of the Road. Inadequate drainage has resulted in erosion of roadside slopes and a loss of soil and vegetation. Improper drainage also contributes to slope instabilities and the potential for landslides, slumping or other significant disturbances. Accelerated erosion also contributes to sedimentation of streams and lakes and impacts to fisheries and aquatic life. Inadequately placed culverts and drainage features under the Road have restricted fish passage. The Road also has served as a vector for weed invasion. Maintaining the historical appearance of a turf shoulder presents special problems due to continued introduction and spread of exotics, accumulation of gravel deposits from road sanding, and the need for occasional mowing to maintain sight distance for safety.

Problems Associated with Transportation Circulation and Transit

The majority of visitors currently access the Park and travel the Going-to-the-Sun Road in private vehicles. There are currently no transit options that provide frequent regular service to points of interest along the Road. Glacier Park, Inc. provides limited hiker shuttle service and the red “jammer” bus tours. Sun Tours also provides tours from the East Glacier area.

Parking congestion at popular sites often prohibits visitors from stopping. Many visitors do not travel the entire length of the Road, but rather park at trailheads or other destinations. Regular frequent transit service would alleviate some of these problems by reducing traffic congestion, freeing up parking space, and providing a convenient method of travel. The GMP recognized the need for expanded transit opportunities and included a transit center in the planned West Side Discovery Center to help facilitate alternative transportation. Associated with the need for transit service is the need for improvements in visitor use facilities along the Road to accommodate both visitors traveling by transit or private vehicles. Roadside facilities, such as improved parking and pullouts, shuttle stops, toilets, exhibits, and interpretative/orientation information would help support an effective transit system and improve visitor travel and circulation in the Park. The following section further discusses visitor use facilities.

Problems Associated with Deficiencies in Visitor Use Facilities

Average daily traffic on the Going-to-the-Sun Road during the primary visitor use season ranges from about 3,600 vehicles per day near Lake McDonald to about 2,200 vehicles per day at St. Mary. During the peak visitor season in July and August, GNP receives about 17,000 visitors daily. Of the 1.7 million annual visitors to the Park, over 80 percent travel the Road. The Road provides access to principal points of interest and offers many stunning views. Visitor surveys have indicated that viewing the scenery and wildlife accessed by the Road is an important component of a visit to the Park (Littlejohn 1991; WIS 2001b). The quality of roadside exhibits and interpretive information, parking, and access to trails also are valuable features that add to the quality of the visitor experience. Peak summer traffic frequently causes crowding at pullouts and parking areas along the Road. Visitors are often frustrated by the lack of parking and inability to experience the Park at congested locations. As a result, some visitors attempt to park in undesignated areas causing resource damage and safety concerns.

Some of the existing pullouts and parking areas are not designed to provide safe entry and exit. Overuse at some pullouts has resulted in erosion, vegetation trampling, and hardened and compacted soils from informal social trails and undefined visitor use areas. A lack of interpretive exhibits, orientation sites, and signs often leads to visitor confusion and congestion at popular sites. Insufficient visitor amenities such as toilets or transit stops diminish the visitor experience. Vegetation growth has obscured many of the Road’s historic scenic vistas. The deficiencies in Park visitor use facilities along the Road are summarized below and described in more detail in the Going-to-the-Sun Road *Transportation and Visitor Use Study* (WIS 2001c).

Pullouts and Parking

About 170 pullouts and several parking areas are located within the Road corridor including about 15 informal gravel pullouts. Some existing pullouts are poorly designed and cause traffic flow and safety concerns. Other pullouts are located on unstable slopes that are subject to slumping, degradation of the subbase, and poor pavement conditions. Informal gravel pullouts, primarily east of Logan Pass, create safety and maintenance issues. In addition to the structural deficiencies of pullouts, many of them are inadequately designed to meet current visitor needs.

Most of the popular parking areas and pullout locations, including Avalanche Creek, The Loop, Logan Pass, Siyeh Bend, Sunrift Gorge, Wild Goose Island Overlook, and Jackson Glacier Overlook, are frequently congested and parking demand exceeds capacity (Figure 2). Parking spaces are often poorly designed, located too close to the Road, lack designated striping or orientation for motorists. At many of the pullouts, parking areas are located across the Road from the visitor attraction, which results in a safety concern for pedestrians and drivers. Deficiencies at larger pullouts and parking sites along the Road are described below.

Apgar. The Apgar Village area includes a variety of amenities for Park visitors including a visitor center, lodging, stores, access to Lake McDonald, and camping. This area needs additional visitor information services and a formal transit stop. Visitor and pedestrian circulation needs to be improved.

West Side Discovery Center/Transit Center. The Park has plans to construct a Discovery Center near Apgar. This facility would include a visitor center, transit staging, and museum and would serve to educate and inform visitors about the Park and assist them in planning their activities. Associated with this project is a staging area for visitors to park and access transit service. Currently there are no areas on the west side to adequately serve as a staging area for transit vehicles and visitor parking.

Lake McDonald Lodge. Lake McDonald Lodge is a popular overnight and day use area. Currently, there is no designated transit stop, and facilities for the dissemination of information about the Park are inadequate.

Pullout #8/Road Camp. Currently there is a lack of adequate toilet facilities along this section of the Road. The Road Camp pullout provides an opportunity to interpret the original construction of the Road, but there is currently no access to historic remnants or interpretive information.

Avalanche. Avalanche is one of the most congested areas in the Park. It is the focal point for a number of visitor activities including picnicking, camping, over-length vehicle turnaround, restrooms, and a popular trailhead. This site is currently lacking adequate toilet facilities. The Trail of Cedars boardwalk is in need of repairs and additional interpretive information.

Avalanche

Red Rock Point. At this popular large pullout, visitors access a scenic portion of McDonald Creek and view a significant historic arch and wall. However, there is no formal trail and as a result, numerous social trails have developed that have trampled vegetation, exposed tree roots, and created erosion. The existing parking area is undefined, which results in safety concerns for pedestrians and motorists.

Logan Creek. The existing vault toilet at the Logan Creek pullout is in disrepair and needs replacing. Improvements in vehicle and pedestrian circulation are needed to address safety concerns. In addition, social trails have developed in the area and need to be obliterated and revegetated.

The Loop. The Loop is the only switchback on the Road and provides a popular stop for visitors to enjoy the view or access the lower trailhead to Granite Park Chalet. The limited parking spaces are generally full during peak periods making it difficult or dangerous for many visitors to stop. Pedestrian safety is a significant concern because the trailhead is located across the road from the parking lot. This requires pedestrians to cross the road where sight distance is extremely limited by the tight bend in the road. Vegetation growth has blocked scenic vistas so visitors often walk or stand along the edge of the road to find an opening in the vegetation. Important visitor services not available at this site include toilet facilities and a transit stop.

Road Camp. This pullout needs improvements in parking layout to better control vehicle and pedestrian movement. The existing trail needs restoration and scenic views have been obscured by vegetation growth. The numerous social trails need to be obliterated and revegetated. There is no existing interpretation of this significant site.

Big Bend. Located in the Alpine segment of the Road, Big Bend is the only large, flat pullout area where a large number of visitors can stop. This area is subject to avalanches in the winter and requires substantial effort to remove the snow in the spring. Because of the size of the pullout and the substantial sight distance, pedestrian safety is generally adequate. Undefined parking sites on both sides of the road are used by visitors to stop and enjoy the scenery, but this informal parking does not allow for efficient use of available parking space. The lack of a designated trail or path has led to informal social trails and damage to roadside vegetation and erosion. This site lacks a toilet and a transit stop.

The Loop

Big Bend

Oberlin Bend. Rehabilitation of the existing trail is needed to repair damages. This site also lacks the interpretive exhibits that were planned for the area.

Logan Pass. This is one of the most popular destinations in the Park, but is deficient in several visitor use facilities. In the fall after the water is turned off, there are only portable toilet facilities that consistently overflow on peak visitor days. Additional facilities are needed for materials and interpretive information to improve visitor enjoyment of the site. This site also lacks a designated transit stop.

Big Drift. This informal pullout east of Logan Pass is often used by visitors to enjoy the scenic views, particularly when there is no parking available at the Logan Pass Visitor Center. This gravel pullout lacks defined parking and safe vehicle entry and exit.

Lunch Creek. This is the first formal pullout east of Logan Pass. Deficiencies in vehicle circulation and pedestrian movement create a safety concern. Informal social trails have developed, which causes erosion and vegetation damage.

Siyeh Bend. The Siyeh Bend pullout has several scattered paved parking areas on the east side of Logan Pass. This popular pullout provides visitors with several recreation opportunities, including scenic vistas, access to Piegan Pass Trail, a transit stop, and trailhead parking. The lack of defined parking spaces also reduces the efficiency and safety for motorists and pedestrians.


Siyeh Bend

Jackson Glacier Overlook. Improvements in pedestrian and vehicle circulation are needed to address safety concerns. This site lacks a transit stop and informational materials for visitors. Vegetation growth adjacent to the overlook has obstructed views of the glacier.

Grizzly Point. The Grizzly Point pullout needs reconfiguration to improve traffic flow and separate visitors from vehicles. Vegetation clearing also is needed to restore views.

St. Mary Falls Trailhead. The existing parking area is not large enough for vehicles to safely pull in and out of traffic on the Road. This creates a safety hazard for motorists and pedestrians. This site also lacks toilet facilities and a transit stop. Vegetation clearing is needed to restore scenic views.

Gunsight Pass Stock Trailhead. This small gravel pullout and parking area does is not adequately sized to meet existing use for unloading pack animals and parking for other trail users. Vehicle circulation is poor, which creates safety concerns for motorists and pedestrians. This site also lacks interpretive information for visitors.

Sunrift Gorge. Sunrift Gorge is a popular visitor attraction where parking demand exceeds capacity. Undefined parking is located on both sides of the road, but vehicles are often parked in undesirable locations that result in a safety concern. This site provides access to a short trail to view Sunrift Gorge and longer trails to St. Mary Falls and Piegan Pass. The existing trails and steps are in need of maintenance and repairs. Hikers accessing longer trails often occupy much of the parking capacity, which leaves insufficient parking for short-term visitors stopping to see Baring Creek Bridge or Sunrift Gorge.

Baring Creek Bridge at Sunrift Gorge

Sun Point. Sun Point is a large parking area located about 1,000 feet (300 meters) south of the Road near the shore of St. Mary Lake. The site is under-utilized and has opportunities for interpretation and visitor use. Picnic facilities, a toilet, trailheads, and ample parking are available. This site is also used as an oversized vehicle turnaround point for vehicles entering GNP from the east. Oversize vehicles traveling west are not allowed past Sun Point. An improved vault toilet, rehabilitation of existing trails, and other visitor use improvements are needed at this site. Vista clearing also is needed to restore the scenic views that were originally available at this site.

Sun Point

Wild Goose Island Overlook. Wild Goose Island on St. Mary Lake is one of the most photographed sites in GNP and is best seen from this overlook. Existing pullouts provide parking at two sites north of the Road and one site on the same side of the Road as the overlook. Pedestrians using the north side pullouts must cross the road in an area with inadequate sight distance for safe crossing. Undefined parking leads to inefficient use of space and congestion during peak times. The existing viewing area is not designed to accommodate the type of use and number of visitors at the site. In addition, the scenic views once available from this site have been obscured by vegetation growth.

Wild Goose Island Overlook pullout

Rising Sun. This popular site contains a number of visitor services, including lodging, a campground, restaurant and other conveniences. Additional information and interpretative material is needed as well as an improved transit stop to improve the quality of visitor services.

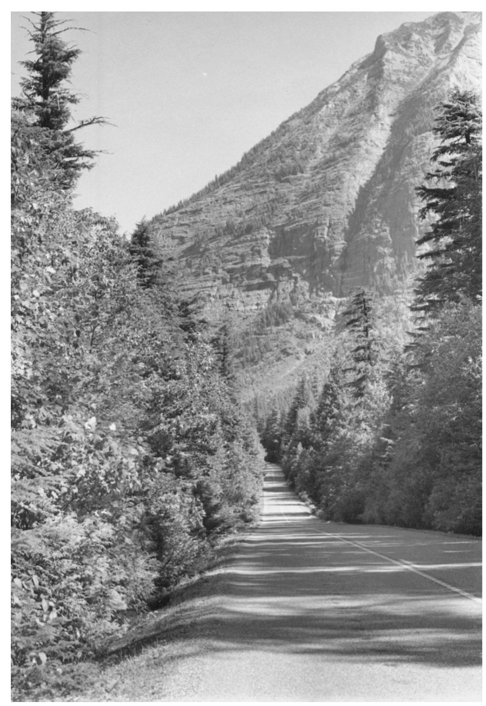
Triple Divide. This small existing pullout lacks adequate vehicle and pedestrian circulation. Parking is not defined and a slight enlargement is needed to improve safety. This site also lacks visitor orientation and information materials.

St. Mary Entrance and Visitor Center. The existing entrance station needs to be rehabilitated because it does not meet accessibility and building codes and standards. The visitor center is outdated and requires upgrading to improve the quality of exhibits, audiovisual resources, and other visitor use facilities. In addition, the existing parking area and access requires reconfiguration to accommodate traffic needs, a transit stop, and parking.

Scenic Vistas

The Road provides exceptional scenic views of the landscape, which is the primary reason that most visitors drive the Road. Since the original Road construction, vegetation growth adjacent to the Road shoulder has blocked scenic vistas, diminishing the quality of the visitor experience the Road was intended to provide. As seen in Figure 3, vegetation growth along the Road has increased substantially since original construction because of the additional light and moisture available along the roadway margin. Scenic viewpoints such as The Loop, Jackson Glacier Overlook, Sun Point, along Lake McDonald and elsewhere no longer provide the scenic vistas originally intended along the Road.

Figure 3. Roadside Vegetation in 1939 (left); Roadside Vegetation Near the Same Location in 1987 (right).

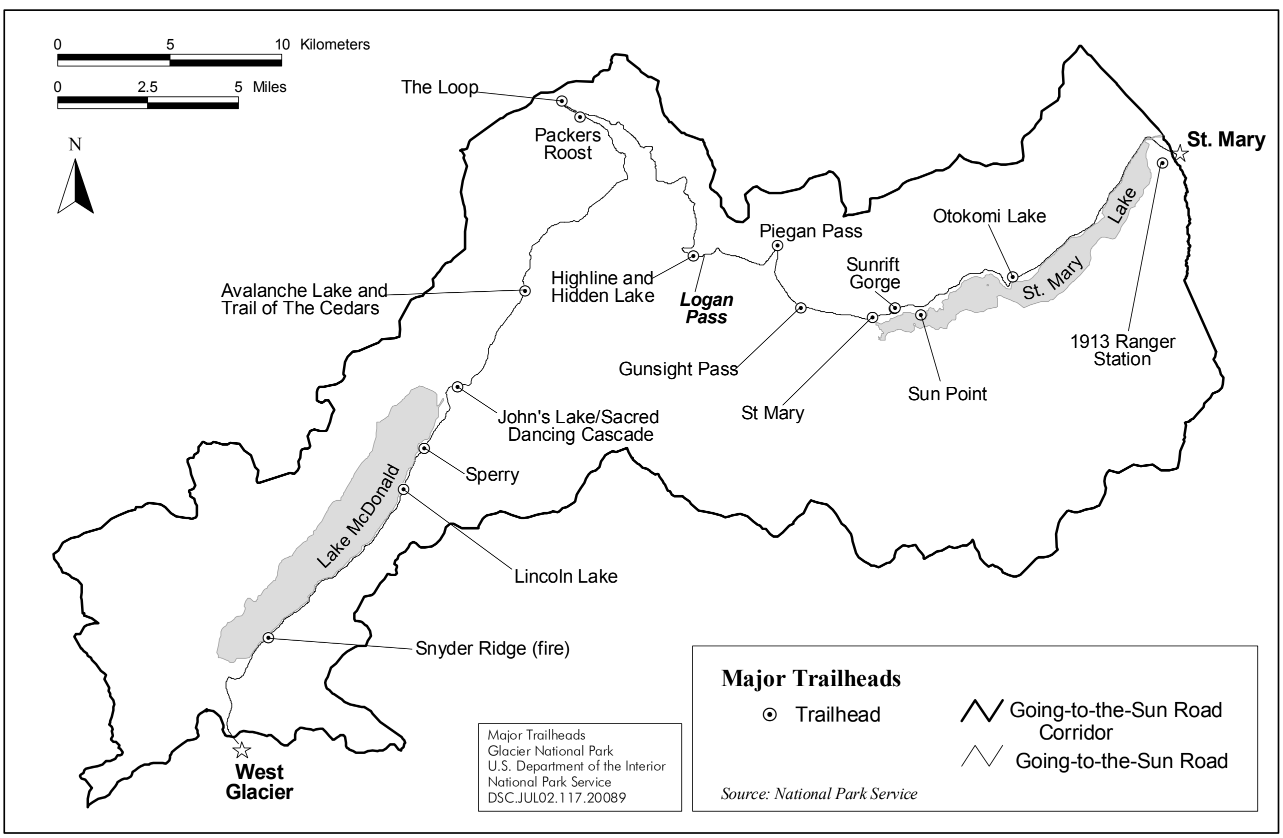


Trails

Several of the pullouts and parking areas located along the Road provide trailhead access (Figure 4). Some trailheads lead to formally designated trails. In other locations, informal trails have been created by visitor travel to scenic overlooks or points of interest adjacent to the Road. The informal social trails created by visitors frequently result in multiple trails and resource damage to vegetation and soils.

Social trail at Red Rock Point

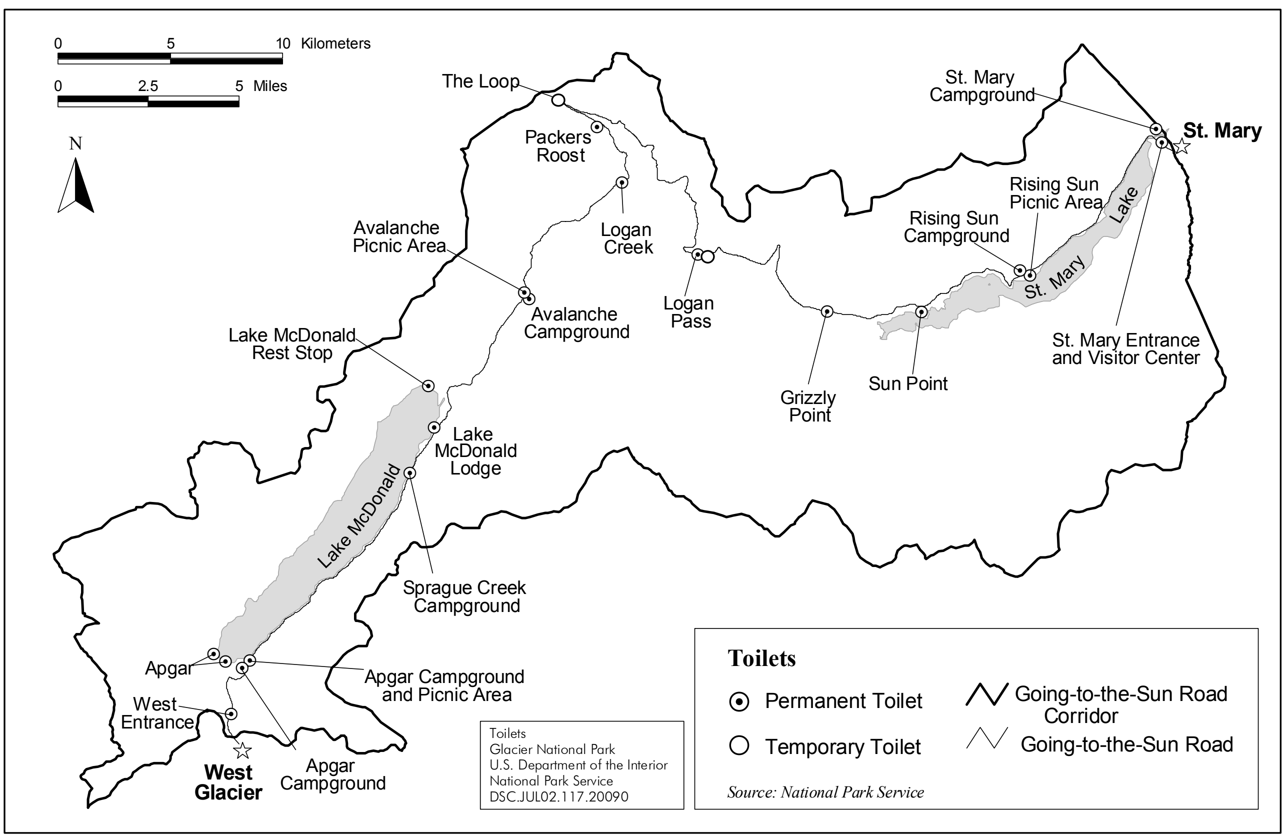
Figure 4. Existing Trailheads.



Toilets

There are nine toilet locations along the Road not including those at Apgar Village, the St. Mary Visitor Center, and campgrounds and lodges (Figure 5). In addition, temporary portable toilets are present at The Loop and Logan Pass. The existing portable, flush, and vault toilets are inadequate during peak visitation. Not all toilet facilities provide American Disability Act (ADA) accessibility. The lack of toilets leads to traffic congestion and parking problems at sites that have toilets. An insufficient number of toilets leads to resource impacts including water quality concerns, wildlife habituation to human urine, and possible visitor/wildlife conflicts.

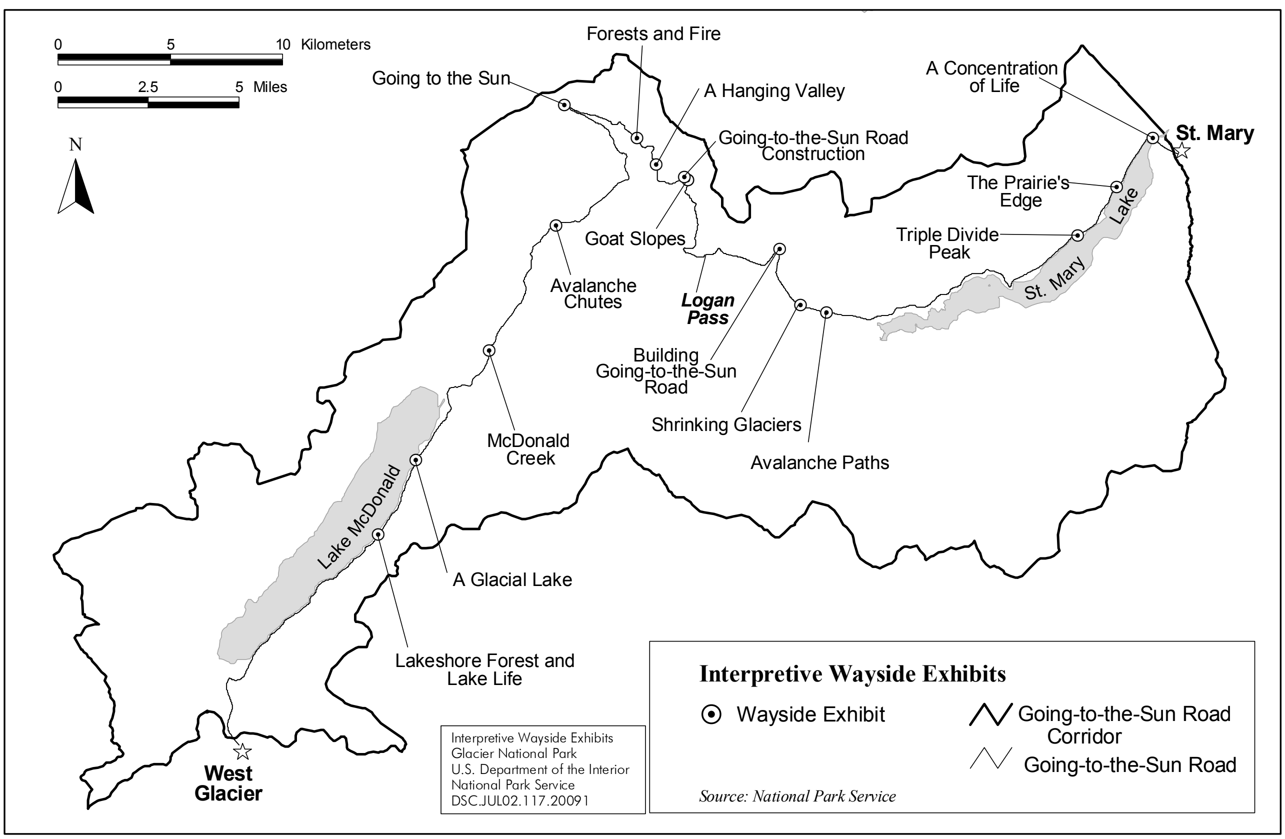
Figure 5. Existing Toilets.



Interpretation and Orientation

Currently there are several exhibits and interpretive stations located along the Road at pullouts, scenic overlooks, and trailheads (Figure 6). The signs, displays, and information provided at these sites assist visitors in experiencing the Park. However, additional wayside exhibits, signs, visitor education, and interpretive information along the Road to assist visitors and direct traffic are needed to increase the quality of the visitor experience. Traffic safety studies have indicated the need for allowing motorists a place to pull off the Road and make travel decisions (Robert Peccia and Associates 1997). Proper orientation of the visitor to the attractions and geographic layout of the Park is critical to providing a quality visitor experience.

Figure 6. Existing Interpretive Sites.



SCOPING AND PUBLIC INVOLVEMENT

In February 2000, Interior Secretary Bruce Babbitt appointed 17 members to serve on the CAC for the rehabilitation of the Going-to-the-Sun Road. The CAC was composed of a diverse group of local business leaders from the east and west sides of the Park; state and local government officials; representatives from the Blackfeet Tribe and the Confederated Salish and Kootenai Tribes; tourism representatives from Montana and Canada; local and national experts on the environment, historic preservation, engineering, and economics; and a representative-at-large. Suzanne Lewis, former GNP Superintendent, was the Designated Federal Official.

The CAC charter stated that:

> *The purpose of the Committee is to advise the National Park Service in the development of alternatives for rehabilitation of the Going-to-the-Sun Road in Glacier National Park, focusing on road condition and rehabilitation strategies, including scheduling, costs and measures to mitigate impacts on visitors and local economies. These alternatives will then be analyzed in an environmental document that will provide the basis for the agency decision.*

The CAC met four times:

- February 29-March 2, 2000, Kalispell, Montana
- September 25-26, 2000, West Glacier, Montana
- September 19-21, 2001, East Glacier, Montana
- November 15, 2001, Whitefish, Montana

All CAC meetings were open to the public, with time allowed for public comment. Official transcripts from each of the CAC meetings were recorded (Goodman Reporting 2000, 2001). After numerous discussions and many hours of review of studies by these dedicated individuals, the CAC's final recommendations to the Park were completed in November 2001 (NPS 2001a).

GNP began seeking public input, or scoping, on the proposed project with a notice in the *Federal Register* (June 5, 2000) and a newsletter mailed to the public and placed on the GNP website. The NPS held a series of open houses in December of 2000 to solicit input and comment from the public on the proposed rehabilitation of the Road and preparation of an EIS. Open houses were held on December 4 in Kalispell, Montana; December 5 in Missoula, Montana; December 6 in Great Falls, Montana; and December 7 in Browning, Montana and Lethbridge, Alberta, Canada. Public scoping comments were accepted by mail and at the GNP website until December 29, 2000. In addition, a number of public comments were received and issues identified during the course of the CAC meetings and public comment and public review of the *Engineering Study*, *Socioeconomic Study*, and *Transportation and Visitor Use Study*.

The Park also requested scoping comments from federal and state agencies that may have an interest in the proposed project. Input was solicited from the U.S. Fish and Wildlife Service, Environmental Protection Agency, Montana State Historic Preservation Office, Montana Department of Fish, Wildlife, and Parks, Montana Department of Environmental Quality, and Montana Department of Natural Resources and Conservation.

PUBLIC HEARINGS AND COMMENTS ON THE DRAFT EIS

The Going-to-the-Sun Road Rehabilitation Plan/Draft EIS (DEIS) was released for a 60-day public review in September 2002. The NPS held public hearings in Missoula, Montana (October 21, 2002), Kalispell, Montana (October 22, 2002), Great Falls, Montana (October 23, 2002), Browning, Montana (October 24, 2002), and in Lethbridge, Alberta, Canada (October 24, 2002). The hearings included an open house for the public to learn more about the proposed project, and a formal comment period where testimony was taken. The hearings also included a question and answer session with NPS staff. Approximately 84 people attended the public hearings and testimony was received from eight participants.

In addition to the comments received at the public hearings, over 250 written comments were received on the Draft EIS. A number of issues was presented at the public hearings and in the written comments, including concerns about the construction schedule, expanding transit service, potential impacts to local businesses, suggestions for visitor use improvements, funding, and other issues. Appendix D includes a summary of substantive comments on the DEIS and NPS responses to those comments. The comments received on the DEIS were used by the NPS to refine the Preferred Alternative and make other minor changes and corrections in the Final EIS.

ISSUES CONSIDERED IN THIS EIS

The regulations governing EIS preparation require that lead agencies determine "the significant issues to be analyzed in depth in the environmental impact statement" and to "identify and eliminate from detailed study the issues that are not significant" (40 CFR 1501.7). The overall purpose of scoping is to focus the environmental analysis on those issues that are relevant to the alternatives and decision to be made.

Issues for consideration in this EIS were identified over a period of almost 2 years from public, CAC, and agency input. An interdisciplinary team that included design engineers, transportation planners, natural and cultural resource specialists, economists, and landscape architects from the NPS, FHWA, and consultants conducted research, site surveys, evaluations, public surveys, engineering assessments, socioeconomic analyses, and prepared reports on the rehabilitation of the Road. Of particular importance was the role of the CAC. The CAC met over a period of 23 months, reviewed numerous studies, listened to public testimony and regional experts, and discussed all facets of the Road rehabilitation.

Below is a summary of the significant issues identified for this project. The section *Impact Topics* (p. 30) provides a discussion of the topics that are considered in this EIS and those that were dismissed from further consideration.

Natural Resource Issues

Geology and Soils

Geologic concerns associated with Road rehabilitation include the rock scaling activities that are needed in the steep portions of the Road, primarily between The Loop and Golden Stairs Point (Figure 2). Unstable rock cuts from natural weathering and freeze/thaw action have created a safety hazard. While removal of loose rock material may be necessary in some locations, the steep rock cuts adjacent to the Road are part of the historic scenic character of the Road. Substantial rock removal in rockfall hazard areas could potentially change the visual character of the Road. In addition, removal of possible rockfall hazards might actually trigger rockfall, and cannot provide 100 percent safety or assurance that natural erosion and rockfall will not continue to occur. The scaling of rockfall hazard areas has implications for impacts to vegetation, wildlife, geologic features, scenic quality, historic character, and safety.

Although proposed drainage improvements and stabilization of eroding or unstable slopes should help to protect soil and geologic resources in the long term, there is concern that rehabilitation activities may result in temporary short-term disturbance to geologic and soil resources including erosion, soil compaction, and loss of topsoil.

Water Resources, Floodplains, and Water Quality

The Road parallels high quality water resources including Lake McDonald, McDonald Creek, and St. Mary Lake. In addition, the Road crosses a number of other smaller tributaries to these streams and lakes. Waters in GNP are classified A-1 by the Montana Water Quality Act, which denotes high quality water. Water quality may be affected by ground disturbing activities in close proximity to watercourses. An additional issue of concern is the potential impact to the Road near Divide Creek from periodic flooding.

Vegetation

The Road bisects a variety of natural vegetation communities including high elevation subalpine and alpine habitat. Road rehabilitation, pullout improvements, changes in parking, and other land-disturbing activities could impact native plant communities. Additionally, vegetation has infiltrated stone masonry structures and the Road prism leading to degradation of historic structures. Material from mud slides, avalanches, and general maintenance has been placed on the backside of guardwalls and now supports vegetation that needs to be removed. Another concern is the revegetation of Road sideslopes and areas of disturbance following construction work. As described in *Visual Resources* below, vista clearing and roadside vegetation clearing would require the removal of trees and shrubs adjacent to the Road at select locations. While this action would improve scenic vistas, there is concern over the disturbance to native vegetation, and natural processes, including succession of natural plant communities.

Wetlands

The majority of the Road is located in upland locations, although wetlands border the Road in a few low-lying areas and next to streams. Land disturbance associated with Road rehabilitation could directly or indirectly affect sensitive wetland and riparian areas.

Wildlife and Aquatic Resources

A diversity of habitats along the Road provides for a variety of aquatic and terrestrial wildlife species. Although individuals of some wildlife species are generally acclimated to traffic and noise along the Road, rehabilitation work would introduce additional noise and human activity for extended periods. Some animals would adapt in time, perhaps becoming habituated roadside or “nuisance” wildlife, and some may be displaced. Early and late season construction, as well as night construction activities, could affect wildlife behavior, foraging, and travel near the Road. There is concern that rehabilitation work may temporarily result in increased displacement, fragmentation, and mortality risk, although mitigation efforts may help to reduce some of those impacts. Ground-disturbing activities that contribute to sedimentation in streams and lakes could affect aquatic habitat and species.

Threatened and Endangered Species and Species of Concern

GNP provides habitat for several federally listed species including gray wolf, grizzly bear, bald eagle, Canada lynx, and bull trout. The wolverine and westslope cutthroat trout occur in the Park and have been petitioned for federal listing In addition, there are state-listed rare wildlife and plant species in the Park, many with suitable habitat within the Road corridor. Rehabilitation activities could displace wildlife species of concern near the Road or possibly directly impact rare plants.

Air Quality

Potential impacts to air quality and visibility from dust and vehicle emissions during construction are a concern. In addition, the possible use of an asphalt batch plant near the Park could affect air quality and visibility.

Visual Resources

Because of the high quality of scenic resources provided by both natural and historic features along the Road, rehabilitation work could reduce scenic quality and values. Visual concerns include maintaining the character of the Road and preserving the adjacent natural setting. Modifications need to be done in a manner sensitive to these resources. Maintaining the scenic quality of the Road includes preserving the historic character, retaining the historic setting, as well as perpetuating the rustic character of materials and design. Maintenance and rehabilitation of the historic structures and stonework is a scenic and cultural resource concern

Scenic vista pullout

and is described more under *Cultural Resource Issues* below.

Other issues of concern include rock scaling that may change the character of the views adjacent to the Road and land disturbing activities that affect vegetation and natural areas.

Natural Soundscape and Lightscape

The substantial rehabilitation effort needed to repair the Road would introduce additional noise from construction equipment and traffic. In addition, night work would require artificial lighting. Construction activities could disturb the natural sounds and night sky and visitor enjoyment of these resources during rehabilitation.

Wilderness and Wild and Scenic Rivers

Although no rehabilitation work would be conducted within potential wilderness areas, the noise from construction could extend into proposed wilderness lands.

The Going-to-the-Sun Road begins on the west side of the Park at the Middle Fork of the Flathead River, which is designated a Wild and Scenic river. Although direct effects to the Flathead River are not expected, the portion of the Road west of the

Continental Divide is located within the Middle Fork watershed.

Cultural Resource Issues

The Road provides a distinctive and exceptional example of landscape engineering that blends civil engineering with landscape architecture. The designation of the Road as a National Historic Landmark and a National Historic Engineering Landmark is due in part to the significance of the numerous historic stonework features, including retaining walls, guardwalls, arches, bridges, and other structures. The 1997 designation of the Road as a National Historic Landmark identified five categories of contributing resources — spatial orientation, circulation, topography, vegetation, and structures. The deterioration of historic features from weathering, avalanches, wear and tear, and incomplete or inadequate repair work has reduced the historic appearance of some portions of the Road. Left unchecked, the historic features that contribute to the Road's National Historic Landmark designation would continue to deteriorate.

Rehabilitation of the Road requires consideration of how to best preserve, protect, and rehabilitate the historic features and cultural landscape of the Road. At issue with rehabilitation of the Road are the appropriate repair and maintenance actions that are necessary to balance correction of structural deficiencies with the preservation and rehabilitation of historic features and cultural landscape. In some locations, historic structures such as guardwalls have totally failed and the historic material from which the wall was constructed is lost. In these and other locations, modern masonry walls have been constructed that detract from the integrity and significance of the Road's historic design. At other locations, modern changes have diminished the integrity of features, but the overall historic appearance is retained. Modern structural material may need to be used to meet safety requirements, with a façade of native stone to provide a historic appearance. In some locations, rehabilitation of existing historic features without the introduction of modern material is possible. There is concern that activities associated with site improvements, such as new pullouts, trails, and parking, could affect archaeological sites and the visual character of the Road.

Visitor Use and Experience Issues

The rehabilitation work for the Road would need to be conducted during the spring, summer, and fall, which are also the times that most visitors experience the Road. Construction activity during the winter and early spring is not possible on high elevation portions of the Road because of the high snowfall and avalanche hazard. A primary issue of concern is how the quality of the visitor use and experience would be affected by Road rehabilitation work. Road rehabilitation could inconvenience visitors, limit their ability to drive the Road, and restrict access to trailheads, scenic overlooks, Logan Pass, and other Park features.

There are also concerns with the existing level of visitor service and safety issues along the Road corridor. Some of the visitor use areas along the Road currently have reached or exceeded their capacity. Parking areas are often at capacity during peak use periods. An issue of concern is how to better distribute visitors along the Road and reduce congestion without major infrastructure improvements in parking and pullout capacity. Safety issues include poorly located or designed parking and pullouts that create a hazard for pedestrians and motorists. Another issue is resource damage caused by visitors from informal social trails and off-shoulder parking.

Park Operation Issues

Proposed Road rehabilitation may result in changes in Park staffing requirements. The extent of this impact is an issue that should be addressed.

Local and Regional Economic Issues

Related to the potential impacts to visitor use are the possible consequences on the local and regional economies from rehabilitation of the Road. Many businesses in northwest Montana and southwest Alberta rely on summer tourism for a large portion of their annual income. A significant issue of concern is how Road rehabilitation work would affect Park visitation and the businesses that rely on tourism. Also of concern are measures that could be used by the Park and other private and government entities to minimize adverse effects during the construction period. Construction-related spending and employment would help to offset potential reductions in tourism, but the extent of the benefit to the local and regional economies is an issue.

Environmental Justice Issues

Available economic data indicate low-income populations including the Blackfeet and Flathead Reservations are present in Glacier and Lake counties, Montana. Of issue is whether rehabilitation of the Road would disproportionately affect low-income populations.

IMPACT TOPICS

The impacts in this EIS are discussed in proportion to their significance. Topics with minor impacts are only briefly discussed; topics with greater impacts are discussed in detail. Impacts considered in this EIS are listed below and those that were dismissed from further consideration follow.

Impact Topics Considered

Impact topics were selected based on the issues identified above and the need to evaluate in detail the potential effects to resources of concern. Impact topics that were selected for detailed analysis include visitor use and experience; local and regional economies; archaeological, historic, ethnographic, and cultural landscapes; topography, geology, and soils; water resources, floodplains, and water quality; vegetation; wetlands; wildlife and aquatic resources; threatened and endangered species and species of concern; air quality; visual resources; natural soundscape and lightscape; and wilderness and wild and scenic rivers. Background information on these topics is discussed in Chapter 3, *Affected Environment*, and the potential impacts to these resources are discussed in Chapter 4, *Environmental Consequences*.

Impact Topics Dismissed from Further Consideration

Two impact topics were dismissed from further consideration in the EIS because there would be no or negligible impacts. Impact topics that were dismissed are briefly discussed below.

Prime Farmland

No prime or unique farmland is present in GNP. There would be no impact on this resource from any of the alternatives.

Hazardous Material

The project area is located entirely within GNP, although potential locations outside of the Park could be used for staging or an asphalt batch plant. No known hazardous materials or contaminated sites are present within areas of potential disturbance along the Road. Petroleum products needed during construction, such as fuel, oil, and hydraulic fluid, are not classified as hazardous material and their use in the Park would be regulated by construction stipulations.

RELATIONSHIP TO OTHER PLANNING PROJECTS

General Management Plan

The GMP for the Park commits the NPS to rehabilitate the Park's historic facilities, including the Road. The Road corridor was identified in the GMP as a separate geographic unit encompassing the Road and associated management zones (Figure 2). Four management zones are included within this geographic area. These zones each define a set of desired resource conditions, visitor experiences, types of management activities, and development.

The visitor service zone includes the Road and developed facilities adjacent to the Road including campgrounds, interpretive areas, lodges, commercial services in Apgar, Lake McDonald, Rising Sun, and St. Mary, administrative facilities, and other visitor amenities. This zone is managed to provide the traditional recreational opportunities for which the Road was designed. The opportunity for visitors to drive and enjoy the Road and adjacent resources is an important visitor experience. All of the proposed actions associated with Road rehabilitation occur within the visitor service zone. The day use management zone includes popular hiking trails such as the Highline Trail, and trails at Avalanche and Hidden Lake. The day use zone is managed to serve a large number of visitors. The backcountry zone is managed to maintain natural processes, with limited development for hiking and backcountry camping. The rustic management zone includes areas such as the Apgar Lookout Road and Packer's Roost. Management in the rustic zone is limited to unpaved roads, trailheads and parking, sanitation, and administrative facilities.

As broadly defined in the GMP, the Road corridor would be managed to provide all visitors with an opportunity to experience the scenic majesty and historic character of the Park through a wide range of visitor activities, services, and facilities, while the integrity of both cultural and natural resources are preserved and emphasized. The GMP identified several management goals to provide direction for the Road corridor:

- Rehabilitate the Road
- Preserve the Road's historic character and significance
- Complete the necessary repairs before the road fails
- Minimize impact on natural resources, visitors, and local economies
- Minimize the cost of Road rehabilitation
- Develop a comprehensive visitor use plan for the Road
- Provide an efficient and convenient public transportation system
- Retain tour and transportation services, including the red buses
- Continue to restrict bicycles during peak use
- Continue restrictions on vehicle length and width

The GMP determined that rehabilitation of the Road is needed to preserve its historic character and significance. Additionally, the GMP provides the conceptual framework and management direction for rehabilitation and visitor use on the Road. This EIS covers the site-specific actions for implementation of proposed improvements to the Road in accordance with the goals of the GMP.

The GMP also addressed construction of the West Side Discovery Center near Apgar. The Discovery

Center will serve as a visitor center and museum, and will be located north of the Going-to-the-Sun and Camas Roads' T-intersection. A transit staging area and parking lot is included in the Road Rehabilitation Plan at the site of the Discovery Center to accommodate expanded transit service during roadwork. Funding for the transit portion of the Discovery Center is included in the budget for the proposed Going-to-the-Sun Road Rehabilitation Plan. The Discovery Center is one of the mitigation measures planned to attract visitors and reduce potential impacts to Park visitation during Road rehabilitation.

The Divide Creek flood hazard concern was addressed in the GMP. The Preferred Alternative selected in the GMP includes relocating Park employee housing and administrative and maintenance facilities. The Going-to-the-Sun Road *Rehabilitation Plan* only addresses the Road improvements associated with Divide Creek between the creek and the St. Mary Visitor Center and protecting the Road from periodic flooding.

Commercial Services Plan/Environmental Impact Statement

In accordance with the direction provided by the GMP, the Park is preparing a *Commercial Services Plan/Environmental Impact Statement* to provide guidance for managing commercial services in GNP. The *Commercial Services Plan* (CSP) is addressing visitor use facilities throughout the Park including areas adjacent to the Road such as Apgar, Lake McDonald Lodge, and Rising Sun, whereas the proposed improvements to visitor use facilities in this Going-to-the-Sun Road rehabilitation project only include those visitor facilities associated with transportation. The goals of the *Commercial Services Plan/Environmental Impact Statement* are to:

- Determine the overall mix of commercial services
- Establish a framework for future decisions
- Establish the character and level of service by Park area based on need, expectations, economic feasibility, and resource implications
- Provide a clear vision and implementation strategy for rehabilitating the historic hotels, and continuing a wide variety of visitor experiences
- Provide the specific information necessary for issuance of concession contracts including those that allow rehabilitation efforts

Roadside Maintenance Guideline

Roadside Maintenance Guidelines for Glacier National Park were developed in 1993 to provide direction on the treatment of the roadway corridor along the Going-to-the-Sun Road and other Park roads (NPS 1993b). The policy established by the guidelines is to: protect the structure and integrity of the Road; avoid or minimize damage to natural resources; maintain or improve roadside safety; protect cultural resources; and recognize the importance of the visitor experience. Roadside maintenance activities include: upkeep and repair of the Road's structural features; cleaning drainage structures; utility repairs; mowing and brushing, seeding, hazardous tree removal, and weed control. The guardwalls will be kept clean of soil and vegetation, including materials from slides and general maintenance activities. Another important aspect is maintenance of the vistas and views that are critical to the character of the Road, roadway views of features and landscape, and the visitor experience. The Park is currently preparing landscape/vista management guidelines for the Going-to-the-Sun Road.

West Entrance Plan

In 2000, NPS completed an Environmental Assessment for improvements to the West Entrance of GNP (NPS 2000). This plan included rehabilitation of the historic entrance station, roadway improvements, a new employee toilet, and an orientation station for visitors. Completion of roadwork and the orientation station are in progress, but funding for rehabilitation of the West Entrance Station and employee toilet would come through the proposed Going-to-the-Sun Road *Rehabilitation Plan*.

Transportation Plan/EA

A *Transportation Plan* was developed by NPS for the Park in 1990 to provide a management plan for safe and enjoyable travel on Park roads, including the Going-to-the-Sun Road (NPS 1990). The *Transportation Plan* identified the need to correct road deficiencies, reduce safety hazards, solve traffic and transportation problems, and to develop public transit options. Maintaining the historic character of the Road was recognized as a high priority, thus preservation of the existing alignment and restoration of historic stone masonry would guide improvements to the Road. The plan also addressed parking and turnouts along the Road and made recommendations regarding treatments. Proposed rehabilitation of the Road in this EIS would correct many of the deficiencies identified in the *Transportation Plan* and implement measures to improve safety and visitor access. The Finding of No Significant Impact for the *Transportation Plan* was signed on June 20, 1990.

Resource Management Plan

The *Resource Management Plan* (NPS 1993a) was developed by GNP to serve as a guide for the management of natural and cultural resources. The management objective for natural resources is to "conserve and protect the integrity of Glacier's naturally functioning ecosystem, recognizing man as a part of this system" and "to conduct and encourage scientific research that contributes to the understanding and management of ecological and cultural systems." The management objective for cultural resources is "to identify, interpret, and protect Glacier's significant cultural resources and to manage them as vital components of the Park's resource spectrum." Rehabilitation of the Going-to-the-Sun Road and visitor use improvements are in accordance with the goals, objectives, and direction provided by the *Resource Management Plan*.

Exotic Vegetation Management Plan

The *Exotic Vegetation Management Plan* (NPS 1991) provides direction for preserving biological diversity of native flora by containing and/or controlling undesirable exotic plant species. Plan objectives include inventory, research, education on exotic species, as well as control and prevention of exotic plant establishment in the Park. Ground disturbing activities associated with proposed roadway rehabilitation and improvements would be in accordance with the Integrated Pest Management (IPM) procedures for controlling the introduction or spread of exotic species outlined in the *Exotic Vegetation Management Plan*.

DECISION PROCESS

The Draft EIS was prepared and released to the public for a 60-day comment period in September 2002. This Final EIS has been prepared in accordance with the NEPA of 1969 and amendments, Council on Environmental Quality Regulations for Implementing the Procedural

Provisions of the NEPA (40 CFR 1500-1508), and National Park Service Guidelines (DO-12). The NPS is the project proponent and lead agency under NEPA. The Federal Highway Administration is a cooperating agency with the NPS. The NPS will issue a Record of Decision (ROD) for the proposed project no sooner than 30 days after release of the FEIS.

Chapter 2
Proposed Action and Alternatives

Overhanging snow and narrow roadway on the Going-to-the-Sun Road west of Logan Pass, 1930s or 1940s

GNPA photo #4824

This chapter describes the alternatives considered for rehabilitation of the Going-to-the-Sun Road. Four alternatives, including a No Action Alternative, were selected for evaluation. Included in this chapter is background information on the alternative development process, design standards for Road rehabilitation, descriptions of each alternative, actions common to all alternatives, alternatives and mitigation excluded from further consideration, and discussion of the environmentally preferred alternative. A summary table at the end of the chapter compares the environmental impacts for each of the alternatives.

ALTERNATIVE DEVELOPMENT PROCESS

The development of alternatives was a multi-phased and multi-disciplined effort spanning several years and involving input from the public, a CAC, an interdisciplinary team from FHWA and the NPS, and consultants (Washington Infrastructure Services, Coley-Forrest, Renewable Technologies, Inc., ERO Resources, and BBC Research) specializing in highway engineering, transportation planning, economics, natural resources, and cultural resources. Initial alternative development began during the preparation of the Park's GMP. Subsequent alternative development occurred during a 2-year *Engineering Study* (WIS 2001a) with input from the

CAC. Based on a review of the alternatives developed in the *Engineering Study*, the CAC developed and submitted recommendations to the NPS for consideration in the EIS (NPS 2001a).

Following receipt of the CAC's "Final Advice," the NPS initiated a final evaluation and synthesis of alternatives for consideration in the EIS. The NPS reviewed material from the *Engineering Study* and the *Transportation and Visitor Use Study* (WIS 2001a, 2001c) and CAC recommendations to select a full range of alternatives for meeting the project purpose and need. The NPS Preferred Alternative is Shared Use with an Extended Rehabilitation Season (Alternative 3), which is also the alternative recommended by the CAC. A description of all of the alternatives evaluated is included in the remainder of this chapter.

DESIGN STANDARDS FOR ROAD REHABILITATION

Sections 106 and 110 of the National Historic Preservation Act of 1996, as amended, require GNP to undertake planning and actions as may be necessary to minimize harm to the National Historic Landmark-designated Road. The Secretary of the Interior's *Standards for the Treatment of Historic Properties* provide guidelines for promoting responsible preservation practices that would be followed during Road rehabilitation (USDI 1998). The standards that are particularly relevant to the Going-to-the-Sun Road rehabilitation are:

- The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
- Most properties change over time. Those changes that have acquired historic significance in their own right shall be retained and preserved.
- Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.
- Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities, and where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

Specific treatments for implementation of Secretary of the Interior's *Standards for the Treatment of Historic Properties* would be incorporated into the final engineering and rehabilitation designs. The recently completed *Cultural Landscape Report* (RTI 2002) provides additional treatment recommendations that would be used to implement repairs to historic features.

ALTERNATIVE 1— NO ACTION (REPAIR AS NEEDED)

The No Action Alternative maintains the status quo. Rehabilitation work on the Going-to-the-Sun Road would continue as funding allows, but work would be focused primarily on critical and emergency repairs without substantial long-range planning. Implementation of needed Road repairs would take about 50 years under current and anticipated levels of funding. This alternative would not meet NPS goals and objectives for rehabilitation of the Road nor would it prevent further loss of natural, historic, and cultural resources, or address potential safety issues. The No Action Alternative has the greatest potential for catastrophic roadway failure or substantial deterioration of historic features.

The Repair as Needed alternative provides for only the basic operation and maintenance of the Road. Preventative maintenance actions for retaining walls, guardwalls, avalanche-removable guardrails, and pavement crack sealing would be addressed as funding allows. As the Road and its structures approach failure, critical repairs would be made within the constraints of available funding and resources. Planning and design would be limited to the immediate project area, and would be based on priority or critical sections established by Park operation and maintenance personnel and FHWA. When repairs are necessary, work forces would be engaged to provide the best repair within available funding. A traffic design and traffic management plan would be established for the specific repair site. The use of specialized techniques, such as prefabrication, would not be cost or time effective for small repairs. The costs and efficiency of repairing failed sections of roadway on a piecemeal or emergency basis would be substantially higher compared with larger scale rehabilitation work.

Scheduling and Funding

Rehabilitation of the Road under the No Action Alternative would take about 50 years; thus, the Road would be under a constant state of construction. The NPS would compete for annual funding through the current FHWA/NPS Park Road Program and it is anticipated that on average, \$1 million to \$2 million dollars per year would be available for Road rehabilitation. The total estimated cost over the 50-year period of construction would range from \$328 million to \$394 million (Table 2). Only minor visitor use improvements are included in the estimated cost for Road rehabilitation. Funding for road maintenance would remain at about \$560,000 per year; however, deterioration of the roadway is likely to increase maintenance requirements.

Traffic Management

It is anticipated that the Road would remain open during rehabilitation work, subject to traffic delays; however, traffic control requirements, and consequently traffic delays, are dictated by the problem and repairs needed. A maximum cumulative delay of 30 minutes would be allowed when traveling over the length of the Road for most repairs, but longer delays may be necessary if damage is extensive (Table 2). Night work is possible depending on the conditions and the type and location of repairs. Rehabilitation work would be conducted from spring until fall subject to weather and safety considerations.

Transit Service During Rehabilitation

Transit service would not be expanded beyond existing operations. Currently, there are two concessioners that operate shuttle and tour services in the Park. Glacier Park, Inc. (GPI) provides both narrated tours and shuttle service along the Road. GPI narrated tours include the red “jammer” buses, with full and half-day tours. In addition, GPI operates two transit vehicles between West Glacier and St. Mary from Independence Day through Labor Day. This transit service operates as a two-way loop system from each side of the Park with vehicles operating at intervals between 2 and 5½ hours. Sun Tours also provides interpretive tours of the St. Mary and East Glacier area that focus on Blackfeet Indian culture and Glacier’s natural features.

Table 2. Comparison of alternative features.

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
SCHEDULE				
Road rehabilitation duration	50 years	20 years	7 to 8 years	6 to 8 years
FUNDING (cost updated to millions of year 2002 dollars)				
Road rehabilitation cost	$102 - $122	$94 - $111	$84 - $112	$75 - $87
Visitor use improvement cost	0	$1.6	$10.4	$10.4
Total transit system cost over rehabilitation period[†]	0	$9.1	$9.4	$8.3
Visitor development mitigation	0	0	$17.7	$17.7
TOTAL COST • 2002 dollars • Inflation adjusted (4%/year) [‡]	 $102 - $122 $328 - $394	 $104.7 - $121.7 $157 - $186	 $121.5 - $149.5 $140 - $170	 $111.4 - $123.4 $126 - $144
Yearly funding required	$1 - $2	$5	$10 - $18	$9 - $16
Annual road operation and maintenance cost following rehabilitation	$0.56	$1.5 - $1.9	$1.5 - $1.9	$1.5 - $1.9
TRAFFIC MANAGEMENT ON THE GOING-TO-THE-SUN ROAD DURING REHABILITATION				
Up to 30-minute delays, everyday, all season	Yes	Yes	Yes	Yes
Up to 1-hour delays	No	No	Mornings[1] and evenings[2] (Monday through Thursday)	No
Up to 2-hour delays	No	Nights[3] (Monday through Thursday)	No	No
Variable scheduled traffic delays for night construction with advance notice	Nights[3] (all week)	Nights[3] (Monday through Thursday) after third Monday in September	Nights[3] (Monday through Thursday)	No
Traffic suspensions on road segments under rehabilitation	No[4]	No	Prior to Independence Day and after mid-September	Monday through Thursday, all season
Access to Logan Pass	Yes	Yes	Yes	Yes

[1] Mornings = 8 A.M. to 10 A.M.
[2] Evenings = 3 P.M. to 8 P.M.
[3] Nights = 8 P.M. to 8 A.M.
[4] Traffic delays or suspensions may be necessary in the event of road failure.
[†] Includes start-up cost and annual operating costs.
[‡] Inflation-adjusted cost reflects the estimated actual cost over the period of construction.

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
TRANSIT SERVICE DURING REHABILITATION				
Schedule	Existing operation, 2½ to 5 hour intervals	Existing operation, 2½ to 5 hour intervals plus destination transit	30-minute intervals	30-minute intervals
Vehicles — vans or buses	3 (2 active; 1 backup)	5 (4 active; 1 backup)	14 (12 active; 2 backup)	14 (12 active; 2 backup)
New transit staging areas	No, existing parking areas would be used	No, existing parking areas would be used	Staging area parking at Apgar (110 to 120 spaces) and St. Mary (25 to 30 spaces)	Staging area parking at Apgar (110 to 120 spaces) and St. Mary (25 to 30 spaces)
Shoulder season service	No	No	Yes	Yes
OPERATIONS AND MAINTENANCE				
Increased annual funding for operations and maintenance	No	Yes	Yes	Yes
VISITOR USE IMPROVEMENTS				
Parking and Pullouts				
Move, add, or reconfigure parking and pullouts to improve safety and traffic flow	No	No	Yes	Yes
Remove or formalize social pullouts	Yes	Yes	Yes	Yes
Add slow-moving vehicle turnouts	No	Yes	Yes	Yes
Vegetation Management				
Vista and roadside vegetation clearing	Yes	Yes	Yes	Yes
Trail Improvements				
Rehabilitate existing roadside trails and add new short trail segments	No	No	Yes	Yes
Toilets				
Rehabilitate existing vault toilets	No	Yes	Yes	Yes
Replace portable toilets with vault toilets and add new toilets	No	Yes	Yes	Yes

Action	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
Visitor Orientation, Information, and Interpretation				
Install orientation and information facilities	No	No	Yes	Yes
Provide interpretive wayside exhibits along the Road	No	No	Yes	Yes
Develop Intelligent Transportation System, update roadside signage, and provide communication material to visitors	No	No	Yes	Yes
Activate public information program to aid visitors and local businesses	Yes	Yes	Yes	Yes
Implement visitor use mitigation measures	No	No	Yes	Yes

Under the No Action Alternative, these transit services would continue, but available funding would be directed only toward Road rehabilitation work rather than expansion of transit service. The NPS would continue to coordinate in-Park transit service with private operators that may provide regional transportation services from surrounding communities to the Park.

Operations and Maintenance

The Repair as Needed alternative does not provide a means for establishing an effective long-term maintenance program. Existing funding for Road maintenance would not increase and Road repairs would not keep up with Road deterioration. Operation and maintenance efforts would remain focused on spring snow clearing and the most critical repairs within budget constraints.

Visitor Use Improvements

Developments associated with visitor use improvements would be minor. Existing roadside social pullouts either would be revegetated or formalized to improve safety and protect resources. During rehabilitation work, the Park would implement a public information program to alert visitors to Road conditions and delays. Roadside vegetation clearing would be conducted to improve scenic vistas. Maintenance and upkeep of existing facilities would continue under current levels of funding.

Mitigation

No additional mitigation measures other than those described as common to all alternatives later in this chapter would be implemented.

ALTERNATIVE 2—PRIORITY REHABILITATION

Priority Rehabilitation allows for planning and design of work ahead of time, rather than in response to road failure or emergency repairs. Advanced planning ensures that historic and cultural resources, environmental and socioeconomic concerns, and operations and maintenance issues are addressed, but implementation of Road repairs over 20 years would not prevent continued deterioration of these resources. Available funding would focus on Road rehabilitation with implementation of a few improvements to visitor use facilities. The addition of two transit vehicles would provide visitors with another travel option during construction. The Priority Rehabilitation alternative requires that individual site rehabilitation designs and traffic management plans are prepared using an established list of priorities. Data collection and final engineering design would be conducted in advance of funding determinations to allow for rapid implementation of needed repairs. Designs and plans would be implemented based upon their priority or as emergencies arise, and as funding is appropriated.

Priority Rehabilitation allows for more planning and impact mitigation than Alternative 1. As a result, there is an opportunity to use specialized techniques, such as prefabrication, to slightly improve construction efficiency and cost. Construction staging would occur at designated sites within and outside the Park. Although this alternative establishes a 20-year plan for rehabilitation, because of its duration there is still a significant potential for major road failure that would require emergency repairs and traffic delays or road closure.

Scheduling and Funding

Rehabilitation of the Going-to-the-Sun Road under the Priority Rehabilitation alternative would take about 20 years. The cost to implement this alternative, including minor visitor use improvements and small-scale expansion of the transit system would range from $157 million to $186 million when adjusted for inflation. Average annual funding of about $5 million in current dollars would be required (Table 2). Operation of two additional transit vehicles over the 20-year rehabilitation period would cost about $9.1 million including start-up cost for vehicles and annual operating costs. About $1.6 million is included for minor visitor use improvements as described later in this section. Because of the expense to implement the proposed rehabilitation of the Going-to-the-Sun Road, GNP would seek special designation to provide funding under the reauthorization of TEA-21 (2004-2009).

Additional funding would be needed to upgrade the level of operation and maintenance activities. Currently the Park does not have adequate maintenance funding to keep up with damage to the Road, and prevent further deterioration. Implementation of proposed Road improvements would necessitate an annual operating and maintenance budget of $1.5 million to $1.9 million per year to protect the capital investment in Road rehabilitation and assure public safety and resource protection following rehabilitation. GNP will seek additional funding specifically dedicated to operation and maintenance. One option the CAC suggested is the establishment of a permanent "maintenance endowment fund" separate from the Park budget that could be used exclusively for Road maintenance.

Traffic Management

Advanced planning would allow preparation of a site-specific traffic management plan to reduce visitor delays and more efficiently conduct rehabilitation work. Traffic management under the Priority Rehabilitation alternative would be similar to that currently used for on-going critical repair work. This alternative emphasizes weekday construction, with limited weekend work. A maximum cumulative delay of 30 minutes would be allowed when traveling over the length of the Road (Table 2). This may include a combination of short stops at multiple construction sites.

Two-hour delays would be allowed at night between 8 P.M. and 8 A.M., five days a week (Monday through Thursday) during the peak visitor season. Beginning the third Monday in September, when visitation is lower, variable traffic delays could occur Monday through Thursday nights between 8 P.M. and 8 A.M. Night traffic delays would be scheduled in advance and posted so that visitor would be aware of travel restrictions. Night construction would be used as appropriate depending on the type of work and safety considerations. Work at night is most likely to occur at lower elevation sites where efficiency is greater and there are fewer safety concerns.

Seasonal visitor access to the Road would remain the same as current operations. The Road would open to visitors in the spring following snow removal and extend through the third Monday in October. Rehabilitation work would continue from spring to fall as weather conditions permit.

Transit Service During Rehabilitation

Transit service during rehabilitation would be similar to existing conditions plus two new transit vehicles would be added to provide destination transit service to specific locations for tours or interpretive and educational programs. A total of four active transit vehicles and one backup vehicle would be available for this alternative. Transit service would allow users several options to access various popular destinations along the Road. Existing visitor staging areas at Lake McDonald Lodge and the St. Mary Visitor Center would be used. The NPS will be examining fares and possible subsidies to provide reasonably priced transit service for visitors. In addition, the NPS would coordinate with private transit operators to develop regional transportation service to the Park as described for Alternative 1.

Operations and Maintenance

The Park currently has an operations and maintenance plan (NPS 1993b) and will be updating the plan over the next several years. The proposed expansion of the operations and maintenance program and budget would allow the Park to maintain the roadway in a manner that protects the structure and integrity of the Road, avoids or minimizes damage to natural resources, maintains or improves roadside safety, protects cultural resources, and recognizes the importance of the visitor experience.

Visitor Use Improvements

Several improvements to visitor use facilities would be implemented under Alternative 2; however, no improvements in parking, major pullouts and overlooks would be implemented (Table 2). Slow-moving vehicle turnouts would be added to about three locations on the west side of the Park, and two to three locations on the east side at lower elevations (Figure 7). These turnouts would be about 120 feet (40 meters) in length and would allow slow vehicles to pull over. About 0.2 acres (0.08 hectares) would be disturbed to construct the roadside turnouts. Roadside vista clearing would be used to restore scenic views at select locations. Existing toilets would be rehabilitated and portable toilets would be replaced with vault toilets. New toilets would be added to the transit staging area at the Discovery Center, Pullout #8, Avalanche, , the Loop, Big Bend, Logan Pass, and the St. Mary Falls Trailhead. Existing toilets would be upgraded and ADA accessibility would be improved at all sites. The Park would activate a public information program similar to the current one to inform visitors about ongoing roadwork.

Mitigation

No additional mitigation other than that described as common to all alternatives later in this section would be implemented.

ALTERNATIVE 3—SHARED USE WITH EXTENDED REHABILITATION SEASON (PREFERRED)

Alternative 3, Shared Use with Extended Rehabilitation Season (Shared Use), is the NPS Preferred Alternative. This alternative is the best balance of rehabilitation requirements and minimization of impacts to visitors and local businesses. Roadwork would be conducted throughout the visitor season, but work that requires substantial traffic delays would be conducted during the spring and fall shoulder seasons, which are times of low visitor use. This alternative would complete Road repairs in 7 to 8 years to prevent further deterioration to historic, cultural, and environmental resources. Alternative 3 also implements expanded transit service during rehabilitation and visitor use improvements to upgrade facilities and address safety concerns.

This alternative includes all of the rehabilitation work necessary to correct deficiencies in the Going-to-the-Sun Road. Advanced planning would allow rehabilitation designs to address all of the engineering, cultural, environmental, socio-economic, and long-term operations and maintenance considerations. The Shared Use alternative allows for improvements in efficiency and cost effectiveness of rehabilitation work by use of flexible traffic management strategies and concentrating work efforts over a shorter period than Alternatives 1 and 2.

Implementation of the Rehabilitation Plan is a large and complex undertaking. This alternative includes development of an integrated delivery plan for implementation of the Going-to-the-Sun Road Rehabilitation Plan. This includes establishment of an independent design and professional construction team including representatives from the NPS, FHWA, and private contractors who will focus on the most efficient approach for completing the project.

Scheduling and Funding

Rehabilitation of the Going-to-the-Sun Road under the Shared Use alternative would take from 7 to 8 years to complete. The cost for implementing repairs, including visitor use improvements, transit service during rehabilitation, and mitigation measures, would range from $140 million to $170 million (Table 2). Annual funding of $10 million to $18 million per year would be needed.

Implementation of expanded transit service would cost about $9.4 million for start-up cost and annual operation during the 8-year rehabilitation period. The current transit program is operated by a private concessioner who charges riders a fee and who is not subsidized by the Park. Expansion of the transit system during rehabilitation would increase transit operating costs. The current range of fares is too low to cover the projected operating costs and a substantial increase in fares may be more than visitors are willing to pay. The NPS will be examining fares and possible subsidies to provide reasonably priced opportunities for transit service. Possible options include increasing transit fees by a nominal amount or increasing visitor entrance fees to cover a portion of the cost of transit operation. Additional funding also would be needed for the capital necessary to purchase the vehicles, signs, and other transit-related expenses. Funding sources for transit may include special federal appropriations, sponsors, local cities, and the Montana Department of Transportation. If subsidized funding or other revenue sources are not secured, an expanded transit system may not be feasible. Additional long-term expansion of transit service within the Park and connections with local and regional transit service would be addressed in the future.

Implementation of visitor use improvements including parking and pullout improvements, new and rehabilitated toilets, trails work and improved visitor information services would cost about $10.4 million.

Additional visitor use and socioeconomic mitigation measures are proposed as part of the Preferred Alternative to minimize impacts associated with rehabilitation work. Proposed measures include construction of a transit staging area near Apgar, rehabilitation of the St. Mary Visitor Center, implementation of an Intelligent Transportation System, additional Park staff, and other actions as described under *Mitigation for Alternative 3*. The cost for these and other mitigation measures is approximately $17.7 million.

Funding for operations and maintenance of the Road following rehabilitation would be about $1.5 to $1.9 million per year. During rehabilitation, funding for operation and maintenance would need to increase incrementally as roadwork is completed.

Traffic Management

Traffic management would be scheduled to minimize visitor impact during rehabilitation. This would require balancing the needs of the rehabilitation contractor, who needs good access and a realistic work schedule to efficiently complete the work, with strategies to maintain visitor traffic flow and access to the Going-to-the-Sun Road. This would require careful planning and staging of construction activities using a combination of short traffic delays during peak visitor times, night work, and rehabilitation work during the shoulder seasons in the spring and fall. Rehabilitation work requiring longer visitor delays would be conducted at night or during the shoulder season in the spring and fall.

Traffic management strategies for the Shared Use alternative include a maximum cumulative delay of 30-minutes over the length of the Going-to-the-Sun Road, with a combination of several short delays at multiple construction sites. These short delays would occur during peak visitor hours throughout the week. Up to 1 hour of cumulative delays over the length of the Road are possible during non-peak hours in the mornings (8 A.M. to 10 A.M.) and evenings (3 P.M. to 8 P.M.), Monday through Thursday. Variable traffic delays would be used for night work, with advance notice of the construction schedule given to the public.

Visitor access along the Going-to-the-Sun Road would remain open throughout the peak visitor season from Independence Day (July 4) to mid-September. An extended rehabilitation season would be used to concentrate work efforts in the shoulder season in the spring and fall when Park visitation is low, prior to Independence Day and after mid-September. Motor vehicle, bicycle, and pedestrian access to the Road during the shoulder season would remain open except for those areas that are under construction. At least 80 percent, or about 40 miles (65 kilometers), of the Road is expected to remain open during the shoulder season, although the open sections would not be contiguous. Logan Pass would remain open throughout the normal visitor season; however, during the shoulder season, access would only be available from one side of the Park.

Transit Service During Rehabilitation

Expanded transit service would be added during construction as a mitigation measure to facilitate visitor access along the Going-to-the-Sun Road and encourage alternative transportation. The number of transit vehicles would be increased to 12 active vehicles and two backup vehicles. This does not include the red "jammer" bus tours or other existing narrated tours that would operate independent of the transit system. The transit system would operate with either 15-passenger vans, 25-passenger, buses, or other vehicles suitable for the narrow roadway.

Transit vehicles would operate in both directions along the Road at 30-minute intervals during the peak and shoulder visitor season throughout the week. Transit bus stops would be located at major trailheads and key visitor attractions. Transit facilities would be code compliant for accessibility. Approximately 17 shuttle stops are anticipated, including staging areas located at Apgar, Sun Point, and St. Mary. The Apgar transit staging area would be located at the planned West Side Discovery Center and would accommodate parking for about 110 to 120 vehicles. About 5 acres (2 hectares) would be needed to construct this transit staging area. Transit parking at the St. Mary Visitor Center would be reconfigured to accommodate about 25 to 30 vehicles within the existing parking lot. The NPS would consider options to fund increased transit service and maintain reasonably priced fares.

Implementation of a transit system during rehabilitation would give the Park an opportunity to experiment with different buses, schedules, fares, and stops. An operational plan would be prepared to direct the acquisition of shuttle vehicles, contracts for operation and maintenance, develop shuttle schedules, and coordination with regional transportation systems. Depending on the success of shuttle operations, various features could be part of a more permanent transit system after rehabilitation is complete. It was recognized that it would be difficult at this time to develop a more permanent transit service that would not be implemented until rehabilitation is complete. The industry is constantly changing and there may be opportunities for different types of shuttle vehicles or other methods to provide transit service. The implementation of future transportation options in the Park would be evaluated at a later date, but proposed rehabilitation of the Road is not believed to preclude any reasonably foreseeable transit options.

Development of a regional transportation system that provides service from local communities and locations outside of the Park is beyond the scope of the proposed rehabilitation project. However, the NPS fully supports private development of a public transportation system with connections to the Park and would participate in transportation planning with local communities and businesses to facilitate integration of Park transit with regional transportation services.

Operations and Maintenance

Expanded operations and maintenance measures would be implemented for the Shared Use alternative as described for Alternative 2. This includes funding to keep the Road in good condition and prevent deterioration of roadway structures and historic features following completion of rehabilitation work.

Visitor Use Improvements

Alternative 3 provides an opportunity to incorporate needed improvements to visitor use facilities adjacent to the Road. Many of the improvements are linked with rehabilitation of specific roadway segments and would be implemented during work on a particular Road segment. All improvements would be located within the visitor service zone encompassing the Road and adjacent visitor use facilities. Visitor use improvements include upgrades in parking areas and pullouts, slow-moving vehicle turnouts, vista and roadside vegetation clearing, formalizing roadside social trails and creation of new trails, and improvements to toilets. Increased levels of interpretation and orientation information for visitors would be added to all visitor use improvement sites. An Intelligent Transportation System (ITS) would be used to provide visitors and others with up-to-date information on traffic delays, road conditions, parking, tours, weather, and other visitor use information. Visitor use improvements are described in detail below.

Parking and Pullouts

Upgrades to existing parking and pullouts adjacent to the Road are proposed to comply with life safety and accessibility codes and standards, improve vehicle and pedestrian circulation, provide parking for public tours, and prevent damage to resources (Table 3). As mentioned for Alternative 2, turnouts for slow-moving traffic would be added at three locations on the south side of the Road (near MPs 7.5, 12, and 20) to improve safety and traffic flow (Figure 7). Similar slow-moving vehicle turnouts would be added at two or three locations on the east side of the Park between Siyeh Bend and Rising Sun. The remainder of pullout improvements occur at existing locations (Figure 7). Upgrades include defining parking spaces, improving vehicle and pedestrian circulation, rehabilitating trails, adding transit stops, rehabilitating or adding toilets, and installing exhibits and interpretive information. Historic scenic vistas would be restored at several pullouts following the landscape vista management guidelines currently being prepared. Accessibility codes and standards would be addressed. Other minor improvements to existing unnamed pullouts, such as vegetation clearing or the addition of interpretive exhibits, would occur throughout the Road corridor. Approximately 15 existing gravel pullouts would either be paved or reclaimed. Visitor use improvements at principal parking and pullout locations are described below and are summarized in Table 3 and shown in Figure 7.

Apgar. The Apgar Village area is located just off the Camas Road near the intersection with the Going-to-the-Sun Road. Proposed improvements for this area associated with Road rehabilitation include adding a designated transit stop, improving vehicle and pedestrian circulation, and providing visitors with information and orientation material. These improvements would be located within existing parking areas or other developed sites.

West Side Discovery Center/Transit Center. As previously described for transit service, a new transit staging area and parking facility would be located near Apgar at the planned location of the West Side Discovery Center. The parking facility under

Figure 7. Visitor Use Improvement Locations.

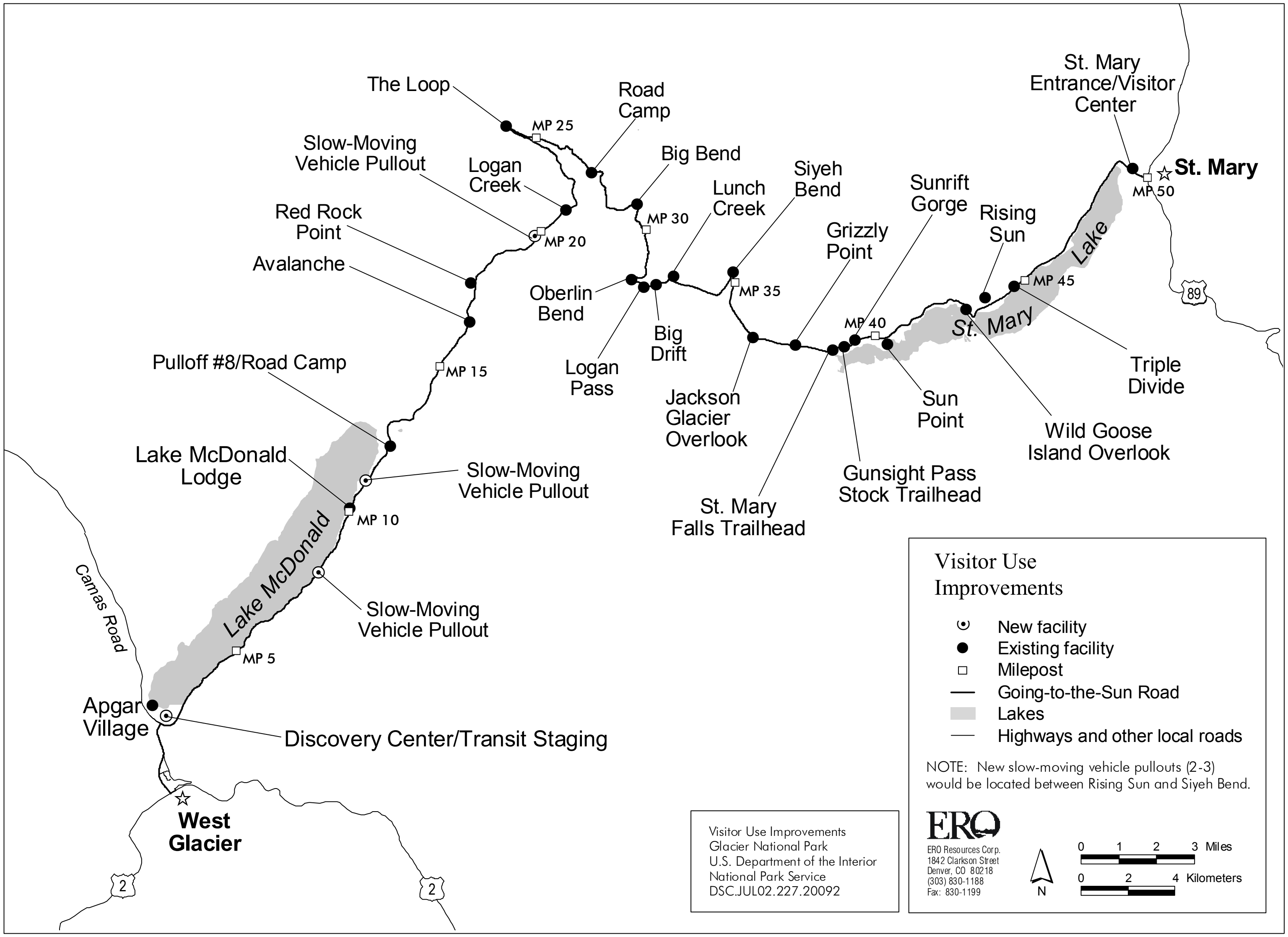


Table 3. Visitor use improvements along the Going-to-the-Sun Road included in Alternatives 3 and 4.

Location → / Improvement ↓	Apgar	Discovery/Transit Center	Lake McDonald Lodge	Pull off #8 / Road Camp	Avalanche	Red Rock Point	Logan Creek	The Loop	Road Camp	Big Bend	Oberlin Bend	Logan Pass	Big Drift	Lunch Creek	Siyeh Bend	Jackson Glacier Overlook	Grizzly Point	St. Mary Falls Trailhead	Gunsight Pass Stock Trailhead	Sunrift Gorge	Sun Point	Wild Goose Island Overlook	Rising Sun	Triple Divide	St. Mary Entrance and Visitor Center
Improve Vehicle Parking & Pedestrian Circulation	X					X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X	X
Provide New Pulloff or Parking		X																							X
Realign Road & Reconfigure Parking																						X			
Improve Site for Oversized Vehicle Turnaround																					X				
Upgrade Entrance Area																									X
Improve Information, Orientation, and/or Interpretation (Including ITS)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Improve Vistas								X	X							X	X	X			X	X			
Rehabilitate Toilet					X		X														X				
Replace Portable Toilet with New Toilet								X				X													
Provide New Toilet		X		X	X					X								X							
Provide or Reconfigure Area for Transit Stop	X	X	X		X			X		X		X			X	X		X		X	X	X	X		
Improve Site For Visitor Staging		X																			X				X
Rehabilitate Trail/Walks					X	X	X		X		X			X	X			X	X	X	X	X			
Provide New Trails/Walks				X						X															
New Disturbance†																									
Acres	*	5	*	0.2	0.1	0.1	0.1	*	0.03	0.2	*	*	*	0.1	0.1	*	*	0.1	0.1	*	*	0.75	*	0.1	0.2
Hectares	*	2.0	*	0.08	0.04	0.04	0.04	*	0.01	0.08	*	*	*	0.04	0.04	*	*	0.04	0.04	*	*	0.3	*	0.04	0.08

*No or incidental new disturbance outside of existing facility.

†A total of about 7.2 acres (2.9 hectares) would be disturbed for visitor use improvements under Alternatives 3 and 4 not including 0.2 acres (0.08 hectares) of disturbance for five slow-moving vehicle turnouts.

Alternative 3 would be about 5 acres (2 hectares) in size to accommodate 110 to 120 parking spaces. A new toilet would be added to this location as well as information services for visitors.

Lake McDonald Lodge. Improvements at Lake McDonald Lodge to aid visitors include the designation of a transit stop within the existing parking lot and a facility to provide orientation and information material for visitors. No new disturbance is needed for these improvements.

Pullout #8/Road Camp. A new vault toilet would be installed at this existing pullout along with improved orientation and information material. A new short (300-foot; 100-meter) trail would be constructed to provide access to the nearby historic Road Camp and adjacent forest. Total new disturbance at this site is estimated to be about 0.2 acres (0.08 hectares).

Avalanche. A number of improvements have been considered in the Avalanche area to improve the quality of visitor facilities at this popular location. Only minor improvements to existing facilities are proposed for Alternative 3 as described below. The NPS will be developing additional rehabilitation plans for the Avalanche area in the future to address other needed improvements.

Proposed improvements include conversion of the NPS residence in the campground to a toilet facility and rehabilitation of the existing picnic area toilet. A roadside transit stop would be designated along with visitor access to Intelligent Transportation System information as described later in this section. Additional visitor information, orientation, and interpretive information would be provided. The existing Trail of the Cedars would be rehabilitated including improved information and interpretive exhibits. Construction of a footbridge across Avalanche Creek would be considered to provide access from the existing parking area to the Trail of the Cedars. Visitor use improvements would be confined primarily to previously disturbed areas, but up to 0.1 acres (0.04 hectares) of new disturbance is possible.

Red Rock Point. This existing roadside pullout is a popular location for visitors to access McDonald Creek. Improvements in vehicle and pedestrian circulation would be implemented within the existing parking area. Information and interpretive materials would be provided for visitors. Existing social trails to the creek would be rehabilitated and a 300-foot (100-meter) defined formal trail would be established to reduce resource damage. Less than 0.1 acres (0.08 hectares) would be disturbed at this site.

Logan Creek. The existing small parking area and vault toilet would be rehabilitated at this site. Visitor safety and access would be addressed by improvements in vehicle and pedestrian circulation. Existing social trails would be rehabilitated and a single formalized short trail constructed. Visitor information and materials would be provided at this site. About 0.1 acres (0.04 hectares) of new disturbance would occur from implementation of these improvements.

The Loop. Proposed improvements to The Loop include reconfiguration of the parking area to improve safety. A crosswalk would be added to provide safe access to the Highline Trailhead located outside of the hairpin corner. Historical viewing and interpretive areas in the center of The Loop would be maintained by selective clearing of vegetation. The pedestrian overlook along the outside of the lower Road would be formalized to provide a safe area for scenic viewing following vista clearing. A permanent toilet would be added to the lower section of The Loop switchback, replacing the existing portable toilet. Included within the reconfigured parking area are separate east- and west-bound transit stops, visitor information, and interpretive material. No new disturbance is anticipated for these improvements.

Road Camp. The existing parking area at this pullout would be modified to improve safety by separating vehicle and pedestrian traffic. The existing trail and stone steps would be rehabilitated and a small viewing platform constructed and interpretation added. Selective vegetation clearing would restore the scenic vista. About 0.03 acres (0.01 hectares) of new disturbance would be needed to implement these improvements.

Big Bend. The Big Bend pullout provides an opportunity to improve the variety and quality of the visitor experience. Proposed improvements include construction of a retaining wall along the existing fill slope to provide room for formalized parking spaces and improved vehicle and pedestrian circulation. East- and west-bound transit stops would be incorporated into the pullout design. Social trails below the parking area would be formalized to reduce impacts to vegetation and provide visitors with a short scenic hike away from the Road. A toilet would be added and a removable kiosk and interpretive exhibits would provide information about the Park. About 0.2 acres (0.8 hectares) of new disturbance would occur with these improvements.

Oberlin Bend. The existing accessible trail at this pullout would be rehabilitated. Interpretive exhibits would be installed along the trail. No new disturbance would be needed to implement these improvements.

Logan Pass. This parking area and visitor center is located at the top of the Continental Divide. During the peak visitor season in the middle of the day, it is often difficult to find a parking space. ITS and transportation options will be explored during construction to help alleviate this problem. A transit stop would be designated within the existing parking lot. Logan Pass will always be open to visitors during Road rehabilitation. The existing portable toilets would be replaced with new vault toilets. Additional interpretive and informational materials would also be added. No new ground disturbances would be needed to implement these improvements.

Big Drift. The Big Drift pullout is an existing informal gravel pullout located just east of Logan Pass. This site is a popular stopping point when the Logan Pass parking lot is full and provides excellent scenic views. Proposed improvements for this site include paving the pullout and improving vehicle parking and circulation

Lunch Creek. Visitor safety would be improved at this existing pullout by separating vehicle and pedestrian circulation. Information and interpretive materials would be added. Approximately 300 feet (100 meters) of an existing social trail would be rehabilitated to provide a formal trail and the remaining trails removed and revegetated. About 0.1 acres (0.04 hectares) would be disturbed implementing trail improvements.

Siyeh Bend. Vehicle parking and pedestrian circulation would be improved at the existing Siyeh Bend pullout. Separate east- and west-bound transit stops would be constructed. A pedestrian walkway and crosswalk for trailhead access would be installed along with rehabilitation of existing trails. New disturbances of up to 0.1 acres (0.04 hectares) would occur with proposed improvements.

Jackson Glacier Overlook. This existing pullout serves as a trailhead for Gunsight Pass and is a popular scenic stop. Vegetation clearing would be conducted to maintain the scenic vista. Pedestrian and vehicle circulation would be separated and a designated transit stop established. Visitor information and orientation material would also be provided at this site. No new disturbance would be needed

Grizzly Point. To improve visitor safety at this existing pullout, the site would be reconfigured to separate vehicles and pedestrians. The scenic view would be restored by clearing vegetation adjacent to the pullout. Information and orientation materials would be incorporated into the design of the pullout. No new disturbance would be needed to implement these improvements.

St. Mary Falls Trailhead. Improvements at this popular trailhead are needed to meet safety concerns associated with the narrow pullout. The depth of the parking area would be expanded and a retaining wall constructed to provide the necessary distance from the Road for safe vehicle entry and exit. This would allow separation of vehicle and pedestrian circulation. A new toilet would be added to this site. A transit stop and information and orientation materials would be incorporated into the trailhead improvements along with rehabilitation of the existing trail. Vegetation clearing would be conducted to improve the scenic vista. About 0.1 acres (0.04 hectares) of new disturbance would occur at this site.

Sunrift Gorge. The Sunrift Gorge pullout provides access to a popular trailhead and the scenic Sunrift Gorge. Parking for visitors would be improved by eliminating unsafe parking areas from the north side of the road and formalizing parking and pedestrian circulation. East- and west-bound transit stops would be incorporated into the pullout. The existing walkways to the area under the bridge and the Sunrift Gorge viewing area on the north side of the Road would be reconstructed to improve pedestrian safety. Information and interpretive material would be added. No new disturbance would be needed to implement these improvements.

Gunsight Pass Stock Trailhead. This small existing gravel parking area provides trailhead access for horse trips and hikes. Proposed improvements include paving and formalizing the parking area to improve traffic flow and safety. Improvements would require relocating the horse ramp and minor trailhead improvements. Less than 0.1 acre (0.04 hectare) of new disturbance would be needed to implement these improvements.

Sun Point. Sun Point is an existing large parking area with picnic facilities, a vault toilet, and trailhead. Several improvements are proposed for this location following use of the area for construction staging. Interpretive exhibits would be added to provide information to visitors. Sun Point would continue to provide RV parking and serve as the oversized vehicle turnaround. A transit stop would be installed in the existing large capacity parking lot. Scenic vistas would be restored by selective vegetation clearing. The toilet would be rehabilitated. Improvements would be located within the existing areas of disturbance.

Information station at Sun Point, August 1951
Photo by D.H. Robinson, GNPA #5882

Wild Goose Island Overlook. Parking and safety improvements at the Wild Goose Island Overlook would require a slight shift in the Road alignment so that all parking sites are located on the south side of the Road. This would eliminate the need for pedestrians to cross the Road to access the overlook. The parking lot east of the overlook would be eliminated and the parking area located west of the overlook would be removed and revegetated. Social trails at the overlook would be formalized to provide multiple viewing locations and to reduce resource damage. A transit stop and interpretive information would be added. Scenic views would be restored by clearing vegetation. Total new disturbance for improvements to the Wild Goose Island Overlook would be about 0.75 acres (0.3 hectares). The abandoned parking area (0.1 acres; 0.08 hectares) would be removed and restored with native vegetation.

Rising Sun. Improvements at this location include the designation of a transit stop and additional information and interpretive materials. All improvements would be located within existing developed areas.

Triple Divide. Modifications to this small existing roadside pullout include improvements to parking and traffic circulation. Interpretative materials and information would be added. Less than 0.1 acre (0.04 hectare) of new disturbance would be needed to implement these improvements.

St. Mary Entrance and Visitor Center. The entrance station would be rehabilitated to meet building and accessibility codes and standards. A new information orientation pullout (5 to 7 vehicles) with information and orientation materials similar to the recently completed West Entrance orientation pullout would be constructed just west of the entrance station. The St. Mary Visitor Center (exhibits, audiovisual, etc) would be rehabilitated as part of the mitigation program. Access to the parking areas and visitor staging for transit service would be improved. About 0.2 acres (0.08 hectares) would be disturbed to implement these improvements.

Trail Improvements

A total of about 1 mile (1.6 kilometers) of new short trail segments would be located adjacent to the Road. These roadside trails would connect existing Park facilities and provide access to features or attractions where feasible. Other trailheads and social trails where resource damage has occurred near pullouts and parking areas would be rehabilitated, protected, or restored.

Visitor Orientation, Information, and Interpretation

A variety of orientation, information, and interpretive measures would be implemented to improve the quality of the visitor experience both during and after Road rehabilitation. Proposed improvements in visitor communication include new orientation stations, information kiosks, interpretive exhibits, additional signs, and an ITS.

Exhibit along Going-to-the-Sun Road

Orientation Stations and Information Kiosks. An orientation station would be located near the East Entrance Station of the Going-to-the-Sun Road in a roadside pullout to assist visitors when they enter the Park as previously described as part of the improvements near the St. Mary Visitor Center. Information kiosks would be located at several popular visitor use sites such as major trailheads, staging areas, and visitor centers. Orientation stations and information kiosks would provide information on Park features and attractions, schedules for educational programs or tours, special events information, and updates on rehabilitation work and traffic delays. The stations may be equipped with interactive real-time computer terminals to answer questions and provide recommendations about specific times of day to see attractions, avoid crowds, and experience the Park.

Interpretive Wayside Exhibits and Signage. Exhibits would provide site-specific interpretive and educational information to enhance the visitors understanding of Park natural, cultural, and historic resources. Interpretive exhibits may include information on geologic features, wildlife, ecosystems, and history. Interpretive opportunities include exhibits and information on American Indian cultural heritage. Exhibits also may be used to explain the history of the Going-to-the-Sun Road construction and the planned rehabilitation work to restore damaged sections of the Road. Wayside interpretive exhibits may be installed at locations such as Avalanche, Big Bend, Baring Creek, Lake McDonald, Siyeh Bend, Jackson Glacier Overlook, and other sites. GNP is beginning a Park-wide comprehensive interpretive plan that will be completed in the fall of 2003. Park-wide interpretive themes and the Comprehensive Interpretive Plan will guide the identification and selection of wayside exhibits and other interpretive materials to tell certain elements of the Park's stories at appropriate locations. Orientation and informational signage will assist visitors with other needs at selected locations along the Road and throughout the Park.

New or updated roadside signs would be used to better communicate the location of Park attractions, distances, and direction. Real-time signage may be used during rehabilitation work to provide information on transit schedules, traffic delays, and parking.

Intelligent Transportation System. An ITS would be implemented to provide information on parking, safety, rehabilitation work, interpretation and orientation, traffic, operations and maintenance, and visitor services. An ITS is a computerized network linking information sources at locations throughout the Park with connections to the Internet. A fiber optic cable would be laid under the Road with real-time information provided at selected locations such as the orientation stations and kiosks previously described. The ITS would be designed to enhance communications before, during, and after rehabilitation. The fiber optic cable would also provide for improved telecommunication for Park staff.

The ITS would provide an important management tool for use during rehabilitation. Traffic volume information would be collected electronically and used to coordinate traffic control and provide efficient traffic flow on the Road. ITS information also would include location of work sites, current delays, road and weather conditions, transit schedules, and interpretive information on the rehabilitation. Transit stops would be equipped to provide real-time information to the visitor on the actual wait times for the next transit vehicle. The ITS also would produce visitor and vehicle data to allow Park staff to adjust operations to best meet the needs of the visitor while protecting Park resources.

Communication with Visitors during Rehabilitation. Timely and accurate information will be a key component to providing a quality visitor experience during Road rehabilitation. Both the Park and the local tourism community would have a role in providing clear and concise information on the status of rehabilitation work. A variety of methods would be used to communicate information to Park visitors including:

- Interactive information on the Glacier website
- Links to the Glacier web page from other government web pages, prominent travel information web pages, and local governments, chamber of commerce, business, and tourism web sites
- Attachments sent in response to requests for information on the Park
- Public service announcements on local radio stations
- Enhanced ITS radio system in the Park
- Messages on local cable access channels
- Variable message signs along the Road
- Handout information provided at entry stations
- Messages and real-time data supplied by the ITS at visitor centers, orientation stations, and wayside interpretive exhibits
- Articulate and well-informed traffic flaggers

Mitigation for Alternative 3

Three categories of mitigation strategies would be implemented to minimize impacts on visitors and the local and regional economies in addition to the mitigation common to all alternatives described later in this chapter. These strategies address impacts on visitor access, visitor experience, and visitation levels and the local economy.

Mitigation Strategies for Impact on Visitor Access

Traffic management and increased transit service during rehabilitation have been incorporated into Alternative 3, as previously described. These measures are intended to maintain visitor access to the Road and its attractions at levels as near to normal as possible during the rehabilitation project.

Mitigation Strategies for Impacts on the Visitor Experience

Improvements to visitor facilities and services were identified as potential mitigation strategies for impacts to the visitor experience in both the community leader workshops (WIS 2001b) and the business survey (WIS 2001d). The range of ideas presented was broad: more programs and hikes originating at the visitor centers, improved trails and campgrounds, improved customer service, major upgrades to existing facilities and construction of new facilities. A common suggestion was to turn the Road rehabilitation process itself into a positive part of the visitor experience.

Road rehabilitation in Alternative 3 would have a direct impact on the visitor experience because of disturbance to existing uses of the Road and of facilities along the road. As mitigation for these impacts, a variety of orientation, information, and interpretive measures would be implemented. These would be implemented during construction to improve the quality of the visitor experience. These measures include orientation and information stations, interpretive wayside exhibits and signage, an ITS, and a visitor communications program.

Mitigation Strategies for Impacts to Visitation Levels and Local Economic Activity

A reduction in visitation to GNP during rehabilitation is a great concern to business and community interests. Visitor expenditures are very important to the local economy in northwest Montana and southwest Alberta, Canada, and periods of reduced visitation in the past have affected local employment and income, imposed economic hardship on tourist-oriented businesses, and hampered the economic development of the communities that depend on them.

Socioeconomic studies and surveys (WIS 2001b, WIS 2001d), which included workshops with local businesses, devoted considerable attention to identifying actions that would address the potential for reduced visitation during Road rehabilitation by:

- Enhancing other Park and local facilities to compensate for disruptions to the Road
- Promoting visitor development for the Park and other regional attractions
- Creating opportunities for visitors to stay longer

Recommended Visitor Development Strategies. Public input to the CAC on the issue of economic development impact mitigation resulted in the recommendations issued in the final report of the CAC (NPS 2001a). The CAC focused first on a set of "visitor development strategies," based on its review of the business survey (WIS 2001d), and then on a list of 15 "specific visitor development strategies," included in the *Socioeconomic Study* (WIS 2001b). Table 4 presents a summary of these recommendations grouped by category.

Visitor Level and Local Economic Impact Mitigation Incorporated in the Alternatives. Visitor development strategies such as those listed above are among the most difficult to pursue for a variety of reasons. Some call for actions by the NPS that may be constrained by existing management plans, authorizations, or budgets. Some are broad-based efforts that require leadership, planning, and concerted action among many institutions of various types within the community. Some may involve the coordination of policies at all levels of government—from local, to state, to national. Given these complexities, economic development impact mitigation is often developed independently and the desired effects may be difficult to achieve.

Despite these difficulties, a number of the visitor development strategies proposed by the CAC have been incorporated into Alternative 3 as described below. The estimated cost for these improvements is approximately $17.7 million. Implementation of these measures is dependent on available funding, but priority would be given to development of transit staging areas at the West Side Discovery Center and the St. Mary Visitor Center and providing improved information services to visitors during rehabilitation.

- Construction of a West Side Discovery Center and transit staging area near Apgar at the site selected in the GMP. This facility would be located near the intersection of the Going-to-the-Sun Road and Camas Road. Development of this site would require reconfiguration of the intersection and improved linkages with the village of Apgar, Apgar Campground, and existing roads. The estimated total cost for these facilities is about $10 million. Public transportation staging, parking, utilities, and vehicle and pedestrian circulation covered by this Plan would cost approximately $6 million.
- Development of a transit staging area within the existing St. Mary Visitor Center parking lot. Rehabilitation of the St. Mary Visitor Center exhibits would include information on the Lewis and Clark expedition and enhancement of other visitor services. The estimated cost for these improvements is about $2 million.

Table 4. Visitor development strategies recommended by the Citizens Advisory Committee.

Strategy Type	Strategic Recommendation
Facility Strategies	• Upgrade historic hotels in GNP • Upgrade existing and construct new amphitheaters in GNP • Construct West Side Discovery Center • Upgrade public transportation to and through GNP • Upgrade and construct amphitheater outside GNP • Improve roads adjacent to GNP
Visitor Development Strategies	• Augment staff and information services for visitors during Road rehabilitation • Improve East Side Visitor Center exhibits • Broaden services at GNP visitor centers • Promote the development of tourism services on Highways 49, 89, 17, and 2
Marketing Strategies	• Use Lewis & Clark Bicentennial Commemoration to promote GNP attractions other than the Road • Improve Internet links to regional events, attractions, and resources • Refocus visitor prospect information on GNP attractions other than the Road • Develop travel industry partners to jointly market GNP • Hire national figure as marketing spokesperson • Upgrade media relations • Promote Blackfeet and Flathead heritage tours, events, and resources • Promote interest in GNP attractions other than the Road • Promote Waterton-Glacier International Peace Park heritage tourism
Organizational Strategies	• Improve "customer service" at GNP through hospitality training and Montana Super Host Program • Use NPS Ambassador Program effectively at GNP • Coordinate with local visitor development organizations • Support Blackfeet Nation efforts to designate Highway 49 a Scenic Byway • Schedule Road rehabilitation around the Lewis & Clark Bicentennial Commemoration • Jointly promote GNP Centennial and Lewis & Clark Bicentennial Commemoration

- Broaden the services provided at visitor centers to improve communications about construction status and potential alternative activities inside and outside the Park. These services would cost approximately $70,000 annually ($560,000 total) for two staff positions, new publications, exhibits about Road construction, and a video on Road rehabilitation.
- Development of information and the addition of staff to improve the experience of visitors stopped on the Road. This would cost about $115,000 annually ($920,000 total) for seven staff and communications equipment not including other indirect costs.
- To alert the public and the media to the potential for travel delays during Road rehabilitation, the Park would activate a public information program to aid visitors and local businesses. The estimated annual cost of this strategy is approximately $40,000 ($320,000 total) for a seasonal public information specialist.
- The NPS would interact with local communities and tourism agencies to develop marketing strategies during

rehabilitation. A variety of measures would be used to improve communications with the public and promote the range of options available to visitors. Anticipated actions include using the Intelligent Transportation System and Internet to inform visitors about regional events and attractions in local communities, Blackfeet and Flathead heritage tours and events, and other attractions in Glacier and Waterton Parks.

- The Park also would participate in organizational strategies with local visitor development groups to promote the Lewis & Clark Bicentennial and the GNP Centennial and support designation of Highway 49 as a Scenic Byway.

Potential Community-led Economic Impact Mitigation. The remaining visitor development strategies proposed as economic impact mitigation are those most difficult to pursue. They demand broad-based participation within the community and policy coordination at different levels of government. These strategy options, although not currently eliminated from consideration, have not been directly incorporated in the alternatives because they are beyond the authority of GNP and the NPS.

Most of these strategies have the potential to trigger visitor activity that would potentially offset any negative impacts of the Road rehabilitation "only if business and local economic and tourism development organizations have confidence in, adopt and adapt the actions to fit their circumstances. They are the ultimate implementers" (WIS 2001b). There have been several interim work sessions between local economic and tourism development specialists to review and prioritize the ideas (WIS 2001b). The outcome of this process has yet to be determined. However, considerable potential remains, especially if the State of Montana, the Province of Alberta, Canada, and the local communities adopt some of the CAC's recommendations as part of a larger, coordinated economic development strategy. The Park intends to support a business planning process to assist community leaders in formulating marketing and visitor development strategies by requesting additional funding to participate in these efforts.

ALTERNATIVE 4—ACCELERATED COMPLETION WITH ISOLATED ROAD SEGMENT TRAFFIC SUSPENSIONS (ACCELERATED COMPLETION)

The objective of the Accelerated Completion alternative is to complete rehabilitation of the Going-to-the-Sun Road as quickly as possible by using isolated traffic suspensions during the week in construction zones and maintaining visitor access on the weekends. This alternative would implement Road repairs over 6 to 8 years, with a time savings of about 1 to 2 years over Alternative 3. The rapid completion of rehabilitation would ensure that further Road deterioration and damage to historic, cultural, and environmental resources would be minimized. Alternative 4 includes all of the rehabilitation work necessary to repair the Road, improvements in visitor use facilities (the same as Alternative 3), and expanded transit service during rehabilitation (the same as Alternative 3). This alternative allows for advanced planning for completion of design and engineering and is the most efficient alternative from the construction standpoint because traffic suspensions allow for concentrated work efforts without the need to maintain traffic flow through construction zones.

Scheduling and Funding

Rehabilitation of the Going-to-the-Sun Road under the Accelerated Completion alternative would take from 6 to 8 years. The total cost for implementing rehabilitation repairs, including transit service during rehabilitation, visitor use improvements, and mitigation measures, would range from $126 million to $144 million over the construction period (Table 2). This includes $17.7 million for visitor use and socioeconomic mitigation measures for construction of the West Side Discovery Center, rehabilitation of St. Mary Visitor Center, installation of an ITS, and other visitor service measures. Implementation of expanded transit service would cost about $8.3 million during the rehabilitation period including start-up costs and annual operation. Projected operation and maintenance costs for the Road following rehabilitation would be about $1.5 to $1.9 million. This alternative provides the lowest cost and shortest rehabilitation schedule of the alternatives under consideration.

Traffic Management

Visitor access along the Going-to-the-Sun Road between West Glacier and St. Mary would remain open throughout the peak visitor season from spring to the third Monday in October subject to construction delays and suspensions. Traffic management under the Accelerated Completion alternative would allow for traffic on the entire Going-to-the-Sun Road, three days per week from Friday through Sunday (Table 2). During this period, traffic delays would be limited to a cumulative maximum delay of 30 minutes over the length of the Road. From Monday through Thursday, visitor traffic would be suspended on Road segments undergoing rehabilitation. Road segments not under rehabilitation, including access to Logan Pass from at least one side of the Park, would remain open for motor vehicles, pedestrians, and bicycles. At a given time, about 40 miles (65 kilometers) or 80 percent of the Road would remain open to visitor access. Road rehabilitation would be conducted at night, where feasible, to facilitate rapid completion of work. Night work would be scheduled in advance to alert the public to possible traffic delays in construction zones.

Transit Service During Rehabilitation

Transit service for Alternative 4 would be the same as for Alternative 3 and includes 12 active vehicles operating at 30-minute intervals. Shuttle vehicles

Concessioner buses at Golden Staircase
Photo by T.J. Hileman, GNPA #3082

would operate between the Discovery Center transit staging area and the St. Mary Visitor Center with approximately 17 stops at popular locations along the Road corridor.

Operations and Maintenance

Expanded operations and maintenance measures would be implemented for the Accelerated Completion alternative as described for Alternatives 2 and 3.

Visitor Use Improvements

Proposed visitor use improvements for the Accelerated Completion alternative are the same as those described for Alternative 3. Improvements to parking, pullouts, scenery and views, trails, toilets, and visitor orientation, information, and interpretation would be implemented.

Mitigation for Alternative 4

The increased intensity of rehabilitation work under Alternative 4 merits the activation of a public information program and implementation of other socioeconomic measures as described for Alternative 3. No additional mitigation actions are proposed for Alternative 4.

ACTIONS COMMON TO ALL ALTERNATIVES

Each of the alternatives would use similar construction techniques, mitigation measures and follow the same design standards for rehabilitation, including drainage, slope stability, roadway surface, retaining walls, guardwalls, and other features. On-going and currently planned rehabilitation work on critical retaining walls would continue for all alternatives.

This section includes a description of each of the principal Road segments and the types of rehabilitation-related work required, other common improvements, and mitigation measures incorporated into the project.

Proposed Rehabilitation Work by Road Segment

The entire Going-to-the-Sun Road needs to be rehabilitated. Completion of the extensive rehabilitation work would take several years no matter which alternative is selected. To guide rehabilitation work and prioritize efforts for the most critical locations and repairs, the *Engineering Study* (WIS 2001a) prioritized Road segments and the types of rehabilitation work that should be completed first (Table 5 and Figure 2). There are five principal segments of the Road, each with special characteristics and different rehabilitation requirements. Priorities for rehabilitation work listed in Table 5 are expressed by assignment of a 1 through 5 rating, with 1 being the highest priority.

The Alpine section of the Road is the highest priority for all categories of rehabilitation work. This is also the most difficult area in which to work because of the narrow roadway, steep slopes, and short work season. The *Engineering Study* identified 190 individual repairs for this 11-mile (18-kilometer) segment of the Road. The West Tunnel and Baring Creek segments of the Road also require extensive high and moderate priority repairs. The lower elevation segments of the Road along Lake McDonald and St. Mary Lake are the lowest priority and require the least amount of rehabilitation because they experience less distress from the

Table 5. Rehabilitation priority by Road segment and milepost (MP).

Rehabilitation Work	Lake McDonald MP 0.0-16.2	West Tunnel MP 16.2-23.4	Alpine MP 23.4-34.2	Baring Creek MP 34.2-43.2	St. Mary MP 43.2-49.7
Drainage	5	2	1	4	3
Slope stability	5	3	1	2	4
Retaining walls, arches, and tunnels	4	2	1	3	5
Guardwalls	4	2	1	3	5
Roadway pavement	4	2	1	3	5

natural elements and they have already undergone partial rehabilitation in recent years.

The following discussion provides an overview of each of the road segments and proposed improvements. Appendix A provides a detailed list of proposed Road improvements by Road segment and milepost.

Lake McDonald. The 16.2-mile (26-kilometer) Lake McDonald segment extends from the Park boundary at the bridge over the Middle Fork of the Flathead River near West Glacier to Avalanche Creek (Figure 2). The general condition of this section of the Road is fair to good. Asphalt paving was conducted on portions of this segment during the 1990s. Areas of slope instability between MP 6.4 and MP 9.1 require continued monitoring and possible future roadwork should slumping of the roadway accelerate. Minor repair work is needed on several retaining walls and guardwalls. Maintaining adequate fish passage would be addressed when replacing culverts at stream crossings.

West Tunnel. The 7.2-mile (12-kilometer) West Tunnel segment of the Road extends from Avalanche Creek to the West Tunnel (Figure 2). This section of the road is in fair to poor condition. Repairs to drainage structures are needed at many locations such as Logan Creek, Haystack Creek, and Alder Creek. Reconstruction of the outside edge of the roadway is needed in several locations because of slope instability. Retaining walls need repair and repointing, and a failed wall needs rehabilitation.

Alpine. The 11-mile (18-kilometer) Alpine segment from the West Tunnel to Siyeh Bend is the most critically in need of extensive rehabilitation (Figure 2). Road conditions throughout this section are generally poor. Proposed drainage work includes cleaning existing drainage structures, installing new cross drains and culverts, improving road surface drainage, installing erosion control measures at culvert outlets, and repairing other roadside ditch and drainage features. Stabilization of eroding cut slopes is needed in several locations, and selective rock scaling would be used to reduce safety hazards.

Within this segment of the Road, there are about 90 stone retaining walls in fair to poor condition. Several of the critically damaged walls are currently under repair and rehabilitation of the remaining walls would be conducted according to prioritized need. Damaged guardwalls throughout this section would be reconstructed or rehabilitated as needed. Roadway foundation work to provide for adequate drainage and to maintain the height of guardwalls would be required. The pavement would be resurfaced to stabilize the roadbase and seal the surface following completion of other repairs.

Baring Creek. The Baring Creek section is about 9 miles (15 kilometers) long and extends from Siyeh Bend to Rising Sun (Figure 2). This section of the Road is in fair to poor condition. Drainage work would include improvements to road surface drainage, cleaning and replacement of culverts, and correction of subsurface infiltration into the roadbase. There are fewer retaining walls and guardwalls in this section, but several would be repaired to correct stone displacement, sinking, and general deterioration. Roadway foundation repair and repaving or chip seal would be used to protect the surface from moisture intrusion.

St. Mary. The 6.7-mile (11-kilometer) St. Mary segment of the Road follows St. Mary Lake from Rising Sun to the Park boundary at St. Mary (Figure 2). This section of the Road was rehabilitated in the 1990s and is in fair to good condition. Miscellaneous culvert and structure repairs are needed to correct drainage deficiencies. Correction of wave action at the toe of the existing road slope is needed to prevent further erosion. Repairs to short segments of retaining walls and guardwalls are needed where walls are leaning or deteriorating. Bank stabilization at a significant archaeological site is needed to prevent undercutting, scouring, and slumping caused by past road construction activities.

Flooding in the vicinity of the Divide Creek Bridge and surrounding lands near St. Mary has been an ongoing concern (Figure 2). Several measures to prevent future flooding and resource damage were evaluated in the GMP. The Preferred Alternative includes relocation of Park employee housing and administrative and maintenance facilities. These structures and associated activities would be moved out of the flood hazard zone of Divide Creek in St. Mary to another location as funding allows. The *Engineering Study* (WIS 2001a) did not develop specific plans for Road rehabilitation between the Divide Creek Bridge and the St. Mary Visitor Center. Previously, several options have been evaluated to protect the Going-to-the-Sun Road from flood-related damage. The current plan is to stay with the existing Road alignment and construct low water crossings or culverts to improve drainage, allow improved dissipation of flood flows, and reduce potential impacts to the Road.

Road Rehabilitation Techniques

Rehabilitation of the Going-to-the-Sun Road involves a variety of repairs and improvements to structural features and the adjacent roadside. The majority of roadway repairs would occur within the previously disturbed roadway prism, which includes the pavement, shoulders, parking, and cut and fill slopes. Substantial areas of new disturbance are not anticipated because the existing Road alignment and width would remain unchanged. Temporary disturbance outside of the existing roadway prism may be necessary to provide construction access to the base of retaining walls or to facilitate necessary repairs, such as installation of culvert outlet protection. Following repairs, all disturbances within and outside of the roadway prism would be revegetated or reclaimed using native plants or structural material as appropriate.

For all alternatives, rehabilitation of historic structural features would be conducted to preserve the significant historic features that contribute to the Roads integrity and status as a National Historic Landmark. Key recommendations for preservation and rehabilitation of historic features identified in the *Cultural Landscape Report* (RTI 2002) include:

- The existing roadway alignment and width are an integral element of the Road's historic significance and would be preserved.

- Remaining historic retaining walls and guardwalls would be preserved or rehabilitated in place.
- Rehabilitation of masonry walls would be done using material and techniques to replicate historic conditions.
- Historic bridges would be preserved.
- Existing historic culvert headwalls would be preserved and maintained if possible and new ones would be designed to use or simulate historic stonework.
- For all features, both historic design specifications and historic design philosophies (qualities such as texture, curvature, and rock sizing) would be adhered to.

Engineering design, rehabilitation techniques, and materials would be selected based on a long life cycle and operation and maintenance considerations. A long life cycle indicates the intent to use high quality materials and construction methods to ensure that Road repairs last and that maintenance requirements are minimized. The actual life cycle would vary with the structure or material, but a life cycle of 20 or more years is expected from most components, except surface paving. The following discussion provides a description of the types of repairs and techniques that would be used to rehabilitate the Road.

Drainage Improvements

Inadequate roadway drainage is the greatest cause of the continued deterioration of the Road and its structures. A number of improvements to drainage structures would be used to protect the structural integrity of the Road, its associated historic features, and the adjacent natural resources. Measures would be implemented to prevent water intrusion into the Road subbase and to channel water away from structural features. Pavement would be sealed to prevent water from entering the roadbase. In areas where the roadway has sunk due to water intrusion, the existing roadbase would be rebuilt by removing all unsuitable roadbase material and replacing it with suitable material in layers separated by geotextile fabric. Cross-drains, which are grate covered trench drains across the road surface, would be added where necessary to catch sheet flow and direct water across the roadway.

Improving roadway drainage would require the replacement or addition of new culverts. Where the culvert inlet or outlet is located in a historic wall, work would be conducted according to historic and cultural resource standards. New culverts may be used in some locations near existing undersized culverts to avoid impacts to historic features. Culvert replacement would most likely require traffic suspension because culverts cross both lanes. Installation of culvert linings would be considered as an option to replacement in select locations and this work could be done with minimal traffic disruption. Appropriate energy dissipating culvert outlets would be installed to dissipate flows and reduce erosion. Replacement culverts would be designed to accommodate fish passage where appropriate.

Inadequate drainage inlets and outlets would be replaced during roadway rehabilitation. Where inlets are located on the traveled roadway, historically appropriate cover grates suitable for bicycle traffic would be used. Drainage outlets in historic stone masonry walls would be constructed to maintain the historic character. Log barriers or other suitable material would be used to protect vehicles from inadvertently entering drainage inlets.

Slope Stability Improvements

The steep precipitous rock cuts adjacent to portions of the Road create a potential safety hazard. Rock scaling would be selectively used to loosen and remove boulders and loose material before it dislodges and falls to the Road. Scaling would only be conducted within the existing Road prism and would not extend beyond areas of previous disturbance unless a significant and obvious safety hazard is present. The historic visual characteristics of the Road would be considered when undertaking this work, and efforts would be made to minimize impacts to visual quality and plant communities. While rock scaling can reduce rockfall hazard, it cannot eliminate all risk along the Road.

A variety of environmentally sensitive techniques would be used to stabilize eroding cut slopes including revegetation and structural measures to hold the soil in place, capture moisture, and facilitate revegetation. A number of measures would be used to repair and stabilize steep fill slopes, including use of retaining walls, reinforced earth, and tiebacks or micropiles. In addition, outlet protection would be added where drainage outfalls are eroding the fill slopes.

Slope creep is generally confined to the outside lane of the Road and would be repaired by periodic repaving or, in more severe cases, structural measures. Techniques that would be used to protect the Road from slump failures include the construction of reinforced earth, tieback anchors, and subsurface drainage. Final design of these measures would follow further geotechnical investigations.

Measures to protect or minimize potential impacts from debris flows include installation of improved culverts, signage, and possible temporary road closure during high runoff events to protect visitors.

Avalanches are common throughout the steep high elevation portions of the Road. Techniques to reduce avalanche damage to Road structures include the selective use of avalanche resistant guardwalls, removable guardrails, and barrier rock as currently used at several locations.

Retaining Wall Improvements

FHWA has identified about 130 masonry retaining walls on the Road, many of which are in need of repair. Repairs would include correction of footings, drainage facilities, repointing of masonry, and other repairs. For many of the retaining walls, only the top 3 to 8 feet (1 to 2.4 meters) are damaged and would be rehabilitated. The design for each wall would depend on site-specific conditions, with consideration of geometric configuration, safety, and historic values. The preferred techniques being used to stabilize retaining walls would continue to be those that minimize disturbance to historic fabric and interference to visitor traffic. Principal repair techniques may include rebuilding the roadbase, constructing a concrete slab anchored with micropiles or tieback anchors, or stabilizing the backfill in place by high-pressure injection of high-strength grout directly through the face of the rock wall. Where retaining walls and their foundations have substantially deteriorated, additional techniques would be used.

There are currently several reinforced concrete retaining walls with partially finished stone veneer. The stone veneer varies in consistency and visual appearance from the original stone masonry work. Options for these walls include:

- Completing the remaining rock veneer work
- Removing the existing veneer, adding a footing extension to the retaining wall where practicable, and facing the concrete wall with a historically appropriate pattern

Guardwall Improvements

There are about 7 miles (11 kilometers) of stone masonry guardwalls along the Road. Many of the original guardwalls have experienced significant mortar deterioration, foundation failure (leaning or sinking), stone displacement and deterioration, and water intrusion. Guardwalls have also experienced damage from annual snow clearing operations. Rehabilitation of the guardwalls would require the use of a variety of different techniques depending on the location and conditions for each specific site. Guardwall work would include:

- Repointing and patching of damaged or deteriorating guardwalls
- Lowering the existing roadway to expose the historical height of the guardwall and providing adequate drainage
- Raising guardwalls where lowering the roadway is not possible
- Removing and reconstructing sections of guardwalls that have advanced foundation failure and/or loss of significant sections of stone
- Constructing reinforced concrete footings under new or replaced guardwalls
- Constructing avalanche resistant concrete core guardwalls
- Installing removable timber guardrails (with steel backing) in selected avalanche-prone locations

Tunnel Improvements

Tunnels are in generally good condition, but repair work on the West Tunnel is needed where the rock veneer is sloughing off and concrete is exposed. This would require stone masonry work to repair and replace damaged rock veneer. Additional stabilization or protection measures would be used on the side portals.

Roadway Improvements

The roadway itself requires rehabilitation in many locations to correct deficiencies in the roadbase, damaged pavement, and safety concerns. The roadway alignment and width are integral elements of the Road's historic significance and would be preserved. Minor deviations in roadway alignment and width would be used in a few select locations where the safety of visitors or Park staff may be compromised. This includes several low elevation sites at pullouts, trailheads, pedestrian crossings, and areas with unstable ground. Minor curve widening and a shift in the centerline would occur at the Wild Goose Island Overlook to improve parking and visitor safety. To prevent the deterioration of the edges of the roadway from over-sized vehicles leaving the pavement, an additional 1 to 2 feet (0.3 to 0.7 meters) of pavement widening would be used on select curves in the Lake McDonald, Baring Creek, and St. Mary segments of the Road. Approximately 15 informal gravel pulloffs that have developed over time will either be removed and revegetated, or paved.

Several techniques would be used to provide long-term correction of damaged roadway segments depending on the severity of the damage. Areas where unsuitable roadbase material is present would require excavation and replacement with suitable material. In some locations, construction of a concrete slab across all or a portion of the roadway, which would be anchored with a combination of micropiles and tiebacks, is needed.

Different types of resurfacing would be used based on the specific conditions for each segment of the Road. It is anticipated that a hot asphalt mix would be used, but new asphalt technology is advancing and new mixes regularly emerge. An overlay would be used for lower elevation sections of the Road along Lake McDonald and St. Mary Lake. Because of the advanced deterioration of the Road at higher elevations and the need to retain the historic guardwall and rail heights, milling and resurfacing would be required. Resurfacing options that would be used depending on the location and site-specific conditions include:

- Chip seal of the surface for areas not requiring repairs to the roadway foundation
- Overlay of the existing structure with additional layers of pavement; in locations where past surfacing has raised the road surface and reduced the effectiveness of guardwalls, it would be necessary to remove the asphalt and/or road base prior to resurfacing
- In areas of deteriorated pavement and where repairs are needed to the roadway foundation, existing pavement and part of the base material would be removed and replaced with suitable base material; waste material would be hauled to a suitable stockpile location, and processed for reuse in roadway rehabilitation or recycled into the new asphalt pavement

Utilities Associated with the Road Corridor

Road rehabilitation would be coordinated with other utility work (water, sewer, telephone, power, ITS, fiber optics) located within the Road corridor to minimize disruption in traffic and disturbance to Park resources. The majority of the utility work would occur within the lower elevation portions of the Road.

Vegetation Management

Roadside vegetation management would be used to restore the Road's historic scenic vistas and improve safety and sight distance for motorists. Vista restoration would occur at locations identified in historical plans and photographs. Vegetation clearing would be implemented at locations scattered along the length of the Road, primarily at lower elevation sites including along Lake McDonald, McDonald Creek, The Loop, Jackson Glacier Overlook, Sun Point, and forested areas where dense roadside vegetation is present. In addition, woody vegetation that has become established within the masonry stonework of retaining walls and other structures would be removed to prevent weakening of the foundation, water intrusion, and damage to historic features.

Vegetation would be managed in accordance with previous documents, including the GNP *Roadside Maintenance Guidelines* (NPS 1993b), which covered the "maintenance of vistas and sight distance clearings within the road prism" for all Park roads. A categorical exclusion was issued for this work on May 19, 1999. The *Vista Design Clearing Guidelines* (NPS undated) and the *Cultural Landscape Report* (RTI 2002) would also direct vegetation management. Landscape and vista management guidelines are currently being prepared to guide the location and extent of vista clearing.

Construction Staging During Rehabilitation

Staging areas are required during road rehabilitation to provide space for storage of materials, maintenance and dispatch of equipment, establishment of construction office facilities, and parking for construction workers. The proximity of staging areas to the work sites affects travel cost and the efficiency of the time and cost of the construction operations. Coordinating staging areas with construction sequences also minimizes damage to completed rehabilitation work. It is anticipated that the majority of staging operations would be located outside the Park for Alternatives 2, 3, and 4 because of the limitations in available space within the Park. The location for staging areas outside the Park would be determined during pre-construction negotiations with a construction contractor.

Within the Park, several small staging areas are available. Logan Pit, an existing maintenance storage area near Avalanche, would be used for material stockpiling, sorting, loading and delivery, precasting, fabrication, and equipment maintenance (Figure 2). This site is currently being used as a staging area for Road repair work and a maintenance yard. On the east side of the Park, Sun Point would be used as a staging area. Sun Point is an existing large parking area and adjacent picnic area used for construction staging during original construction of the Road. A portion of the roadway and disturbance area within a rehabilitation work zone and existing pullouts also would be used for staging materials and equipment.

Material Sources

Original stone used for masonry work along the Road was obtained from within the Park but stone from outside of the Park has been used at times in recent years for repair work. Rehabilitation of masonry walls would require the collection of additional stone material, preferably from within the Park. Planned sources for acquiring suitable stone include naturally occurring rock fall material and material gleaned from rock scaling operations. Furthermore, the Park currently has about 2,800 tons of imported rock that was quarried and shaped for use on the Road. The use of rock sources outside of the Park would be considered if sufficient material is not available from within the Park. If needed, fill material would come from approved borrow sites located outside of the Park. Concrete batch plants may be located in the Park, but there would be no asphalt batch plants in the Park.

Water for dust abatement, compaction, and other contractor operations would be needed. Anticipated water sources include pumping from streams, lakes, and withdrawing from the Park water system. The specific source, timing, and amount of water withdrawal would be determined prior to each phase of construction

Traffic Management and Visitor Access During Construction

Traffic management is one of the key distinctions between the rehabilitation alternatives as described previously in this chapter. However, several traffic management methods are applicable to all alternatives depending on the type of rehabilitation work. Traffic management would involve a combination of four primary traffic management methods:

- **Alternating One-Ways**—Work is restricted to one lane while the other lane is kept open for traffic. Traffic is allowed to flow in one direction while the other direction is stopped. When a specified time elapses, or when the traffic queue clears the site, traffic is allowed to flow in the opposite direction.
- **Intermittent Stops**—When only short periods are needed for work on both lanes of the Road, intermittent stops are most effective for controlling traffic and minimizing delays.
- **Two-Way Stops**—When work must be performed on both lanes of the Road, traffic is stopped in both directions for an hour or more while the work is executed. Traffic remains stopped in both directions until both lanes are available for traffic.
- **Traffic Suspension**—Certain operations that encompass the entire roadway width would require sustained traffic suspension on isolated segments of the Road.

Table 6 provides an example of traffic control measures that would be needed for different types of rehabilitation work.

Visitor access to the Road during rehabilitation work would be similar for all alternatives, including No Action. Segments of the Road not under rehabilitation would be open to motorists, bicyclists, and pedestrians, subject to existing restrictions. Gates with vehicle turn-arounds would be located at about 14 different locations along the Road to control visitor access to construction zones. At any given time, it is expected that at least 40 non-contiguous miles (65 kilometers) of the 50-mile (80-kilometer) Road would remain open to visitors. Logan Pass would remain accessible from at least one direction during rehabilitation, and the Road would be accessible during the Lewis & Clark Bicentennial Commemoration in 2005 and 2006. For all alternatives, emergency vehicles would be allowed entry throughout the Road during rehabilitation for medical emergencies, fire, or other critical needs.

Tour bus and visitors at The Loop, 1929
GNPA photo #3937

Glacier National Park has been coordinating with Eagle Transit, Flathead County's transit provider, in an effort to improve regional transportation services. Currently Eagle Transit does not provide transportation services to the Park. However, Eagle Transit has applied for a grant through the Montana Transportation Partnership that would fund inter-city transit service providing two round trips daily, Monday through Friday, serving Hungry Horse, Columbia Falls, Kalispell, and Whitefish. This bus service would likely stop at the Glacier Park International Airport as well as the Inter-city Bus Station in Kalispell. Although not in the original proposal, Eagle Transit may extend services to West

Table 6. Types of rehabilitation work for each method of traffic management.

Alternating One-Ways	Intermittent Stops	Two-Way Stops	Traffic Suspension
• Valley pans, inlets, and outlets • Soil slope stabilization • Rock bolting • Retaining wall rehabilitation • Guardwall rehabilitation • Roadway foundation adjustments	• Access to work site • Material delivery • Crane setup and removal • Soil slope stabilization • Asphalt removal • Resurfacing • Debris removal	• Rock scaling • Roadway foundation adjustments • Soil slope stabilization • Rock bolting	• Roadbase excavation • Major retaining wall rebuild • Bridge deck repairs • Work on narrow roadway sections • Culverts and cross drains

Glacier, pending funding approval. If Eagle Transit receives this grant, Glacier National Park would arrange for the Hiker's Shuttle to meet these two weekday trips in West Glacier for timed transfers into the Park. Glacier National Park has already revised the Hiker's Shuttle schedule to provide improved shuttle service for visitors in the 2003 season. During the rehabilitation of the Going-to-the-Sun Road, public transit coordination is particularly important. An attractive, regional transit system could reduce the number of cars coming into the Park, thereby reducing congestion as well as minimizing the number of cars needing parking at shuttle staging areas in the Park.

For all alternatives, existing red bus and other tours would continue throughout Road rehabilitation. Tour stops to popular features would be maintained, although alternative stops may be necessary if a previously used stop is under construction.

Mitigation Measures

Mitigation includes those measures and actions taken to reduce the anticipated environmental effects of the proposed action. These measures may include actions to minimize or mitigate potential impacts. Mitigation measures are an integral component of the proposed action and would be implemented as part of the project. A number of the mitigation measures related to protection of natural and cultural resources during rehabilitation work are common to all alternatives and are included in construction costs. Other measures, including visitor use improvements, transit service, and economic mitigation measures, vary by alternative as previously described for each alternative. Described below are those mitigation measures identified for construction-related activities, natural resources, cultural resources, and socioeconomic resources that are common to all alternatives.

Construction Stipulations and Mitigation

A number of mitigation measures for construction-related activities would be incorporated into the project design to reduce natural and cultural resource impacts. Construction specifications would include the detailed requirements that the construction contractor would use for implementing these mitigation measures. An overview of construction-related mitigation measures is provided below. Additional measures specific to each resource are included in subsequent sections.

<u>Construction Design Mitigation Measures</u>

- The existing Road alignment would be maintained except for minor modifications at Wild Goose Island Overlook for safety and curve pavement widening for large vehicles on the lower Road sections.
- Design specifications for rehabilitation of the roadway, retaining walls, guardwalls and other features would avoid sensitive resources and minimize the amount of disturbance necessary during construction.
- Rehabilitation design for historic features would follow the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (USDI 1998) and consider recommendations from the *Cultural Landscape Report* (RTI 2002, 2003).
- Design parameters to correct drainage deficiencies, stabilize slopes, repair damaged masonry, and other improvements would include measures to provide both short- and long-term protection of adjacent natural resources.
- During final design, engineers and resource specialists would conduct field reviews to ensure that improvements meet design objectives and protect natural and historic resources.

<u>*Construction Operation Mitigation Measures*</u>

- Construction zones would be identified and fenced with appropriate materials to 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 zones.
- A safety plan would be developed prior to initiation of construction work to ensure the safety of Park visitors, workers, and Park personnel.
- Construction staging areas would be identified and limited to existing areas of disturbance or within the specified work zone for each project.
- No material borrow sources (other than native rock collection) or asphalt batch plants would be located in the Park.
- Wherever practicable and within the overall objectives of the rehabilitation, the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* (FHWA 1996 and updates) would be implemented.
- Equipment servicing or refueling within 100 feet (30 meters) of streams or water bodies would be prohibited. Contract specifications would include restrictions on the location of fueling sites, requirements for spill containment, and other measures to safeguard aquatic and terrestrial habitat from construction-related contaminants.
- All chemicals and petroleum products would be stored and contained away from water sources.
- All hazardous material use would require contractor compliance with applicable federal and state laws.
- No chemicals would be used for dust abatement.
- Vehicle traffic would be managed within the construction zone, and contractor hauling of materials, supplies, and equipment would be controlled to minimize disruptions in visitor traffic.
- Traffic delays, night closures, and other limitations in visitor access would be disclosed in advance of construction.
- Contractors would coordinate with Park staff to reduce disruption in normal Park activities. Construction workers would be informed about the special sensitivity of Park values, regulations, and appropriate housekeeping.
- Resource specialists including landscape architects, biologists, botanists, historians, environmental specialists, and archeologists would be involved in inspections and monitoring, and would provide recommendations during rehabilitation work.
- Construction crews would use buses or vans to commute to work sites in the Park to reduce traffic where appropriate on a project-specific basis.
- Excess excavated material would be removed from the Park. However, stone for masonry work would be retained.

Natural Resource Mitigation

<u>*Geology, Soils, and Water Resources*</u>

Geologic features such as rock outcrops and the steep rock walls that line the Going-to-the-Sun Road would be protected by minimizing disturbance to roadside geology. Rock scaling operations would be limited to those locations where rockfall hazards have been identified within the existing roadway prism, and only the amount of rock necessary to increase safety would be removed. Excavation would be selectively used to complete necessary rehabilitation and care would be taken to avoid damaging rock that would remain.

Erosion and sediment control measures from the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* (FHWA

1996 and updates) would be used for rehabilitation work along with other Best Management Practices (BMPs). BMPs include those generally accepted technical measures that are considered most effective and practicable for controlling pollutants and minimizing impacts to the environment. In addition, a stormwater and sediment control plan would be prepared prior to construction to protect soil resources, minimize erosion, and prevent sediment-laden water from entering nearby streams. Components of this plan include implementation of measures to minimize the loss of soil material before, during, and after construction. General erosion control BMPs typically would include:

- Minimizing the area of disturbance to defined construction limits and limiting the time soil is exposed.
- Conducting site-specific geotechnical and drainage monitoring.
- Installing filter barriers (silt fences, certified weed seed free straw bales, coir logs).
- Constructing sediment retention structures (temporary and permanent sediment traps, sediment basins).
- Providing culvert outlet protection (riprap aprons or basins to reduce water velocity and prevent scour) and provisions for fish passage.
- Armoring ditches on a site-by-site basis to prevent scouring and erosion.
- Revegetating disturbed areas.
- Conducting periodic water quality monitoring in nearby streams.

Topsoil would be removed prior to any ground disturbing activities and stored for use in revegetation rather than importing topsoil from outside the Park. Selective topsoil redistribution to soil deficient areas would be used as needed, but topsoil would not be stockpiled over the winter. Long-term soil protection would come from prompt revegetation of disturbed areas following construction as described below.

Vegetation

Impacts to native vegetation adjacent to proposed rehabilitation work sites would be minimized by limiting the area of disturbance and using temporary barriers to define the work zone. NPS staff restoration biologists and landscape architects would work closely with construction contractors to minimize impacts to vegetation and ensure acceptable reclamation and revegetation of disturbed areas.

Mitigation to reduce impacts on vegetation resources and ensure revegetation of disturbed areas would include several measures:

- Implementation of BMPs to prevent wind and water erosion (FHWA 1996 and updates).
- Salvage of topsoil with existing seed sources, along with suitable plant material for transplanting.
- Implementation of landscaping design features, such as slope rounding, to minimize visual impacts and to aid in creating suitable site conditions for revegetation.
- Application of topsoil and native seed according to site-specific conditions and vegetation communities.
- Application of soil amendments, mulches, organic matter, and other measures as appropriate to facilitate revegetation.
- Revegetation to restore native vegetation to areas disturbed during rehabilitation
- Revegetation seeding and planting using native species from genetic stocks originating in the Park. Plant species density, abundance, and diversity would be restored as nearly as possible to pre-construction conditions for non-woody species.

- Monitoring to evaluate vegetation cover and development of contingency and maintenance plans if vegetation cover is not similar to original ground cover.
- Preparation of a vegetation management plan for the entire Going-to-the-Sun Road.

Additional measures to prevent the introduction and spread of noxious weeds during construction include:

- Continuing current weed management practices in accordance with the Park's *Exotic Vegetation Management Plan* (NPS 1991) and including preventative measures in all rehabilitation contracts.
- Conducting weed control measures prior to ground disturbing activities.
- Minimizing the area of disturbance and the length of time that disturbed soils are exposed.
- Avoiding use of topsoil currently supporting exotic plants.
- Requiring that all construction vehicles be pressure washed clean of mud and weed seed prior to their initial entrance into the Park. Subsequent re-entries do not require cleaning unless directed by the contracting officer.
- Limiting the use of fertilizers that may favor weeds over native species.
- Using periodic inspections and spot controls to prevent weed establishment. If weeds invade an area, an integrated weed management process to selectively combine management techniques to control the particular weed species would be used.

Wetlands

Mitigation measures to avoid and minimize direct and indirect impacts to wetlands would include:

- Placement of silt fences or other barriers adjacent to wetlands and streams to avoid direct impacts from construction equipment.
- Use of best management erosion and sediment control measures to prevent the introduction of sediments into wetlands and waters of the U.S.
- Maintenance of the existing hydrologic connections between wetlands located on both sides of the road with culverts, subsurface drains, or other measures.

Wildlife, Aquatic, and Sensitive Resources

Mitigation and conservation measures would be incorporated into the selected alternative to minimize potential impacts on wildlife, aquatic life, and other sensitive plant and animal species. Measures applicable to protecting resources and minimizing impacts for all species are described below.

- Removal of snags and cavity nest trees would be avoided to the extent possible. If clearing is necessary, cavity trees would be removed during the non-breeding season.
- Surveys for sensitive and listed bird species nests would be conducted prior to design activities.
- Surveys of culverts and bridges would be conducted for evidence of bird (mostly swallow nesting), bat (mostly roosting/food digestion sites), and other wildlife use prior to design to minimize disturbance during the nesting season.
- Where existing social trails are formalized, actions would be taken to prevent creation of new social trails.
- Timing and location of construction activities would be used to minimize disruption of wildlife foraging and movement patterns.
- Loud construction noises within about 2,600 feet (800 meters) of active golden eagle nests, depending on terrain and vegetation, would be avoided between April 1 and August 1, subject to site-specific conditions, and the recommendations of Park biologists.

- A buffer area adjacent to McDonald Creek at the Logan Pit construction staging area would be maintained to minimize disturbance to harlequin duck habitat and activity. This includes preservation of existing riparian vegetation and possible use of temporary fencing. Park biologists would determine if other restrictions in the timing of construction activity might be appropriate where roadwork borders streams used by harlequin ducks.
- Cliff survey data would be used to guide construction timing near bighorn sheep and mountain goat habitat. Construction activity would be adjusted to the extent practicable to minimize impacts to bighorn sheep and mountain goats during their peak use periods according to the recommendation of Park biologists.
- Measures to reduce impacts to westslope cutthroat trout would be similar to those described for bull trout in the following section.
- If culvert replacement is needed, oversized culverts would be used selectively to provide crossings for small to medium sized mammals as well as amphibians and reptiles, and to address fish passage concerns where appropriate.
- The NPS would provide contractors with acceptable locations, amounts, and timing for water withdrawals from streams and lakes to minimize impacts on aquatic life and fish spawning habitat. Pumps for water withdrawal would be required to have screens to prevent entrainment of fish.
- Construction activities near perennial streams would be conducted during periods of low flow. Aquatic habitat and spawning habitat would be evaluated prior to construction to determine the need for restrictions in the timing of work or other measures to avoid impacts to native fish.
- Highly palatable plant species would not be planted adjacent to the road to minimize attracting wildlife.
- A stormwater management plan would be prepared with BMPs used to minimize erosion and the introduction of sediments to aquatic habitat during and after construction.
- Drainage improvements would be used to control runoff and reduce erosion.
- Sediment traps would be used selectively to capture road sand and erosion from runoff prior to discharge into streams.
- Animal-proof garbage collection and food storage requirements would be incorporated into all work contracts and plans. Human waste management mitigation also would be incorporated into all contract and work plans.
- Surveys for sensitive plant species would be conducted prior to each phase of construction, with appropriate measures taken to avoid, protect, or mitigate impacts as directed by Park biologists.
- The Park biologist monitoring construction activities may introduce other restrictions in construction activities, location, or timing to minimize impacts to species of concern.

Threatened and Endangered Species

Mitigation measures for threatened and endangered species would be similar to those used to protect other wildlife, aquatic life, and wetlands. Specific conservation measures for threatened and endangered species that would be implemented are described below.

Grizzly Bear

- Enforce speed limits on the Road to reduce vehicle related injuries of bears, and of other animals whose carcasses could attract bears to the Road, further increasing risk of injury.
- Implement measures to reduce potential for bear-human conflicts. Specifications for storage and disposal of food, refuse, construction materials, petroleum products, human waste and other possible attractants would be incorporated into the construction

contract to minimize the potential for impacts (GNP 1999). Construction personnel would be trained in how to behave in the presence of bears. Should a habituated bear frequent the area, construction activities may be temporarily suspended while management actions are implemented.

- Timing and location of construction activities would be considered when planning specific construction segments and projects to minimize disruption of wildlife foraging and movement patterns. The specific restrictions on timing and location will be discussed in our BA Amendments.
- The Park's Biological Technicians will monitor the activity of grizzly bears and other wildlife. Wildlife and Bear Management Rangers will enforce requirements for storage of food, garbage, petroleum products, and other attractants, and enforce regulations that prohibit feeding of wildlife during construction activities. These employees would help prevent impacts to bears by documenting the distribution and activity of bears and by making comprehensive inspections of the work site, storage areas, contractor vehicles, and human waste receptacles. The number of employees will be based on the size and number of ongoing construction contracts.

Bald Eagle

- Timing and location of construction activities would be used to minimize disruption of bald eagle foraging and movement patterns. Limit night construction and timing of construction near bald eagle nests. Construction activities near nests would occur between one hour after sunrise and one hour before sunset to minimize impact to morning and evening foraging activities. Work near the bald eagle territory at Lake McDonald would be restricted during the critical use dates from March 1 to May 15. Additional restriction beyond those dates may be instituted based on monitoring of nesting activity at the Lake McDonald and St. Mary nests, specifically observation of construction related disturbance.
- All construction equipment would contain adequate mufflers to reduce the amount of noise produced. There would be no blasting near bald eagle nest or roost sites.
- Buffer zones of at least 100 m surrounding bald eagle forage sites need to be maintained to reduce human disturbance to foraging eagles (GNP 1999a).
- Most road construction activities would not occur in the winter, thus reducing impacts of the proposed project on bald eagle winter locations at Lake McDonald and St. Mary Lake.
- In order to help insure the nesting success of bald eagles, if a nest is found to be active within 100 m of the project site, the contractor may be required to implement noise reduction mitigation depending on the date, time, type and duration of work.

Canada Lynx

- If culverts are added or replacements are needed, oversized culverts with modifications or alterations would be considered in order to provide crossings for small mammals.
- Timing and location of construction activities would be used to minimize disruption of wildlife foraging and movement patterns.
- Any observation of Canada lynx within the project area would be reported to the wildlife biologist and appropriate action would be taken to reduce potential impacts.

Gray Wolf

- Timing and location of construction activities would be considered when planning specific construction segments and projects to minimize disruption of gray wolf foraging and movement patterns.

- Any observation of gray wolves within the project area would be reported to the wildlife biologist and appropriate action would be taken to reduce potential impacts.
- In the event wolf pack activity expands into areas proximate to the Road, additional measures may be undertaken to protect wolves, especially at den and rendezvous sites.

Bull Trout

- Resource specialists would be involved in inspections and monitoring, and provide recommendations during rehabilitation work.
- All hazardous material use would require contractor compliance with applicable federal and state laws.
- All chemical and petroleum products would be stored and contained away from water sources. Equipment servicing or refueling within 100 ft (30 m) of streams or water bodies would be avoided. Contract specifications would include restrictions on the location of fueling sites, requirements for spill containment and other measures to safeguard aquatic and terrestrial habitat from construction related contaminants. There would be no drainage of oil, hydraulic fluids, anti-freeze, or other chemicals in the park.
- Minimize the areas of disturbance to defined construction limits.
- Conduct site-specific geotechnical and drainage monitoring.
- Install filter barriers.
- Construct sediment retention structures (temporary and permanent sediment traps, sediment basins).
- Provide culvert outlet protection. If culverts are added or replacements are needed, oversized culverts would be considered in order to address fish passage concerns where appropriate. The park uses culverts with a minimum diameter of 18 inches for permanent stream crossings and crossdrains. Culverts would be designed to enable fish passage.
- Best management erosion and sediment control measures would be used to prevent introduction of sediments into wetlands and waterways. The NPS would provide contractors with acceptable locations, amounts, and timing for water withdrawals from streams and lakes to minimize impacts to aquatic life and spawning habitat. Pumps for water withdrawals would be required to have screens to prevent entrainment of fish.
- Construction activities, such as bridge or culvert work, in perennial streams would not be conducted during the spawning season to avoid impacts to native fish.
- Specific best management practice (BMP) erosion and sediment control measures would be developed as a component of the stormwater NPDES permitting process and incorporated into the construction specifications. Erosion and sediment control measures would be tailored to specific site conditions for each phase of work. The types of BMPs likely to be used include: silt fence, temporary detention basins, berms, sideslope drains, inlet and outlet protection, rock check structures, and other suitable measures. Long-term erosion and sediment control would be provided by mulching and revegetation of disturbed areas. Waste materials associated with construction would be immediately loaded into end dumps and hauled away.
- During construction a park employee or park representative will be at the construction site to monitor water quality and sediment releases. If these releases are deemed excessive, the activity will be halted until the stream clears. At that time work activities may proceed.
- Cooperation with park staff in developing and implementing other reasonable mitigation measures to meet site-specific requirements (see Programmatic Agreement in GTSR BA).

Air Quality

Mitigation measures to prevent degradation of air quality include:

- Dust abatement measures, such as watering unpaved disturbed areas.
- Disturbed areas would be revegetated as soon as possible after construction to reduce airborne particulates.
- If needed, asphalt batch plants would be located outside of the Park and would be sited in compliance with Montana Department of Environmental Quality (DEQ) requirements.

Visual Resources

Mitigation measures to prevent impacts to visual resources include:

- Rehabilitation of the deteriorating roadway and stone masonry work would be used to restore the scenic quality of the Road.
- Native stone would be used whenever and wherever possible for retaining walls, guardwalls, and other stone features to blend the structural components of the Road into the natural setting.
- Revegetation would mitigate areas of construction-related disturbance.
- Selective roadside vegetation management would be used to recapture historic scenic views.
- Any additional structures and modifications would reflect the historic and natural setting of the Road.
- Materials and their design would reflect a cultural design philosophy and rustic character of GNP.
- GNP's *Roadside Maintenance Guidelines* (NPS 1993b) and recommendations from the *Cultural Landscape Report* (RTI 2002, 2003) would provide guidance for mitigating impacts to visual resources.

Natural Soundscape and Lightscape

Mitigation measures to prevent impacts to the natural soundscape and lightscape include:

- All construction equipment would contain adequate mufflers and pollution emission controls.
- Night construction would be avoided near Apgar, Lake McDonald Lodge, Sprague Creek Campground, Rising Sun, and St. Mary and other sensitive areas that may affect visitors and wildlife.
- Information on construction zones would be available to visitors so that they can plan their recreation activities accordingly to avoid areas of noise and disturbance.

Cultural Resource Mitigation

Preliminary planning and final design for rehabilitation of historic features on the Going-to-the-Sun Road have and would incorporate design criteria, guidelines, and regulatory standards to avoid and minimize potential adverse impacts. Rehabilitation work would be conducted in accordance with Secretary of the Interior's *Standards for the Treatment of Historic Properties* (USDI 1998) and recommendations from the *Cultural Landscape Inventory* (RTI 2001) and *Cultural Landscape Report* (RTI 2002, 2003). The NPS would consult with the State Historic Preservation Office (SHPO) and Advisory Council on Historic Preservation (ACHP) throughout each phase of rehabilitation. If during the course of final design, circumstances occur that result in an unavoidable adverse effect, the NPS would work with SHPO and ACHP according to Section 106 procedures to determine mitigation requirements. The type and level of mitigation required would vary depending on the resource involved and the level of damage. Historic documentation, public interpretation, and restoration of related historic resources are among potential mitigation steps.

Socioeconomic Resource Mitigation

As noted in the Going-to-the-Sun Road *Socioeconomic Study* (WIS 2001b), the Road rehabilitation project would affect people and businesses, as well as the environment. This is especially true for the economies of three Montana counties and the part of southwest Alberta adjacent to the Park. These areas depend on tourism to a substantial degree, particularly in communities closest to the Park boundaries. Therefore, considerable effort was devoted to the development of strategies that would mitigate the socioeconomic impacts of the proposed Road rehabilitation.

During the Going-to-the-Sun Road *Socioeconomic Study* and the companion Going-to-the-Sun Road *2001 Business Development Survey* (WIS 2001d), potential socioeconomic mitigation strategies or visitor development strategies, were solicited during working sessions with local economic development and tourism development specialists. This information was used by the CAC in its advice forwarded to the NPS on alternative strategies to use during Road rehabilitation (NPS 2001a).

The strategies break down into three categories, based on how they address the key concerns of maintaining: 1) visitor access; 2) the quality of visitor experience; and 3) visitation during the Road rehabilitation project. All of the mitigation categories have the potential to help reduce or offset potential socioeconomic impacts on the local economies during Road rehabilitation and to potentially minimize the impacts on visitation. However, limitations in funding and the authority of the Park make it necessary to select a strategy from among many options for use in the Road rehabilitation project.

The majority of socioeconomic mitigation strategies would be implemented under Alternatives 3 and 4, because of the greater intensity of work and the shorter construction schedule. However, several socioeconomic mitigation strategies are common to all alternatives. Traffic management measures would be used by all alternatives to reduce the impacts on visitor flow during construction. As described in previous sections, each alternative would provide different techniques to maintain traffic and visitor flow during rehabilitation. In addition, each alternative would maintain varying levels of transit service during rehabilitation to provide an alternative transportation method for visitors. The Park would emphasize public information and communication strategies to inform visitors on the condition of the Road, delays, and other information that would impact visitor travel.

Several visitor developments not specifically included in the rehabilitation of the Going-to-the-Sun Road would have benefits recognized by all alternatives. Planned upgrading of the historic hotels in GNP would contribute to the quality of visitor services. Although in the early stages of development, hotel code compliance and upgrading is expected to cost about $100 million.

ALTERNATIVES AND MITIGATION EXCLUDED FROM FURTHER CONSIDERATION

Several alternatives for rehabilitation of the Going-to-the-Sun Road were considered in the *General Management Plan* and in the subsequent *Engineering Study* and Citizens Advisory Committee. The alternatives evaluated in the EIS, for the most part, encompass those recommended by the CAC and are similar to those previously discussed in the GMP. Closure of one side of the Road was considered as an alternative in the GMP, but eliminated from consideration for reasons described below. Implementation of one-way traffic during rehabilitation was also considered, but eliminated. One hour transit service was replaced with ½-hour transit service for the Preferred Alternative to improve options for alternative transportation. In addition, other visitation and economic impact mitigation measures were eliminated as incompatible with Park management policies. All of these are discussed below.

Close Alternating Sides of the Going-to-the-Sun Road for Rehabilitation on a Fast Track Schedule

The *General Management Plan* included a fast-track rehabilitation alternative (4 to 6 years) that entailed closure of the Road on each side of Logan Pass for 2 to 3 years until construction work was completed. This alternative would allow access to Logan Pass from one direction depending on which side of the Road is under construction. Because of the public concern over the possible adverse economic impacts and the insufficiency of engineering data, the NPS final decision in the GMP was to complete additional engineering and economics studies in consultation with a federal advisory committee. Several alternatives were developed during the course of these studies with input from the public and the Citizens Advisory Committee. One of these alternatives, the Accelerated Completion alternative currently included in the EIS, is similar to the fast-track alternative previously considered in the GMP. The Accelerated Completion alternative includes traffic suspensions during the week on one side of the Pass with access to Logan Pass from the other direction and the entire Road open on weekends. The NPS determined that this alternative provides for fast completion of the Road with less effect on visitor travel and local economies than complete closure of one side of the Road. For these reasons, completely closing one side of the Road was excluded from further consideration.

Convert the Going-to-the-Sun Road to a One-Way Loop During Rehabilitation

One option considered to maintain traffic flow during construction was to allow traffic from one direction to continue unimpeded. This could include alternate directional traffic either east or west along the Going-to-the-Sun Road. There are several disadvantages with this alternative. One disadvantage is visitors not intending to travel the entire length of the Road would be required to loop back to their starting point using State Highways 2, 49 and 89 (Figure 1). The total loop distance using these highways and the Going-to-the-Sun Road is about 135 miles (215 kilometers). This would be a considerable inconvenience for visitors planning a short day trip to Logan Pass, trailheads, or other destinations along the Road. Also, the need to continually move material, equipment, and construction personnel both directions on the Road would require a significant level of traffic management to frequently stop visitors for construction-related traffic. The one-way loop also would have effectively eliminated all over-sized vehicles from using the Road because once they got to the turnaround point (Avalanche or Sun Point), they could not turn and drive in the opposite direction. For these reasons this alternative was eliminated from further consideration.

Transit Shuttle Service at One-Hour Intervals

The Going-to-the-Sun Road Rehabilitation Plan/Draft EIS included transit service with one-hour intervals for the Preferred Alternative (Alternative 3). After further consideration and comments from the public, the NPS determined that this level of service may be inadequate to meet the demand for transit service during rehabilitation. As a result, transit for the Preferred Alternative was increased to provide shuttle service at ½-hour intervals and the one-hour service was eliminated from consideration.

Visitation and Local Economic Impact Mitigation Eliminated from Consideration

Some of the proposed economic development impact mitigation calls for actions by the NPS that are constrained by existing management plans. The NPS reviewed the visitor development strategies during the *Socioeconomic Study* (WIS 2001b) and eliminated from further consideration:

- Winterizing historic hotels
- Constructing new outdoor amphitheaters

Although these strategies may be desirable from some perspectives, they conflict with adopted policies for management of the Park, as reflected in the GMP.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act (NEPA) of 1969, which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that the environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural and natural resources." As expressed in NEPA's Section 101, "it is the continuing responsibility of the Federal Government to:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. 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;
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

The environmentally preferred alternative for rehabilitation of the Going-to-the-Sun Road is based on these national environmental policy goals. A discussion of how each alternative meets these goals follows.

Alternative 1— No Action (Repair as Needed)

This alternative does not fully meet provisions for protection of environmental and cultural resources and, most importantly, a National Historic Landmark and premier visitor experience. While Alternative 1 would eventually repair deteriorating road conditions and rehabilitate cultural features, degradation of these resources is likely to continue if corrective actions are extended over 50 years. Alternative 1 does not correct existing pullout deficiencies that create visitor safety concerns. This alternative does not fully meet the provisions of the environmental policy goals.

Alternative 2—Priority Rehabilitation

Alternative 2 would provide for protection of environmental and cultural resources by implementing Road repairs over a 20-year period. While this is an improvement over Alternative 1, it does not provide the same level of resource protection as Alternatives 3 and 4 and does not fully meet provisions 1 and 4 of the environmental policy goals. Deterioration of historic cultural resources and damage to natural resources would continue until repairs are completed. This alternative does not include the visitor use improvements included in Alternatives 3 and 4 that improve safety and hence does not fully realize provisions 2 and 3 of the national environmental policy goals.

Alternative 3—Shared Use

This alternative seeks to meet the environmental policy goals by providing needed corrections to the structural integrity of the Road, rehabilitating and preserving historic cultural features, improving visitor safety, and protecting natural and scenic resources. Proposed improvements would be implemented over 7 to 8 years, which would minimize further significant deterioration of environmental and cultural resources. This alternative meets national environmental policy goals 2 and 4 by preserving the Road's status as a National Historic Landmark. Alternative 3 addresses the need to balance needed rehabilitation repairs, while maintaining visitor access and minimizing impacts to regional businesses that depend on tourism. Alternative 3 would realize each of the provisions of the national environmental policy goals.

Alternative 4—Accelerated Completion

Alternative 4 is similar to Alternative 3 and would likewise realize each of the provisions of the national environmental policy goals. This alternative best meets provisions for protecting environmental and cultural resources because needed Road rehabilitation would be implemented in the shortest period of time (6 to 8 years). The Road's status as a National Historic Landmark would be preserved under this alternative. However, Alternative 4 does not provide the best balance for resource protection, maintaining visitor use, and minimizing impacts to regional businesses. Accelerated completion of the Road would require restrictions in visitor access and does not fully meet provisions 3 and 5 of the national environmental policy goals to the same extent as Alternative 3.

The Environmentally Preferred Alternative

The environmentally preferred alternative is Alternative 3 because it surpasses other alternatives in realizing the full range of environmental policy goals stated in Section 101 of NEPA. Alternatives 1 and 2 do not provide for the near-term protection of natural and cultural resources and lack measures to reduce all of the safety concerns. Alternative 4 meets the provisions of the environmental policy goals, but restricts visitor access and would result in adverse economic consequences to local communities. Alternative 3 is the environmentally preferred alternative because it: 1) provides a high level of protection of natural and scenic resources; 2) preserves the Road's status as a National Historic Landmark; 3) maintains visitor access throughout rehabilitation; and 4) best balances resource protection, preservation of historic features, while minimizing economic impacts to the local economy.

SUMMARY

Table 7 provides a summary comparing the potential environmental effects of alternatives. Additional discussion of resource impacts for each of the alternatives is included in Chapter 4.

Table 7. Comparison of alternatives and impacts.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
VISITOR USE AND EXPERIENCE	The visitor experience at GNP would continue to be affected by the deterioration of the Road. Although visitors would encounter few traffic delays from Road repair, the potential for Road failure would remain relatively high. Baseline annual visitation would grow slowly over the next 20 years from about 1.7 to 1.9 million. Transit operations would continue at current levels, and no new visitor service operations would be planned.	Similar to Alternative 1 only there would be more construction sites and traffic delays. Despite delays, visitors would maintain full access to all sites along the Road throughout the construction period. Minor adverse impacts to the visitor experience are anticipated during construction, but a reduction in annual visitation of about 72,000 is projected. Two new transit vehicles would be added to provide destination transit service for tour groups. Visitor service improvements would be limited.	The rehabilitated Road would improve both the visitor experience and visitor safety. Upgraded parking and pullouts would also improve traffic flow and safety. In the short term; however, visitors would experience minor adverse impacts to the visitor experience from traffic delays. During the shoulder seasons, visitor access to the Road would be limited to areas not under construction, but 80% of the Road including Logan Pass would remain accessible. About 119,000 fewer visitors are projected to visit the Park during rehabilitation. Mitigation measures to reduce potential impacts to the visitor experience include expanded transit service, pullout rehabilitation, additional toilets, trail improvements, information facilities, interpretive exhibits, and other facility improvements.	Similar to Alternative 3, except that visitor access would be limited to the portions of the Road not under construction throughout both the peak and shoulder seasons Monday through Thursday. This would have a moderately adverse impact on the visitor experience and is estimated to reduce annual visitation by 208,000. Visitor use improvements similar to Alternative 3 would help minimize impacts.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
LOCAL AND REGIONAL ECONOMY	Continued and increasingly expensive Road maintenance and repairs would be required. Over the lengthy rehabilitation period, these additional maintenance requirements would divert an ever-increasing share of already scarce Park resources away from other Park operations. Road rehabilitation would have negligible effects to the local economy, but should Road failure occur during this period, it could cause visitation to plummet and produce significant adverse economic consequences for the region. The baseline economic output from this alternative is about $181 million annually.	Similar to Alternative 1 except that the rehabilitation period is significantly shorter, reducing the potential for catastrophic Road failure. A reduction in tourism-related expenditures during rehabilitation is estimated at about $8.5 million annually. This would be partially offset by about $2.3 million in construction related spending. The net annual economic impact would be about $6.2 million. Negligible environmental justice impacts are estimated.	Projected reductions in visitation during rehabilitation would is estimated to reduce tourist-related economic output by about $13.5 million annually. The short-term annual reduction in visitor spending would be somewhat offset by the short-term increase in employment of seasonal construction workers and construction related spending of $6.9 million. The net annual economic impact would be about $6.6 million. Negligible environmental justice impacts are estimated.	The short-term reduction in annual visitor spending is projected to be substantially higher than Alternative 3 due to limitations in Road access throughout the visitor season. A projected reduction in tourism-related expenditures of about $23 million annually would occur from reduced visitation to the Park. Construction related expenditures would reduce this impact by about $7 million, for a net economic impact of about $17 million. Construction will take 1 to 2 fewer years than Alternative 3; therefore, impact would occur for a shorter time. Moderate adverse environmental justice impacts are estimated, particularly in Glacier County.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
CULTURAL RESOURCES	Negligible effect on archeological and ethnographic resources. Short-term minor to moderate effects to historic features and cultural landscape from construction disturbance. Major adverse long-term effect on historic resources and cultural landscape if rehabilitation is implemented over 50 years and resources continue to deteriorate.	Adverse impacts would be slightly reduced compared to Alternative, 1, but moderate to major adverse, long-term effect to historic resources and cultural landscape are likely if repairs take 20 years to implement.	Negligible effect on archeological and ethnographic resources. While continued impacts to historic features and cultural landscape are possible, implementation of repairs to historic features in 7 to 8 years would have a long-term major beneficial effect upon completion of rehabilitation.	Same as Alternative 3, except repair of historic features 1 or 2 years sooner would reduce the potential for further deterioration.
TOPOGRAPHY, GEOLOGY, AND SOILS	Minor short-term effects from ground disturbance during rehabilitation. Delays in repairs would lead to a moderate long-term loss of soil and reduced productivity and increased potential for Road failure and adverse effects to geologic resources.	Similar to Alternative 1, but repairs would be implemented over a shorter period. Moderate long-term losses in soil and potential for instabilities that could lead to damage to geologic resources.	Minor short-term losses in geologic and soil resources from Road rehabilitation plus additional moderate long-term losses in soil resources from construction of new pullouts, trails, and parking areas. Moderate beneficial effect from correcting existing drainage and erosion problems.	Similar to Alternative 3, but work would be implemented sooner and existing areas of erosion and instability would be addressed quicker.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
WATER RESOURCES AND WATER QUALITY	Minor short-term effect to hydrology and water quality at localized construction sites from sedimentation of streams and lakes. Implementation of repairs over 50 years would delay needed repairs to the drainage system, which could contribute to moderate long-term impacts to water quality.	Similar to Alternative 1. A delay in drainage improvements would allow continued impacts to water quality over the 20-year rehabilitation period. Moderate long-term effects until repairs are completed.	Minor short-term adverse effects to hydrology and water quality during rehabilitation and improvements to visitor facilities from construction disturbance. Minor to moderate beneficial improvements from completing drainage improvements, stabilizing eroding roadside slopes, and formalizing or reclaiming social trails near water features. An increase in impermeable surface with visitor use improvements would have a minor long-term effect on runoff.	Similar to Alternative 3, but beneficial drainage work, slope stabilization, and trail improvements would be implemented 1 to 2 years sooner.
FLOODPLAIN	Negligible short-term effect on localized flooding because other than Divide Creek, there would be no substantial changes to the roadway. Use of low water crossings in the Divide Creek floodplain would have a moderate to major beneficial effect by allowing a more natural dispersion of flood flows and protection of the Road and historic bridge.	Same as Alternative 1.	Same as Alternative 1, with negligible additional floodplain impacts from improvements to visitor use facilities.	Same as Alternative 3.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
VEGETATION	Minor loss and short-term disturbance to vegetation adjacent to the Road. The majority of the disturbance would occur within the existing Road prism. Vista clearing to restore scenic views would result in a minor long-term loss of roadside vegetation. Revegetation of disturbed sites with native plants would reduce long-term effects. Minor short-term introduction of exotic plants is possible, but weed management would attempt to prevent spread. Delays in revegetating existing eroding slopes may result in moderate to major long-term impacts to vegetation.	Similar to Alternative 1, although revegetation of existing eroding slopes would be implemented over 20 years instead of 50 years. Minor short-term introduction of exotic plants is possible, but weed management would attempt to prevent spread. A minor long-term loss of about 0.2 acres (0.08 hectares) from additional slow-moving vehicle turnouts.	Minor short-term temporary impacts to vegetation similar to Alternative 1 during rehabilitation. A minor long-term loss in vegetation resources (7.4 acres; 3.0 hectares) for pullout and parking improvements, slow-moving vehicle turnouts, and trail construction. A minor long-term beneficial impact would occur from revegetation of existing disturbances and rehabilitation of social trails. Minor short-term introduction of exotic plants is possible, but weed management would attempt to prevent spread.	Same as Alternative 3.
WETLANDS	Negligible to minor short-term effect. Wetlands would be avoided and temporary disturbances promptly restored without loss of function or value.	Same as Alternative 1.	Same as Alternative 1. Wetlands would be avoided when implementing visitor use improvements.	Same as Alternative 3.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
WILDLIFE	Minor to moderate short-term disturbance to wildlife from construction noise and human activity. Minor long-term loss in habitat because most work would be conducted within the existing Road prism. Although work sites would be small, wildlife displacement near the Road would extend over 50 years.	Similar to Alternative 1, but construction activities would extend over 20 years and roadside turnouts would result in a minor long-term loss of 0.2 acres (0.08 hectares) of habitat.	Similar to Alternative 1, but wildlife displacement near the Road would occur over 7 to 8 years. A minor long-term loss of wildlife habitat (7.4 acres; 3.0 hectares) from pullout and parking improvements, slow-moving vehicle turnouts, and trail construction. The loss of habitat would be minimized by locating new facilities adjacent to or near existing developments.	Same as Alternative 3.
AQUATIC RESOURCES	Minor short-term disturbances where roadwork is adjacent to streams and lakes from sedimentation. No direct effect to aquatic habitat. Existing drainage deficiencies that lead to water quality concerns would not be implemented soon enough to prevent further water quality and potential aquatic life impacts.	Similar to Alternative 1, but beneficial effects to water quality and aquatic habitat from drainage improvements would be implemented sooner.	Similar to Alternative 1 during rehabilitation, but drainage deficiencies and benefits to aquatic life would be implemented in 7 to 8 years. Additional visitor use facilities would result in minor short-term impacts to aquatic life near construction sites.	Similar to Alternative 3, with beneficial effects implemented 1 to 2 years sooner.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN	Negligible to minor short-term effects on habitat. Minor to moderate short-term effect on bald eagle foraging, and gray wolf, and lynx movement and activity during construction. Moderate effects on grizzly bear activity near the Road. Minor short-term effect on bull trout from sedimentation. Road rehabilitation may affect, but is not likely to adversely affect bald eagle, lynx, gray wolf, or bull trout, and is likely to adversely affect grizzly bear. Moderate short-term disturbance and possible displacement of golden eagle, harlequin duck, bighorn sheep, mountain goat, and wolverine during rehabilitation. Possible temporary sedimentation of westslope cutthroat trout habitat. No effect to threatened or endangered plants and no known effect to plants of concern. Future surveys of impacted sites would be conducted prior to construction and extensive conservation measures would be implemented to minimize effects.	Same as Alternative 1.	Similar to Alternative 1. Minor to moderate short-term additional disturbances during implementation of visitor use improvements. Potential long-term adverse affect to individual state rare velvet-leaf blueberry plants near Apgar transit staging area, but avoidance measures would be implemented to the extent possible.	Same as Alternative 3.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
AIR QUALITY	Negligible to minor temporary increase in emissions and a decrease in visibility from dust and construction vehicle emissions.	Similar to Alternative 1, although additional construction sites would have slightly greater emissions. The addition of two transit vehicles would have negligible to minor beneficial effect on air quality by reducing traffic.	Similar to Alternatives 1 and 2, but additional construction sites and visitor use improvements would increase the potential for vehicle emissions and dust. Impacts would be minor and short-term. Increasing transit system capacity would have a minor long-term beneficial effect by reducing traffic.	Same as Alternative 3.
VISUAL RESOURCES	Negligible to minor short-term effects to visual quality from introduction of equipment and construction disturbance. Delay of repairs to a 50-year period could result in moderate to major loss in scenic quality from deterioration of the Road, historic features, and natural resources. Once rehabilitation is completed there would be moderate to major, long-term beneficial effects to visual quality along the Road.	Similar to Alternative 1, but repairs would be implemented sooner. Moderate to major long-term effects are possible if further Road deterioration occurs.	Similar to Alternative 2, but a reduction in the duration of visual intrusions caused by prior Road damage, and a decrease in the likelihood of future damage. Minor long-term adverse impacts from introduction of new visitor improvements such as slow-moving turnouts, short trails, transit staging, and new pullouts. Minor long-term beneficial effects from rehabilitation of social trails and improvements to pullout configuration.	Similar to Alternative 3, with beneficial improvements implemented 1 to 2 years sooner and with slightly greater visual effect with a larger transit parking area near Apgar.

Table 7 continued.

Impact Topic	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
NATURAL SOUNDSCAPE AND LIGHTSCAPE	Minor to moderate short-term increases in noise during rehabilitation may disturb wildlife and visitors. Introduction of artificial lighting for night construction is possible for emergency repairs and would have a minor to moderate short-term effect on the night sky.	Similar to Alternative 1, although additional construction sites would increase noise, and night construction may occur. Effects would be minor and short term.	Similar to Alternative 2, with additional construction sites and noise and planned night construction. Effects would be minor to moderate and short term on wildlife and visitors.	Same as Alternative 3.
WILDERNESS AND WILD AND SCENIC RIVERS	No direct disturbance. Noise from construction activity would have a negligible to minor short-term effect on proposed wilderness values. Negligible short-term effects to the values for which the Middle Fork of the Flathead River was designated wild and scenic.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

This page intentionally left blank.

Chapter 3
Affected Environment

Overhanging snow on the Going-to-the-Sun Road

June 2002

The Affected Environment chapter provides baseline information on the environment potentially affected by the Preferred Alternative and other alternatives. The chapter is divided into three resource categories: socioeconomic resources, cultural resources, and natural resources. The analysis area for each of these resources varies. Although proposed rehabilitation and improvements to the Going-to-the-Sun Road are confined to a narrow corridor along the existing Road, indirect impacts for these actions may extend beyond the area of actual disturbance.

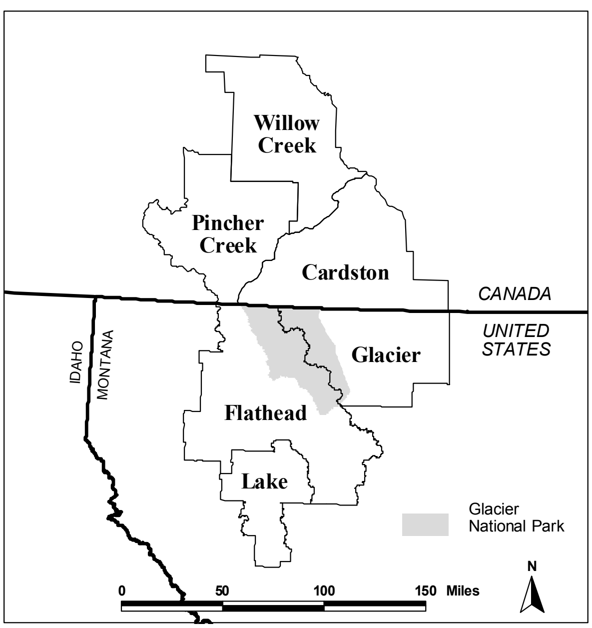
Visitor use and experience are linked primarily to access to the Road and associated amenities. The affected environment for economic impacts encompasses local and regional economies for three counties in Montana and the southwest portion of Alberta Province in Canada. For natural resources, the affected environment is broadly defined as the Going-to-the-Sun Road geographic area identified in the GMP (Figure 2). The affected environment for natural resources may extend outside of the immediate Road corridor for resources, such as wide ranging wildlife species. For cultural resources, the affected environment is more closely tied to the specific historic and archeological features along and adjacent to the Road.

SOCIOECONOMIC RESOURCES

GNP and Waterton Lakes National Park (WLNP), GNP's sister unit in the Waterton-Glacier International Peace Park complex, are key elements of the economic and social environment of communities in both the United States and Canada.

This section of the EIS provides background information on the existing socioeconomic conditions in the study area and is the basis for the impact analysis in the Environmental Consequences chapter. The study area for the socioeconomic analysis, as defined during the work of the CAC and Washington Infrastructure Services, includes Flathead, Glacier, and Lake counties in Montana and the municipal districts of Pincher Creek, Willow Creek, and Cardston in southwest Alberta; these are the areas most likely to be affected by rehabilitation of the Going-to-the-Sun Road (Figure 8).

Figure 8. Study Area for Socioeconomic Analysis.



Park Visitation and Operations

The following discussion describes GNP visitation trends and conditions, including historical and forecasted visitation levels, visitor characteristics, including their activities at GNP and their travel and spending patterns, and Park operations including expenditures and employment.

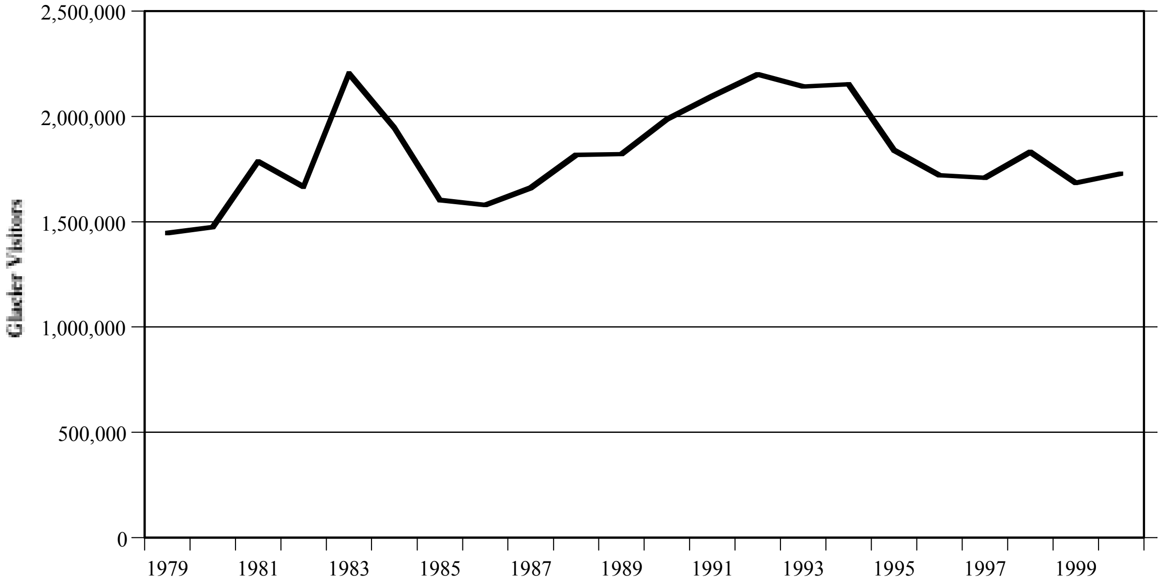
GNP visitor-related information relies primarily on data furnished by the NPS and by the Going-to-the-Sun Road *Socioeconomic Study* (WIS 2001b) and the Going-to-the-Sun Road *Transportation and Visitor Use Study* (WIS 2001c). One component of these studies was a survey of GNP visitors conducted in late August and early September 2000 (WIS 2001b). A similar survey was conducted in late July 2002 (Coley-Forrest 2002). The results of these surveys are an integral component of the socioeconomic analysis, as they provide valuable information on visitor background, expenditures, and experiences at the Park.

Visitation Level and Trends

This section discusses levels of visitation and their trends, including variation annually, seasonally, and weekly.

Annual Visitation. During the past 21 years, the annual number of visitors to GNP has ranged between a low of 1.4 million visitors in 1979 to highs of 2.2 million visitors in 1983 and 1992 (Figure 9). Visitation has fallen from the high levels of the early 1990s, and from 1995 to 2000, annual visitation has remained around 1.7 million visitors.

Figure 9. Visitors to Glacier National Park (1979-2000).



Over this same period, total national park visitation across the United States has grown steadily, from 47.5 million in 1979 to nearly 65 million in 1999, representing an average annual growth rate of 1.5 percent. Fluctuation of annual visitation levels for the entire national parks system is less volatile than for any particular park, because these totals represent parks in a variety of geographic locations and environmental settings and are not as vulnerable to the impacts of localized events such as fires, weather or flooding.

Visitation to national parks are subject to substantial annual variation. A comparison with visitors at Yellowstone National Park (YNP) from the mid-1980s through the mid-1990s indicates growth in visitation at the two parks was relatively similar. However, significant flooding problems at GNP in 1995 resulted in diminished visitation, which continued through the remainder of the decade. Similarly, concerns over forest fires were one cause of a 10 percent drop in visitors at YNP between 1999 and 2000. Visitor projections at GNP are expected to remain relatively flat over the next 20 years. Current estimates indicate about 1.9 million visitors by 2020 (WIS 2001b).

Seasonal Visitation. In addition to annual variation, there is a great deal of seasonality in visitation at GNP. Between 1995 and 1999, the average monthly visitation at GNP in July and August was greater than 500,000. These summer months are clearly the busiest periods at the Park, with nearly 60 percent of visitation occurring in July and August, and another 28 percent of visitors arriving during June and September (Figure 10). The remaining months of the year, from October through May, account for 12 percent of GNP visitors.

Weekly Visitation. As shown in Figure 11, there is relatively small variation in the number of daily visitors who enter the Park throughout the course of the week.

Figure 10. Monthly Visitors to Glacier National Park (1995-1999).

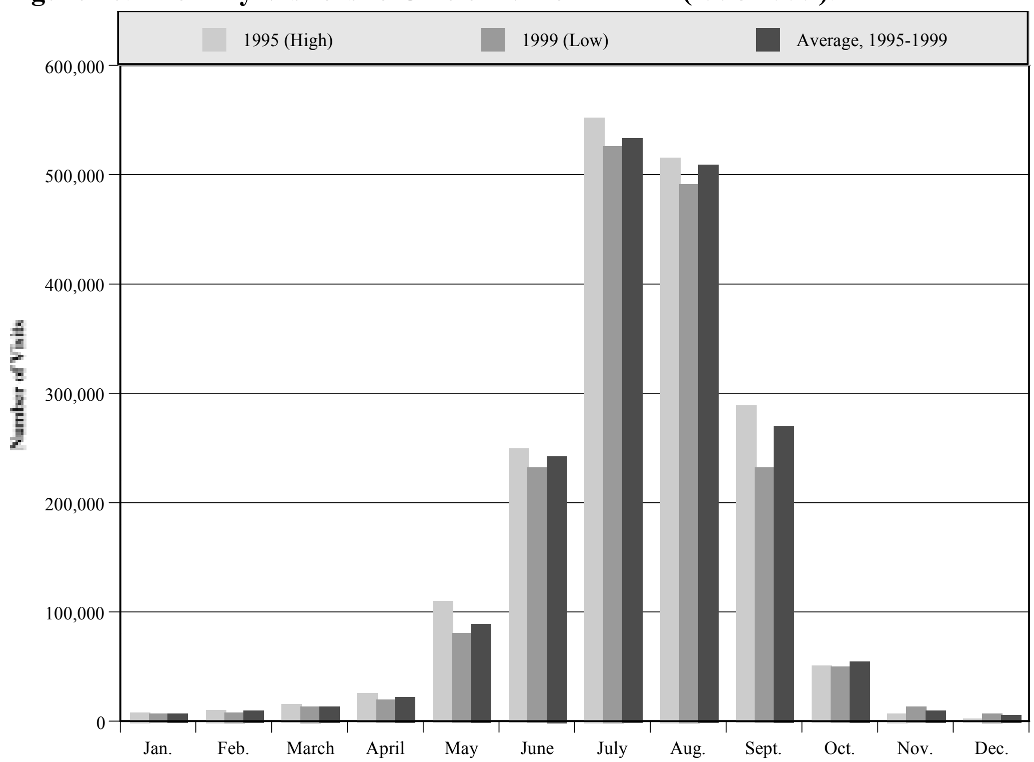
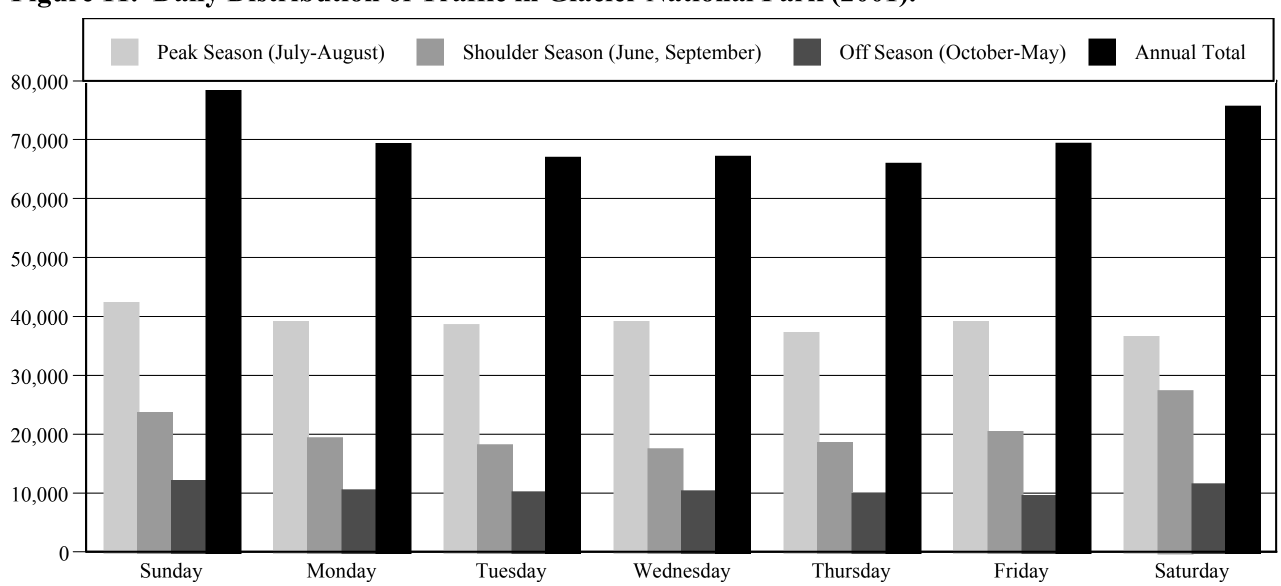


Figure 11. Daily Distribution of Traffic in Glacier National Park (2001).



The highest traffic occurs during the weekend, when approximately 31 percent of visitors enter the Park. However, mid-week visitation is only slightly lower per day. Monday through Friday account for roughly 69 percent of Park visitation. This trend is likely the result of Glacier's relative geographical isolation, out of proximity to major metropolitan population bases that could generate high levels of weekend visitation.

Visitor Use Patterns and Experience

This section addresses different elements of the GNP visitor experience, including the recreational activities that visitors participate in, such as driving the Going-to-the-Sun Road and visiting many other Park areas, as well as the duration of trips, where visitors stay, how visitors travel to GNP and their expenditures during their visits.

Visitor Activities. Visitors to GNP engage in a variety of recreational activities during their trips to the Park (Table 8). The most popular component of a visit to Glacier is sightseeing, which 97 percent of visitors do. Similarly, nearly nine in ten Glacier visitors participate in wildlife viewing and photography. More than half of all visitors do some sort of day hiking. A much smaller share of visitors participates in fishing, bicycling or backcountry camping. These more physically rigorous and time-consuming activities appeal to a narrower range of Glacier visitors.

Table 8. Proportion of visitor groups participating in each activity.

Visitor Activities	Percent of Visitors
Sightseeing	97%
Photography	89%
Wildlife Viewing	87%
Visit Visitor Centers and Museums	72%
Day hike	53%
Shop	51%
Picnic	45%
Camp in Developed Campground	32%
Attend Ranger-Led Program	22%
Boat	19%
Fish	13%
Bicycle	8%
Horseback Ride	7%
Overnight Backcountry Camp	3%
Other	11%

Source: GNP 1991

Use of Going-to-the-Sun Road. The Going-to-the-Sun Road is one of the main attractions of GNP and an essential component of the visitor experience. In addition to providing unparalleled vistas for its travelers, it is the only route by which visitors can cross Glacier in their vehicles. The importance of the Going-to-the-Sun Road is indicated by the popularity of the sites to which it provides access. The areas along the Road receive the highest number of visitors and are often the focal point for a visit to GNP (Table 9 and Figure 12).

The most frequently visited destination along the Going-to-the-Sun Road is the Logan Pass area, where 76 percent of all visitors stopped during their trip to Glacier, 90 percent of which were out-of-state visitors. In addition to Logan Pass, there are a number of other popular sites along the Road. Among those are Lake Mc Donald, where 63 percent of visitors stopped, and the St. Mary Visitor Center, on Glacier's eastern side, which was visited by 41 percent of visitors. Many of these visits to areas along the Going-to-the-Sun Road are fairly short. A large share of visitors stops for more than an hour at only two sites, Avalanche and Logan Pass.

Table 9. Time spent in specific areas along the Road.

Area	Percent of Respondents Who Stopped	Most Frequent Response for Duration of Stop
Apgar	48%	15 – 30 minutes
Lake McDonald	63%	15 – 30 minutes
Avalanche	40%	1 – 4 hours
McDonald Creek/Overlook	29%	< 15 minutes
West Side Tunnel	26%	< 15 minutes
The Loop	35%	< 15 minutes
Big Bend	18%	< 15 minutes
Oberlin Bend	12%	< 15 minutes
Logan Pass	76%	1 – 4 hours
Siyeh Bend	21%	< 15 minutes
Jackson Glacier Overlook	36%	< 15 minutes
Sunrift Gorge	29%	< 15 minutes
Sun Point	29%	< 15 minutes
Rising Sun	32%	< 15 minutes
St. Mary Visitor Center	41%	15 – 30 minutes

Source: WIS 2001c.

Table 10. Days spent in the Glacier National Park area by Park visitors.

Number of Days	Percent
1	28%
2	21%
3	15%
4	10%
5	7%
6	18%

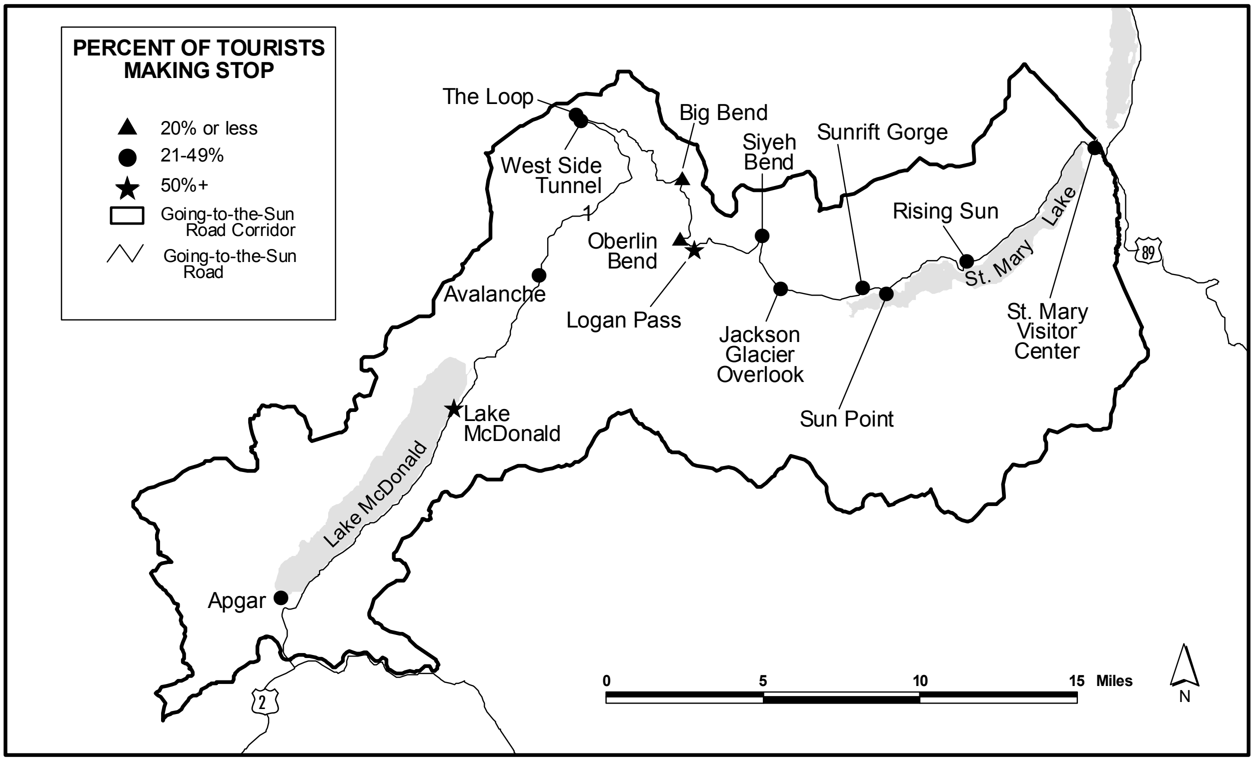
Source: WIS 2001c.

Visits to Other Park Areas. Glacier visitors explore a number of different areas in addition to those Park attractions located along the Going-to-the-Sun Road. The Many Glacier/Swiftcurrent Area, located to the northeast of Logan Pass and accessed by the Many Glacier Road from US 89, is visited by 39 percent of Glacier visitors, while one in four visitors ventures to Canada to stop at Waterton Lakes Park. Because these areas are dead-end destinations, rather than stops along the Park's main thoroughfare, these visits require additional driving time. Therefore, the visitors who are attracted to them typically spend more time there once they have arrived. Other destinations frequented by visitors in the Park include Two Medicine, Polebridge/ North Fork, Chief Mountain, and Camas Road. Table B-1 in Appendix B includes a summary of visitor use in GNP besides the Going-to-the-Sun Road corridor.

Duration of Trip. About one-half of all GNP visitors spend less than 2 days in the Park (Table 10). For in-state Glacier visitors, the average stay in the Park vicinity is 2 days and 1 night, while non-Montanans visit the Glacier area for an average of 4 days and nights.

In addition to time spent in the GNP area, many visitors also travel to other parts of the state. On average, Canadian visitors to Glacier spend one additional day in Montana, while other out-of-state visitors typically travel in Montana for another four days.

Figure 12. Percent of Tourists Making Stops.



Travel Routes. While there are many routes that visitors to GNP may take to arrive or depart from the Park, the majority of visitors use either US 2 or US 89 (Figure 1). These two roads account for about 70 percent of all trips to and from the Glacier area.

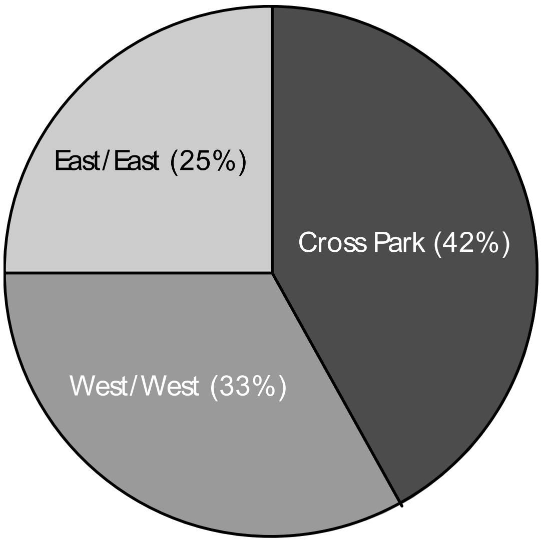
Depending on the route traveled, visitors to Glacier may travel through one or all of the counties in the United States portion of the study area. Visitors who travel to, or from, the west side of the Park on US 2 travel through Flathead County in route. US 2 on the east side of the Park takes a visitor through Glacier County. Travel on US 93, north of Glacier, brings visitors through Flathead County, while south of the Park, US 93 and MT 83 cross both Flathead and Lake counties. On the southeast side of GNP, US 89 travels through Glacier County.

Overall, the largest portion of visitors to GNP (42 percent) choose to enter the Park from one direction and exit the Park in the other direction, either moving from west to east or vice versa. The second largest share of travelers (33 percent) both enter and exit on the west side. Figure 13 illustrates the relative frequency of the three combinations of entry and exit travel route combinations for GNP visitors.

The routes that visitors travel to and from the Park have significant implications for the distribution of visitor expenditures and local economic impacts.

Visitor Origins. GNP is a destination for travelers from many parts of the world. Visitors come from throughout North America and overseas to experience its unparalleled natural beauty and take advantage of its recreational amenities. For this analysis, visitor origins were placed in four

Figure 13. Travel Routes To/From Glacier National Park, 2000.



Source: BBC 2003.

categories based on responses to the 2000 visitor survey. The vast majority (72.8 percent) of visitors to Glacier are from states other than Montana. The remaining share of visitors is comprised of Canadians, locals from Flathead, Lake or Glacier counties or non-local Montanans. Canadian visitors account for 6.8 percent of Glacier visitation, while local Montanans are 9.2 percent and non-local Montanans make up the remaining 11.2 percent. While there are non-Canadian foreign visitors to GNP, the totals are relatively insignificant.

Results of the 2002 Visitor Survey indicate a drop in the number of out-of-state and foreign visitors to GNP. It is thought that this change in visitor origins is due primarily to the tragic events of September 11, 2001, and that the results of the previous 2000 Visitor Survey more accurately reflect historical visitor patterns.

Visitor Spending. The 2000 visitor survey asked respondents to estimate their group's average daily expenditure on various goods and services during their visit to the Glacier area (WIS 2001b). The average group spent about $220 per day, though there is a great deal of variation among visitors depending on their lodging choices. Lodging and/or camping, along with meals and drinks at bars and restaurants, account for the largest share of total visitor expenditures. Out-of-state visitor groups spend the largest amount, while local Montanans spend much less. Average daily expenditures by Canadian visitors ranged from about $46 to $270 per day depending on their place of lodging. Additional information on average daily expenditures is included in Appendix B, Tables B-2 and B-3.

Based on responses to the 2000 and 2002 visitor surveys on travel routes to and from the Glacier area, and interviews with local representatives, estimates were developed for expenditures that took place in different market areas within the larger study area (Table 11). In 2002, total expenditures by GNP visitors were an estimated $128 million, distributed between three Montana counties and southwestern Alberta. This estimate excludes spending by residents of the study area who visited the Park. The largest share of total visitor expenditures in the study area took place in Flathead County followed by Glacier County, , Lake County, and southwest Alberta (BBC 2003).

Contribution of GNP Visitors to Local Economies. The estimated $128 million in annual spending (year 2002) by visitors to GNP provides an important contribution to local economies within the study area. For example, the estimated $43 million in annual spending of GNP visitors on lodging and camping in United States portions of the study area, depicted in Table 11, represents a substantial portion of all annual expenditures on lodging in the three-county area.

Table 11. Baseline GNP visitor expenditures by category and county (year 2002).

Expenditures	Montana Counties			SW Alberta	Regional
	Flathead	Glacier	Lake	CD-3	Total
Groceries	$5,000,000	$3,400,000	$1,900,000	$1,700,000	$12,000,000
Restaurant/Bar	$9,600,000	$6,600,000	$3,600,000	$3,200,000	$23,000,000
Gas/Auto	$5,500,000	$3,700,000	$2,100,000	$1,800,000	$13,100,000
Lodging/Camping	$21,000,000	$14,300,000	$8,000,000	$7,000,000	$50,300,000
Recreation	$4,300,000	$2,900,000	$1,600,000	$1,400,000	$10,200,000
Gifts	$6,000,000	$4,100,000	$2,300,000	$2,000,000	$14,400,000
Other[†]	$2,200,000	$1,500,000	$800,000	$700,000	$5,200,000
Total	$53,600,000	$36,500,000	$20,300,000	$17,800,000	$128,200,000

[†]Excluding airfare.
Source: BBC 2003.

Using the IMPLAN input/output model (described in more detail in Chapter 4 and Appendix B), the direct and secondary output (sales) and employment within the study area that is supported by GNP visitor spending was estimated (BBC 2003). Direct employment and sales supported by GNP visitors reflects the "first round" effects of visitor purchases. Secondary employment and sales supported by GNP visitors reflects "multiplier effects," or the economic activity that is supported by goods and services purchases of businesses serving tourists, as well as the activity supported by the purchases of the employees who work in tourism related businesses.

In addition to the $128 million in estimated direct sales to Glacier Park visitors in 2002, secondary, or "multiplier" effects added another $75 million to the economic activity generated by GNP visitors in the study area. The total level of sales or output related to GNP visitation in 2002 is estimated at nearly $204 million, as shown in Table 12 (BBC 2003).

Table 12. Estimated direct and secondary output supported by GNP visitation (year 2002).

Area	Direct Output	Secondary Output[†]	Total Output
Montana			
Flathead County	$53,600,000	$22,200,000	$75,800,000
Glacier County	$36,500,000	$8,300,000	$44,800,000
Lake County	$20,300,000	$7,300,000	$27,600,000
Study Area Total	$110,400,000	$37,800,000	$148,200,000
Statewide[‡]	$110,400,000	$49,900,000	$160,300,000
Alberta	$17,800,000	$25,600,000	$43,400,000
Total	$128,200,000	$75,500,000	$203,700,000

[†]Secondary output totals include induced effects (economic activity supported by direct employee spending) and indirect effects (economic activity supported by goods and services purchases of directly affected industries).
[‡]Statewide totals are derived by defining the state of Montana as the area of impact within IMPLAN.
Source: BBC 2003.

The annual output (sales) figures can be translated into numbers of jobs based upon the IMPLAN model (IMPLAN 2002). Visitation to GNP in 2002 is estimated to have directly supported about 3,500 jobs in Montana and Alberta and indirectly supported over 1,000 additional jobs (Table 13).

Park Operations

Another facet of GNP's contribution to local economies is the operation of the Park itself. NPS operations at GNP includes seasonal and full-time employees with an annual budget that includes $10 million in base funding for operations and about $18 million in special project funds for 2002. Park concessionaires, particularly Glacier Park Inc. (GPI), which operates the major lodges within the Park and other facilities and services, also add to local employment and economic activity and may help to stabilize the local economy.

Park concessioner activity is reflected within the lodging sectors of the three Montana counties, captured in the IMPLAN model. A portion of the local economic activity resulting from NPS operations is also reflected in the model, as part of the recreation services sector. However, the relatively unusual nature of these operations and the fact that a substantial portion of their funding is not directly linked to visitor expenditures implies that these activities may not be well represented by standardized economic models. The following is a summary of key aspects of current Park operations, from an economic standpoint.

Table 13. Estimated direct and secondary employment supported by GNP visitation (year 2002).

Area	Direct Jobs	Secondary Jobs†	Total Jobs
Montana			
Flathead County	1,550	370	1,920
Glacier County	1,010	140	1,150
Lake County	640	130	770
Study Area	3,200	640	3,840
Statewide	3,200	850	4,050
Alberta	300	200	500
Total	3,500	1,050	4,550

†Secondary jobs include induced effects (jobs supported by direct employee spending) and indirect effects (jobs supported by goods and services purchases of directly affected industries).

Source: BBC 2003.

Expenditures. The Park's 2002 appropriations total $28 million, a 22 percent increase over 2001 appropriations of $23 million. The primary reason for the increase was an addition of $6.9 million in funds for construction projects, including the Apgar/Headquarters water system and hotel stabilization at Many Glacier. In addition to annual appropriations, the Park spent $1.8 million in 2001 and $2.5 million in 2002 in earned revenues, primarily consisting of recreation fee demonstration projects. These expenditures were supported by $3.2 million in revenues in 2000 and $3.1 million in revenues in 2001.

Of the $28 million 2002 budget, only $10.4 million (36 percent) consists of on-going Park operations, with other operating spending including the cost of collecting revenues ($750,000), a new learning center to be established in 2002 ($225,000), and expended revenues ($2.5 million). All other spending is composed of various one-time projects, including this EIS and a number of on-going construction efforts.

The majority of operating appropriations consists of employee salaries and benefits. In 2000, salaries and benefits made up 87 percent of all operating spending, with supplies and materials, services and travel constituting another 10 percent.

Employment. GNP's 2001-2002 budget reports 155 full-time positions, 25 of which were unfilled as of January 2002 (Table 14). These employees are organized into six operating divisions that report to the Superintendent's office: administration, interpretation, resource management, facility management, project management, and concessions management. In addition to these full time positions, GNP employs approximately 390 seasonal workers each year.

Table 14. National Park Service employees by division at Glacier National Park.

NPS Division	Total Positions	Vacant Positions	Filled Positions
Superintendent's Office	5	2	3
Administration	21	0	21
Interpretation	13	3	10
Resource Management	52	11	41
Facility Management	55	9	46
Project Management	6	0	6
Concessions Management	3	0	3
Total	155	25	130

Source: GNP 2002.

Local and Regional Economy

The Montana portions of the study area cover Flathead, Glacier, and Lake counties and include large parts of two American Indian Reservations, the Flathead Reservation and the Blackfeet Reservation. The Alberta portion of the study area includes three municipal districts, incorporated and unincorporated towns and villages, and two Native Reserves.

Information presented in this section without citation comes from the Going-to-the-Sun Road *Socioeconomic Study* (WIS 2001b). Other citations included in this text refer to new information gathered specifically to prepare this analysis.

Montana

Figure 14 depicts the Montana portion of the study area, which includes three counties of northwest Montana: Flathead, Glacier, and Lake counties. This section provides information on land ownership, economic conditions, employment, and other economic characteristics of the Montana portion of the study area.

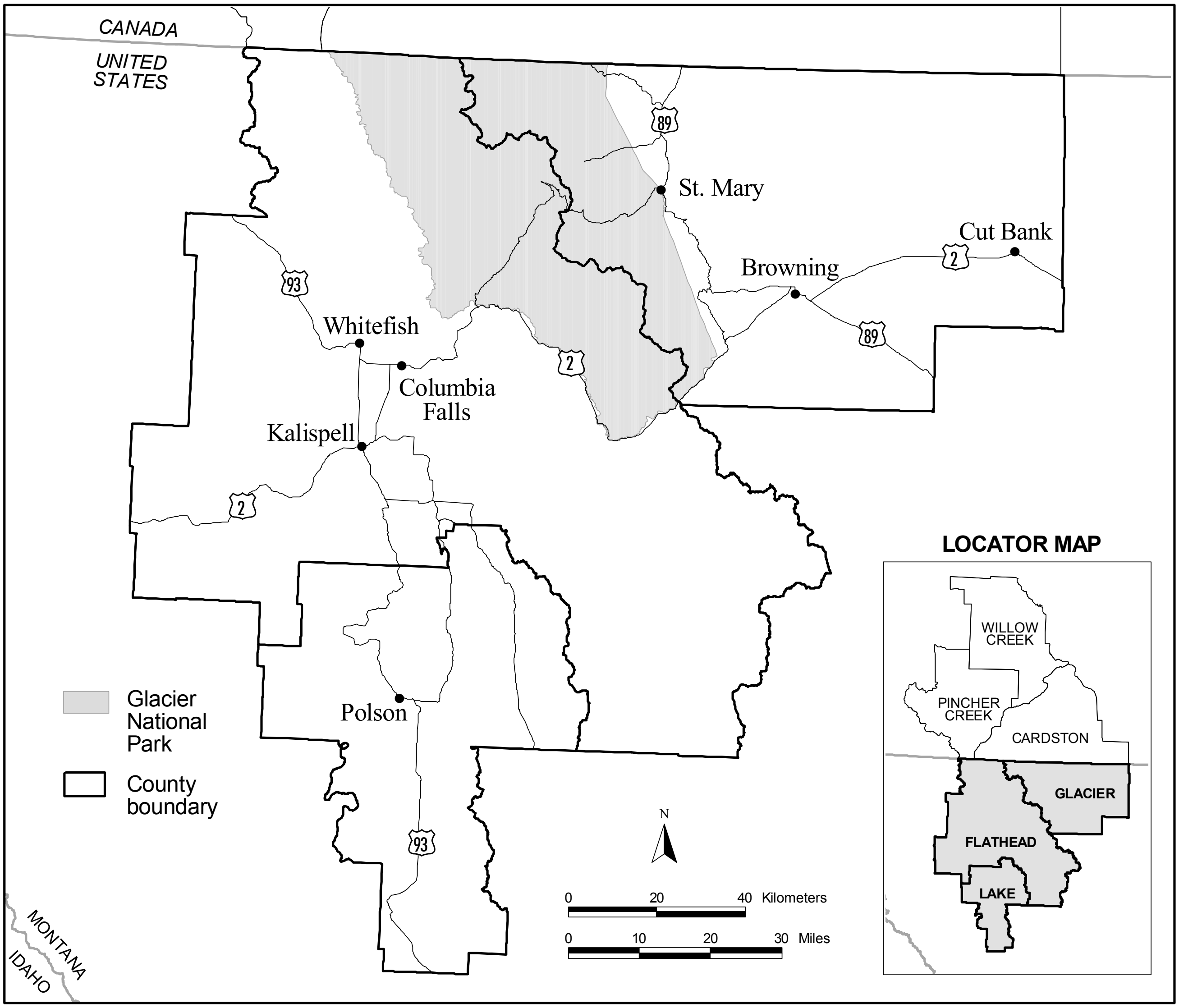
Land Ownership. A large share of the lands within the United States portion of the study area is not privately owned. In the three Montana counties, there are national parks, national forests, Bureau of Land Management (BLM) property, a wildlife refuge, and substantial portions of two large American Indian Reservations (Table 15).

Table 15. Montana portion of the study area land area and ownership.

Location	Ownership Percentage				
	Land Area in Square Miles	National Park	USFS/BLM	Reservation	Other
Montana	145,556	1%	26%	6%	67%
Flathead County	5,099	11%	53%	1%	35%
Glacier County	2,995	33%	2%	48%	18%
Lake County	1,494	0%	15%	37%	48%
Three-County Region	9,588	16%	31%	21%	32%

Source: WIS 2001c.

Figure 14. Montana Economic Study Area.



Economic Base and Employment. For its size, Flathead County has a diverse local economy anchored by tourism, forest products, and electric power generation. Emerging trends include technology, the arts, professional services, and businesses catering to second-home owners and retirees.

In Glacier County, almost half of the land area is within the Blackfeet Reservation. With Reservation residents comprising about 70 percent of the county's population, Tribal agencies are a major source of jobs and income, bolstered by tourism and agriculture.

The Flathead Reservation comprises about 37 percent of the land area in Lake County. The remaining land includes large natural resource areas such as Flathead Lake, the National Bison Range, and the Bob Marshall Wilderness. Besides a strong visitor base, the Lake County economy relies on timbering, manufacturing, and electric power generation.

Over 50 percent of total employment in Flathead, Glacier, and Lake counties is in the trade and services sectors. Construction jobs represent an above state average share of employment in Flathead County, reflecting rapid growth from 1990 to 1999. In Flathead County, the construction sector responds to other economic development activity within the county, including the county's emerging identity as a desirable second-home and retirement community. Only about 12 percent of the construction jobs in Flathead County are with heavy construction firms, and only about 3 percent are with highway, street and bridge construction firms (Census 2002).

Manufacturing jobs are 11 percent of total employment in Lake and Flathead counties, which is a relatively large share for small counties. Forest products firms are the largest source of manufacturing jobs in both counties. Job growth in tool and technology manufacturing grew quickly in Lake County between 1990 and 1999, but a major consumer product manufacturer experienced layoffs in 2000. Historically, aluminum processing also has been important in Flathead County. The Columbia Falls Aluminum plant cut back operations sharply in 2001, but is increasing production in 2002 to about 50 percent of capacity (Daily Inter Lake Newspaper 2002).

Glacier and Lake counties have large farm and agricultural services sectors, and of all three counties, Glacier has the most prominent government sector, at 22 percent of total employment. Table B-4 in Appendix B includes a profile of employment by key industry sector in Flathead, Glacier, and Lake counties and comparable data for Montana as a whole.

Total employment in the three counties grew to 66,346 full and part-time jobs in 1999 from 37,652 in 1980, an average annual rate of 3.0 percent compared to 1.8 percent for the State of Montana (Table 16). Almost all the job growth occurred in Flathead and Lake counties, which grew respectively at rates of 3.4 percent and 3.6 percent per year on average. Glacier County added only a few hundred jobs between 1990 and 1999, and the employment level in 1999 was still somewhat lower than in 1980.

Employment by industry in the three-county region has shifted over the past two decades from high- to relatively low-earning sectors of the economy. Based on data from 1999 (the most recent available), jobs in the services sector are now 32 percent of total employment, up from 22 percent in 1980, while retail jobs are 20 percent of total employment, up

Table 16. Total employment, 1980 to 1999, three-county study area, Montana.

Location	1980	1990	1999	Average Annual Rate, 1980 to 1999
Montana	394,012	436,574	552,276	1.8%
Flathead County	24,705	33,287	46,904	3.4%
Glacier County	6,095	5,286	5,929	-0.1%
Lake County	6,852	9,376	13,513	3.6%
Three-County Region	37,652	47,949	66,346	3.0%

Source: Bureau of Economic Analysis 2001.

from 18 percent. Manufacturing jobs dropped to 10 percent of total employment in 1999 from 13 percent in 1980. The region's economy is now also less agricultural—farm employment was 4 percent of total employment in 1999, compared to 7 percent in 1980. As the third largest source of jobs in the region, government lends some stability to the local economy. Table B-5 in Appendix B includes a breakdown of employment by industry for the Montana portion of the study area.

Transportation Construction Industry. Montana's transportation construction industry (including prime and subcontractors involved in highway, street, bridge, and tunnel construction) is relatively small, with reported employment in 1999 of 1,529 spread across 113 establishments, only eight of which employ more than 50 persons. Most of the places where Montana's transportation construction businesses are located are more than 2 hour's drive from GNP. There is, however, a construction firm in Kalispell that has been involved in previous Going-to-the-Sun Road work. Three metropolitan areas (Billings, Great Falls, and Missoula) and Gallatin County, which includes Bozeman, contain more than 70 percent of employment in the transportation construction industry and most of the larger establishments. Information on the distribution of transportation construction employment and businesses is included in Appendix B, Table B-6.

Tourism. GNP visitors are one of the most important components of tourism and the general economy in Flathead County. However, the county's visitor attractions also include the Big Mountain ski resort, and Whitefish, a resort community based on year-round recreation. GNP visitors influence, but do not appear to dominate the overall economy of the county. An indicator of this is that during two downward trends in GNP visitation in the past, the rate of job growth in Flathead County slowed but did not decline.

Within the study area, Glacier County is the most dependent on tourism stimulated by GNP. One of the county's largest local employers is GPI, the lodging operator for the Park, and there are many small tourist businesses within the county. Park visitors and the ability of local businesses to capture tourist expenditures are driving local economic growth expectations.

In Lake County, many residents earn a living from tourism, including tourism generated by GNP. However, other major attractions—particularly Flathead Lake—contribute to the visitor economy. Visitor levels at GNP influence but do not appear to dominate the county's overall economy. Annual fluctuations in visits to GNP do not correspond closely with annual changes in population and employment in Lake County, but during two recent downturns in Park visitors in the mid 1980s and mid 1990s, the rate of employment growth in the county did slow down.

As a general indicator, both Flathead and Glacier counties generate greater bed tax revenue per capita than the statewide average (Table 17). Bed tax revenues in Lake County are misleading because the largest lodging establishment in the county is located on tribal land and does not collect bed taxes.

Table 17. Bed tax revenue per capita and revenue growth in the Montana study area.

Location	Bed Tax Revenue per Capita in 1999	Bed Tax Revenue Annual Growth rate Since 1990
Montana	$12.00	6.5%
Flathead County	$17.46	4.9%
Glacier County	$30.25	6.4%
Lake County	$3.00	5.6%

Source: BBC 2003.

Labor Force and Demographics. Tourist businesses employ many workers throughout the three-county region, but the range of other employment opportunities varies from county to county. In Flathead County, local residents find employment in a small concentration of manufacturing and professional services establishments, while in Lake County local residents work in timber production, power generation, manufacturing, and medical care. With fewer choices, Glacier County residents generally work at tourism-related or agricultural jobs.

Income. Total personal income has grown by almost 6 percent annually since 1980 in the study area, compared to 5 percent in Montana as a whole, but because of population growth, per capita personal income in the region grew more slowly (Table 18).

Per capita income in the three-county region grew by an annual average of 4.4 percent from 1980 to 1999 compared to an annual average of 4.6 percent for the State of Montana, and is now 92 percent of the Montana average, down from 96 percent of average in 1980. Income in Glacier County has lagged behind Flathead and Lake counties by a considerable margin (Table 19). Per capita income in Glacier County grew by an annual average of 2.5 percent from 1980 to 1999, and was 69 percent of the state average in 1999 — down from 3 percent above average in 1980. The sharp decline reflects the contraction of the local oil and gas industry.

Table 18. Per capita personal income, Montana and three-county study area.

Location	1990	1995	1999
Montana	$9,143	$15,524	$21,997
Flathead County	$9,348	$15,862	$22,265
Glacier County	$9,462	$11,162	$15,205
Lake County	$6,959	$13,270	$17,234
Three-Region County	$8,815	$14,695	$20,295

Source: Bureau of Economic Analysis 2001.

Table 19. Total personal income, Montana and three-county study area.

Location	1980	1990	1999
	(thousands of dollars)		
Montana	$7,211,462	$12,416,204	$19,418,790
Flathead County	$486,788	$944,304	$1,620,301
Glacier County	$100,286	$135,496	$191,629
Lake County	$132,915	$279,289	$446,093
Three-County Region	$719,989	$1,359,089	$2,258,023

Source: Bureau of Economic Analysis 2001.

Unemployment. The job base in these counties prompts people to commute into the primary study area on a regular or seasonal basis. However, unemployment rates among local residents remain higher than in the State of Montana as a whole, especially in Glacier County because of its dependence on seasonal jobs and high unemployment among residents of the Blackfeet Reservation. Table 20 compares unemployment rates at the state, county, and regional level for selected years since 1990.

Labor Force Availability and Employment Seasonality. Seasonality, availability, and other characteristics of the local labor force affect the

Table 20. Unemployment rates, Montana and three-county study area.

Location	1990	1995	1999
Montana	6.0%	5.9%	5.2%
Flathead County	7.6%	8.1%	7.1%
Glacier County	11.8%	14.7%	14.3%
Lake County	8.2%	8.0%	6.3%
Three-Region County	8.2%	8.8%	7.6%

Source: LAUS 2001.

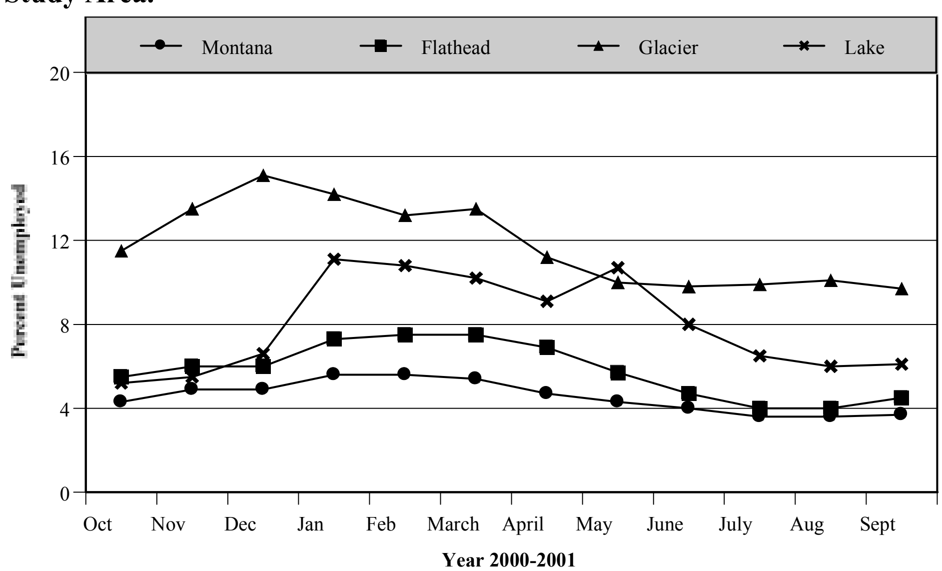
ability of firms and projects to hire locally within the Montana study area. A relatively high proportion of Glacier County's labor force was unemployed during 2000, and, based on 1990 data, relatively few Glacier County residents commuted to jobs in other counties, while the county attracted a relatively small proportion of new residents. A large proportion of Lake County workers commuted to jobs in other counties, as compared to the other counties in the study area and in Montana as a whole.

Employment within the study area fluctuates seasonally, as it does to a much lesser extent in Montana as a whole. In all three counties, the unemployment rate is highest in the winter and lowest in the summer, mainly reflecting patterns of activity in tourism and agriculture. A diversity of employers tends to lessen seasonal differences in unemployment in Flathead and Lake counties, compared to Glacier County. Using data from 12 recent months, Figure 15 illustrates the seasonality of unemployment in the counties of the study area compared to Montana as a whole.

Within the three-county study area, local residents filled about 95 percent of local jobs in 1990, according to the most recent commuting data available. Missoula County was the largest single-county source of in-commuters to the study area in 1990, with most going to Lake County where Missoula County residents were about 2 percent of the work force located in Lake County. A significant proportion (16 percent) of Lake County's working residents held jobs outside the county, with more than half of Lake County's out-commuters traveling to work in Flathead County (BBC 2003).

Demographics. The three-county study area is mainly rural, and although there are many population centers, most are quite small. Flathead County contains some of the population centers in the study area: the city of Kalispell (14,223), unincorporated Evergreen near Kalispell (6,215), the city of Whitefish (5,032), and the city of Columbia Falls (3,645) (Census 2000a). There are 15 other small population centers in Flathead County. Glacier County has seven population centers, the largest of which are the city of Cut Bank (3,105) and the town of Browning (1,065), unincorporated North Browning (2,200), and unincorporated South Browning (1,677). Among the 18 population centers in Lake County, the largest are Polson (4,041), the city of Ronan (1,812), and the town of St. Ignatius (788).

Figure 15. Seasonality in Monthly Unemployment Rates in the Montana Study Area.



Source: LAUS 2001.

Since 1980, the population of the primary study area has consistently grown faster than the State of Montana as a whole. Regional growth is mostly due to high growth rates in Flathead and Lake counties since 1990, where there has been a surge of recreation development and second-home ownership. In contrast, the growth rate in Glacier County since 1990 has fallen to below that of the state and region. The 2000 Census counted 114,225 people in the three counties and placed Flathead County's population at 74,471, or 65 percent of the total (Table 21).

Table 21. Study area population, Montana and three-county study area.

Location	1970	1980	1990	2000
Montana	694,409	788,752	799,055	902,195
Flathead County	39,460	52,076	59,218	74,471
Glacier County	10,783	10,599	12,139	13,247
Lake County	14,445	19,101	21,046	26,507
Three-County Region	64,688	81,776	92,403	114,225

Source: Census 2000a.

The presence of the Blackfeet and Flathead reservations influences the demographics of the study area. The projections indicate that the state and all three counties will grow considerably slower in the future, with Glacier County expected to grow hardly at all. As a whole, the projections indicate that the three-county region would grow at the rate of about 1.5 percent per year from 2000 to 2025 (Table 22). Projected populations for the year 2025 within the three-county study area published by the State of Montana are 113,160 for Flathead County; 13,420 for Glacier County; and 38,930 for Lake County.

Demographic data indicates that 19 percent of the population in the three-county study area were below the poverty level in 1998 (Census 2000b). Persons in poverty are greatest in Glacier County (36 percent), followed by Lake County (22 percent), and Flathead County (15 percent). Additional information on demographic characteristics for the three-county study area and Montana is included in Appendix B, Table B-7.

Flathead Reservation. Lake County contains more than 600 square miles (1,555 square kilometers) of the Flathead Reservation and the Reservation's important population centers. About 44 square miles (114 square kilometers) of the Reservation are in Flathead County, and the rest of the Reservation is in Sanders County. The Flathead Reservation contains most of Flathead Lake, the Mission Valley, the National Bison Range, and the Mission Tribal Wilderness, as well as significant commercial timber resources.

The population within the 1.2-million acre (486,000 hectares) Flathead Reservation is 26,172, having grown at about 2.1 percent per year since 1990. Only about 27 percent of the population on the Reservation consists of American Indians. The

Table 22. Historical and projected population growth rates for the Montana study area.

Growth Rate	Montana	Flathead	Glacier	Lake
Annual rate of growth 1990 to 1999	1.2%	2.3%	0.9%	2.3%
Projected annual rate of growth 2000 to 2025	1.0%	1.7%	0.2%	1.5%

Note: Projections data available from Census and Economic Information Center, Montana Department of Commerce
Source: NPA 2000; BBC 2003.

Reservation population is relatively young, with only 5.6 percent 65 years old or older compared to 13.3 percent for the state and 15.7 percent for Lake County (Census 1990, 2000a).

Membership in the Confederated Salish and Kootenai Tribes of the Flathead Nation is about 6,900 (Montana Dept. of Labor and Industry 2002). Tribal headquarters are in unincorporated Pablo in Lake County (population of 1,814) (Census 2000a). Three other larger communities of Lake County—Polson, Ronan, and St. Ignatius—are on the Reservation or within its boundaries.

Lake County's largest employer is the tribally owned and operated Best Western KwaTaqNuk Resort and casino on the shore of Flathead Lake in Polson. Other large employers are the Tribal government and Salish and Kootenai College, a tribally operated institution. State estimates show the unemployment rate on the Flathead reservation is somewhat lower than the Lake County rate, but the Bureau of Indian Affairs reports a much higher rate, about 44 percent, probably because of a different definition of the labor force (U.S. Bureau of Indian Affairs 1999). Reservation per capita income in 1989, the last year for which data are available, was about 81 percent of the rate for Montana as a whole (Census 1990). The share of persons below the poverty line in 1989 was 23 percent on the Reservation, compared to 16 percent for the state as a whole.

Other involvement in economic development by the Tribes includes direct investment and business development assistance, including the direct financial backing of another of Lake County's major employers, S & K Technologies, a defense contractor. Chambers of commerce in Polson, St. Ignatius, and Ronan promote the attractions and tourist services of the Mission Valley.

Blackfeet Reservation. The Blackfeet Tribe (Tribe) ceded land east of the Continental Divide to the United States government in an 1896 treaty. The current Blackfeet Reservation contains about 1.9 million acres. Most of the land area of the Reservation is within Glacier County and the rest is in Pondera County, Montana. The Tribal headquarters are in Browning in Glacier County. The communities of East Glacier and St. Mary, which are gateways to GNP, are on the Reservation.

The population of the Blackfeet Reservation was 10,100 in 2000, having grown at about 1.7 percent per year since 1990. About 84 percent of the population on the Reservation consists of American Indians. The Reservation population is young, with 43 percent under 18 years old compared to about 28 percent for the State of Montana as a whole (Census 1990, 2000a). The Tribe has about 15,300 enrolled members (Montana Dept. of Labor and Industry 2002).

Blackfeet Reservation farmers and ranchers produce a variety of crops and large numbers of livestock on Reservation land, about a third of which is rangeland. Reservation-based agencies such as the Tribe, Blackfeet Housing Authority, U.S. Indian Health Service, and U.S. Bureau of Indian Affairs are among the largest employers in Glacier County. Many Reservation residents are active as forest firefighters. The Reservation also contains the headquarters of GPI, the Park's lodging concessionaire, and many motels, campgrounds, restaurants, and stores whose market is mainly GNP tourists.

The unemployment rate on the Reservation is much higher than state and county levels: about 20 percent in 2000 according to the Montana Department of Labor and Industry (LAUS 2001). However, unemployment on the Reservation may be as high as 70 percent (Baucus 2001). Reservation per capita income in 1989, the last year for which data are available, was about 50 percent of the rate for Montana as a whole. The share of persons below the poverty line in 1989 was 47 percent on the Reservation, compared to 16 percent for the state as a whole (Census 1990).

The Blackfeet Nation promotes economic development by sponsoring its own business development agency, and the Tribe delivers technical assistance to businesses through Blackfeet Community College. Still, local business ventures have experienced distress, including the Blackfeet Writing Company, a manufacturer with 80 percent Tribal ownership that recently reduced its employment levels sharply.

Economic Development and Tourism Promotion. Tourism planning and promotion, as well as other local economic development activities, are the responsibility of a wide range of organizations located in many communities throughout the study area (Table 23). The range of organizations in Flathead County reflects its broad-based visitor orientation while the influence of American Indian Tribal interests is prominent in Glacier and Lake counties.

Housing. Census data for the year 2000 provides information about the total numbers and general types of housing in Montana portions of the study area. Although there are variations among them, Flathead, Lake, and Glacier counties demonstrate similar characteristics. All have relatively even splits between owner occupied and other units. Flathead County has the largest share of owner occupied units, with 62 percent, while 51 and 53 percent of the units in Glacier and Lake counties are owner occupied. Flathead also has the largest number of units overall, with 34,773, followed by Lake with 13,605, and Glacier with 5,243. The most significant factor shared by the three counties is the large number of seasonal units, constituting 79 percent of vacant units in Lake County and 69 and 41 percent in Flathead and Glacier counties, respectively.

The 2000 Census reported 9,535 vacant units in the three counties. However, 70 percent of these are seasonal units and are unlikely to be available for workforce housing. Excluding seasonal units, there were 1,600 vacant owner and renter units reported in the 2000 Census—2.9 percent of all units in the three counties. Of these units, 1,027 were classified as renter units and would be more likely to be affordable for additional workers. Housing units by county are included in Table B-8 of Appendix B.

Availability of housing may be more limited than it appears because large numbers of the vacant units are located on reservation land. On the Blackfeet

Table 23. Organizations involved in economic development and tourism promotion in the Montana study area.

County	Organizations
Flathead	Bigfork Chamber of Commerce Columbia Falls Chamber of Commerce Flathead Convention and Visitors Bureau Flathead County Port Authority Glacier County Regional Tourism Commission Kalispell Chamber of Commerce Lakeside-Somers Chamber of Commerce Whitefish Chamber of Commerce Whitefish Convention and Visitors Bureau
Glacier	Cut Bank Chamber of Commerce Glacier Action and Involvement Now (GAIN) of Cut Bank Blackfeet Tribal Council East Glacier Chamber of Commerce
Lake	Salish and Kootenai Tribal Council Port Polson Chamber of Commerce St. Ignatius Chamber of Commerce Ronan Chamber of Commerce

Source: WIS 2001b.

Reservation for example, most housing is HUD units that cannot be rented out legally. If reservation and seasonal units are excluded from vacancy calculations, about 2,000 of 9,500 vacant units in the three counties are available (Table 24).

Construction of an additional 500 units is reported as having been started between 1997 and 1999, which may have provided additional vacant units. However, no information is available about demolition over that time period, so no firm conclusions can be drawn about more recent changes in the housing market.

Table 24. Non-seasonal/reservation vacant units.

Housing Units	Flathead County	Glacier County	Lake County
Total Vacant Units	5,183	939	3,413
Seasonal Units	3,570	268	2,690
Units on Reservation Land	—	333	700
Available Vacant Units	1,613	338	23

Source: Census 2000a.

Community Facilities and Services. A wide array of jurisdictions and agencies provide public services in Montana including: the State of Montana; Flathead, Glacier and Lake counties; numerous cities and towns (Kalispell, Whitefish Columbia Falls, Browning, Cut Bank and others); and a variety of local water, wastewater, and fire districts. The following is a brief description of service provision in a number of areas, followed by a more in-depth discussion of the public revenues and expenditures of a number of major entities.

Public Safety. Public safety services are provided at the federal, state, provincial, county, and municipal levels. For the most part, however, localities take responsibility for public safety. In Montana, these services are delivered by the three counties in unincorporated areas and by municipalities in incorporated areas. Because the study area is largely unincorporated, the counties provide most public safety services.

Water and Wastewater. Unlike public safety, water and sewer services in Montana are not typically provided by the county. Instead, utilities managed by cities, towns, and local improvement districts provide this service.

Fire protection. Fire protection is similar to water and sewer service provision, with municipalities and local districts providing the service.

Schools. School services in the Montana study area are provided by a number of districts and are overseen by superintendents in each county. Flathead County serves over 11,000 students in 32 elementary and middle schools and four high schools. Glacier County has a student population of 3,000 and Lake County has a student population of 4,600.

The school districts adjacent to GNP are located in Flathead County and Glacier County. In Flathead County, the Columbia Falls, Kalispell, West Glacier and Whitefish districts constitute 15 elementary schools with 5,700 students and three high schools with 1,600 students. Kalispell school trustees are evaluating the construction of one or more new high schools to alleviate overcrowding and serve expected growth (The Daily Inter Lake 2002). On the east side of GNP, the closest districts are Browning and East Glacier, with 1,400 students in eight primary schools and 548 high school students in one school.

Public Revenues and Expenditures. One method of gauging the available capacity of the various public service providers is through an examination of their financial condition. The following discussion summarizes the finances of the three-county study area and Montana.

The budgets of the three counties vary in size, from Glacier at $13.8 million to Lake at $18.2 million and Flathead at over $60 million. These variations are due to a diversity of revenue bases and service demands. The budget for the State of Montana exceeds $1.8 billion for general fund services alone. The finances of each of the three counties are subject to fluctuations in taxable valuations and related dependence on property tax revenues as well as a lack of sales tax revenues.

Flathead County. Flathead County is the largest of the three counties with a 2001 budget that was over four times the budget of Glacier County, totaling $61.2 million. Primary expenditures included government activities, various capital projects, provision of solid waste services, road and bridge funds, and sheriff expenses.

Approximately 50 percent of these services are funded through property taxes ($31 million), while the balance ($30 million) are supported by fees, grants, and other revenues. The general fund is primarily supported by property taxes (24 percent of revenues) and state transfers (26 percent). Primary funding for the road and bridge and sheriff funds comes from the same two sources, with property taxes and intergovernmental transfers constituting essentially all revenues.

Flathead County's taxable property value has decreased from $137 million in 1997-1998 to $130 million in 2001-2002. As in Glacier and Lake counties, this is due to changes in the state's property classification system. In addition, like Glacier and Lake counties, Flathead County does not have any general obligation debt.

Glacier County. Glacier County's 2001 budget was reported at $13.8 million including $7.4 million in appropriations for the county hospital.

While most of the county's general fund, road fund, bridge fund and public safety fund expenditures are supported by taxes, hospital expenditures are generally reimbursed. The largest share of general fund revenues (43 percent) consists of property taxes, with other large revenue sources including intergovernmental funds (state and federal transfers making up 24 percent of revenues) and interest earnings (10 percent). Property taxes also constitute the largest share of road fund and public safety revenues, with various intergovernmental transfers providing substantial additional support to those funds.

Glacier County's taxable valuation has declined slightly over the past 4 years, from $22.4 million in 1997-98 to $17.4 million in 2001-2002. The decline is primarily due to state property re-classifications, which are designed to phase out taxation of personal property. Based on this level of taxable valuation, the county generates $17,400 with every mil of property tax that is levied. Glacier County does not have any general obligation debt to support with property taxes or other revenues.

Lake County. Lake County's budget in 2001 totaled $18.2 million. Major expenditure items in Lake County included general fund services, public safety and district court, various solid waste functions, improvements to the Ronan airport, and road and bridge services.

Together, these services make up two-thirds of Lake County spending. The majority of the budget is funded by property taxes and intergovernmental revenues. Primary general fund support comes from property taxes and intergovernmental transfers, which constitute 29 and 26 percent of respective revenues. Property taxes and intergovernmental revenues also make up 90 percent of road and bridge fund revenues and 56 percent of sheriff revenues.

Like Glacier County, Lake County's taxable valuation decreased from $47 million in 1997-98 to $45 million in 2001-2002 due to state re-classifications. Lake County does not have any general obligation debt to support with property tax or other revenues.

State of Montana. The State of Montana's 2000 financial statements reveal general fund revenues of $1.1 billion and special revenue fund revenues of $1.8 billion. Over 82 percent of state revenues come from taxes and federal transfers, with taxes constituting a majority of general fund revenues ($822 million) and federal funds contributing a majority of special revenue funds ($1.1 billion). State-generated tax revenues consist primarily of income, property and fuel taxes, with smaller contributions from natural resources and other taxes.

A relatively minor revenue source is the 4 percent accommodations (bed) tax imposed on users of overnight lodging facilities. Total receipts from this tax totaled $11 million in 2000, with two-thirds distributed to the state Department of Commerce, 10 percent to other state agencies and 22.5 percent to various regional tourism corporations.

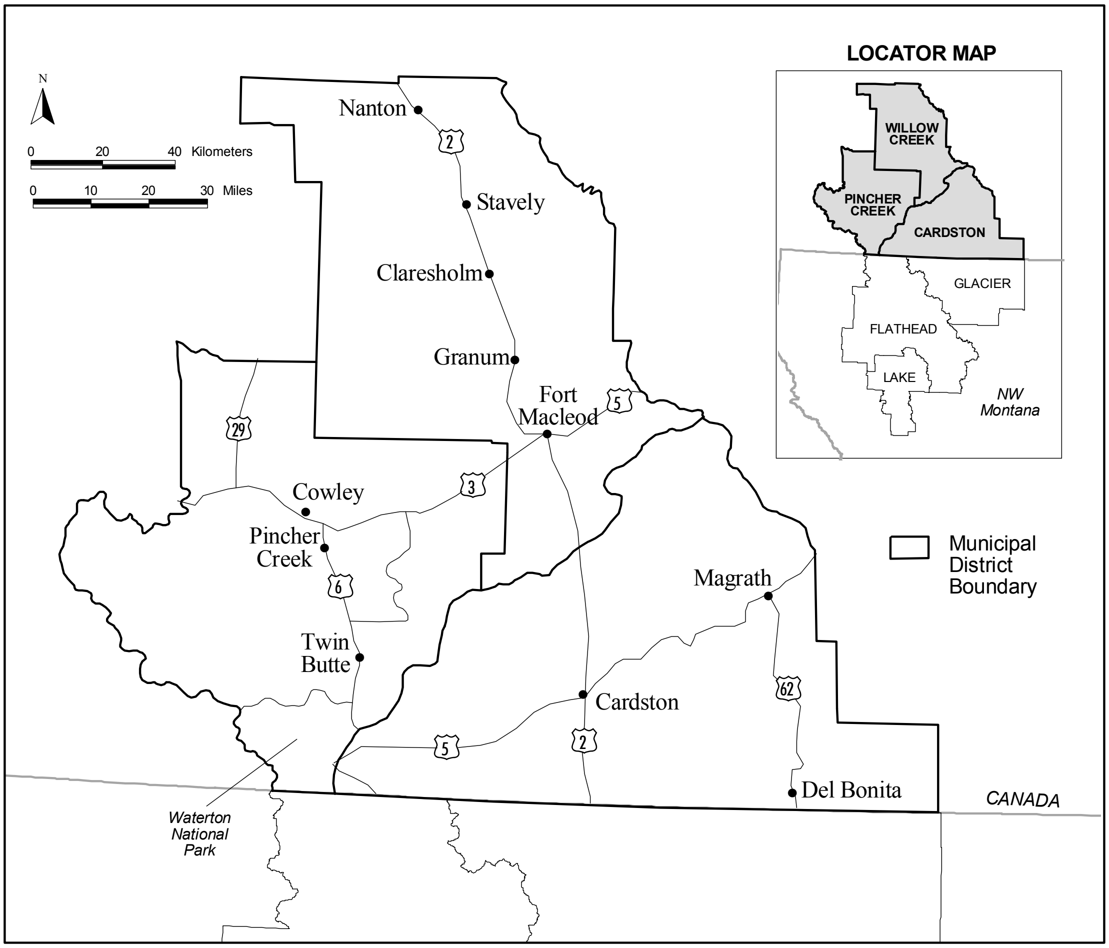
While the state's revenues primarily come from two sources, taxes and federal transfers, expenditures are distributed more evenly, with 87 percent spread among five areas: general government, public safety/corrections, transportation, health/social services, and education/cultural. Of these expenditures, three (general government, public safety/corrections, and education/cultural) are primarily state funded and the other two (transportation and health/social services) are predominantly funded by federal revenues.

Southwest Alberta

The portion of the study area located in Canada is the part of southwest Alberta Province that surrounds the Park and connects to the United States at three border crossings north of Glacier County, Montana (Figure 16). The area, defined as Alberta Census Division 3, includes the municipal districts of Pincher Creek, Willow Creek, and Cardston, many incorporated villages and towns, the WLNP and the Town of Waterton, and two First Nation (North American Indian) Reserves. The border crossings between Montana and southwest Alberta are Chief Mountain (Montana 17 to Alberta 6), Carway (U.S. 89 to Alberta 2) and Del Bonita (Montana 444/213 to Alberta 62). This section discusses information on land ownership, economic conditions, employment, and other economic characteristics of the Alberta portion of the study area.

Land Ownership. The land area of the study area in Canada is about 5,324 square miles (13,790 square kilometers). Much of the study area is private land. WLNP is the largest block of public land within the southwest Alberta study area. The Blood Band Reserve (526 square miles; 1,362 square kilometers) and the Piegan Nation Reserve (about 176 square miles; 456 square kilometers) are other large areas of special-status land within the study area.

Figure 16. Southwest Alberta Study Area for Socioeconomic Analysis.



Economic Base. Agriculture and mining (primarily oil and gas production) remain key sectors of southwest Alberta's economic base, although mining has been stagnant since the early 1980s. Recently, value added industries like food processing and wood, fiberglass, and cement products manufacturing have grown as contributors to the local job base. Another emerging trend is the growth of the housing, trade, and services sectors because of retirees attracted to the study area by the quality of life and low cost of living. The health care industry is an established presence in southwest Alberta, as are businesses catering to tourists who visit the region for its natural attractions and recreational opportunities.

Tourism. Visitation to southwest Alberta's parks and attractions peaks in the summer months. The study area is on a popular and heavily promoted travel route that links national parks from Jasper in Canada to Yellowstone in the United States. The major parks along the "Trail of the Great Bear" include Jasper, Banff, Glacier, and Yellowstone. WLNP attracts more than 400,000 visitors per year. Surveys in WLNP and in the "Chinook Country" tourism region of southwest Alberta indicate that from 40 percent to 50 percent of visitors to the study area are from the United States. The United States-to-Canadian currency exchange rate is favorable to United States visitors, but relative increases in Canadian travel prices may reduce the margin somewhat in the future.

Labor Force and Demographics. In 1996, about 25 percent of the employed labor force in southwest Alberta worked in agriculture, 2 percent in mining, about 5 percent in manufacturing, and about 6 percent in construction. About 8 percent of employed persons worked in the accommodation, food, and beverage industry that supports tourism. Some localities in the region where employment in the tourism-related industries is especially important are the Waterton townsite (45 percent of employed residents), Glenwood (41 percent), Cowley (19 percent), Fort Macleod (15 percent), and Hillspring (12 percent) (Statistics Canada 2001; BBC 2003).

Income. Average household income in the southwest Alberta study area was $40,427 Canadian in 1996, or about 20 percent lower than the level of $51,118 Canadian for Alberta as a whole. Average household income for the study area was $38,562 Canadian in 1991, indicating an average annual rate of increase of 0.9 percent through 1996, or less than the rate of inflation for the period. However, only about 14 percent of the population in the southwest Alberta study area resided in low-income households in 1996, compared to about 18 percent for the province as a whole (Statistics Canada 2001).

Unemployment. The unemployment rate in the southwest Alberta study area was 8 percent in both 1991 and 1996, which is higher than for Alberta as a whole (6.9 percent in 1996) because of the large number of persons employed seasonally in agricultural jobs. There are pockets of very high unemployment within the study area, too, particularly among residents of the Native Reserves where the unemployment rate averaged about 27 percent in 1996 (Statistics Canada 2001).

Working outside of Canada is uncommon for residents of the southwest Alberta study area. In 1996, only a few dozen persons reported working outside the country, equating to less than one-half of one percent of the employed labor force (Statistics Canada 2001; BBC 2003).

Demographics. The 1999 estimate of the population of southwest Alberta was 41,231, an increase of about 3 percent per year from the 1996 census count of 37,764. From 1991 to 1996, the population of the southwest Alberta study area grew at less than 1 percent per year compared to growth in Alberta as a whole of about 1.9 percent per year. Relative to the province as a whole, the southwest Alberta study area had proportionately more residents in 1996 under the age of 15 (27 percent versus 21 percent) and fewer resident 65 years old or older (12 percent versus 18 percent).

Native North Americans were about 19 percent of the total population of the southwest Alberta study area in 1996. Some Native North Americans live in many of the communities within the southwest Alberta study area, but most live on the region's two Reserves. In 1996, 4,305 Native North Americans resided on the Blood Reserve and 1,645 resided on the Piegan Reserve.

Economic Development and Tourism Promotion. The southwest Alberta study region contains 14 incorporated towns and unincorporated villages. The largest towns, and their populations in 1996, are: Pincher Creek, 3,659; Claresholm, 3,427; Cardston, 3,417; and Fort Macleod, 3,034. All other population centers in the study area had 1996 populations of less than 2,000.

Most towns in the study area have an economic development board and staff, and there are five chambers of commerce. There are also three regional organizations devoted to economic development and tourism promotion. One of these, the Niitsitapi Tourism Society of Alberta promotes Native North American-centered tourism for the Blackfeet Confederacy. There are notable community-based tourist attractions and events in the towns of Pincher Creek, Claresholm, Cardston, Fort Macleod, and on the Blood and Piegan Reserves.

Housing. Canada's Census Division #3 reported 3 percent vacancies and only 385 vacant units in 1996. No breakdown of these figures between owner and renter occupied is available.

Community Facilities. On the Canadian side of the border, public services are delivered by the Province of Alberta and a number of municipal districts, towns, and villages. Most major public services are provided by Cardston County, the municipal districts of Pincher Creek or Willow Creek, or smaller towns, villages or improvement districts. The services provided by these entities include public safety, water and wastewater, and fire protection.

Schools. In Canada, school services are overseen by educational boards, with direct management of schools provided by school districts and divisions. Although these jurisdictions are not coterminous with municipal boundaries, three districts or divisions service the majority of the study area. The largest of these is the Lethbridge school district, with 18 schools serving 5,524 students in grades one through nine and five schools serving 2,231 students in grades ten through 12. The Livingstone Range school division and the Westwind school district are both somewhat smaller than Lethbridge, with Livingstone housing 28 primary and seven secondary schools with 3,555 and 1,218 students respectively. Westwind serves 3,145 primary students in 30 schools and 1,082 secondary students in four schools.

Public Revenues and Expenditures. As described above, a number of local government jurisdictions deliver services in southwest Alberta. The largest of these, and most equivalent to the United States counties examined earlier, are Cardston County and the Municipal Districts of Pincher Creek and Willow Creek. In addition, the Province of Alberta delivers other key services.

Municipal Districts. While their budgets range from $3 million (Cardston) to $6 million (Pincher Creek), all three of these entities have similar revenue and expenditure profiles. On the revenue side, all depend primarily on property taxes and provincial grants, with these two sources constituting 80 percent of Pincher Creek's revenues, 89 percent of Willow Creek's revenues, and 78 percent of Cardston's revenues. Expenditures in all three areas are heavily weighted toward general government and transportation and utilities. These line items make up 85 percent of Pincher Creek's budget, 91 percent of Willow Creek's budget, and 81 percent of Cardston's budget.

The three jurisdictions are also similar in their debt capacity and tax rates. The three entities together only have $127,000 in debt, all issued by Pincher Creek and resulting in annual payments of $10,000. All also have municipal property tax rates ranging from .007 to .008. They levy these property taxes against assessed values that range from $212 million in Cardston to $310 million in Willow Creek and $404 million in Pincher Creek.

Province of Alberta. Alberta's 2001-02 fiscal year estimates provide a revenue forecast of $22.7 billion. This is projected to come from a number of sources, including non-renewable resource revenues (i.e., royalties) of $7.5 billion, $6.1 billion in income taxes, $2.4 billion in other taxes, and a variety of other revenue.

It should be noted that Alberta is a relatively low-tax province. It is the only Canadian province without a sales tax or capital tax on financial institutions, one of three provinces without a general capital tax, and one of six provinces without a payroll tax. Alberta's tax base consists primarily of royalties on non-renewable resource extraction, a 10 percent personal income tax, a varying corporate income tax, a fuel tax of 9 cents per liter, and a cigarette tax of $14 per carton.

Over 70 percent of provincial expenditures consist of learning, health and wellness, and infrastructure development activities, with $21.6 billion in total expenditures budgeted for 2001-02.

Analysis of Fiscal Condition (per capita). One method of comparing service delivery capacity between the various governmental entities is expenditures per capita. While this measure is somewhat clouded by the varying services delivered by different entities, it is suggestive of service levels. Table 25 presents expenditures per capita for the three United States counties, as well as the Canadian jurisdictions.

The service levels provided by each of the governments appear relatively comparable. Large per capita expenditure in Glacier County is largely due to the presence of a county hospital, which is not provided in other areas. Without the hospital, Glacier's per capita expenses drop to below $500.

Table 25. Expenditures per capita.

Location	Budget†	Population	Budget per Capita
Flathead County	$61,199,505	74,471	$822
Glacier County	$13,834,856	13,247	$1,044
Lake County	$18,163,487	26,507	$685
Cardston County‡	$2,931,763	4,565	$642
M.D. of Pincher Creek‡	$2,730,409	3,172	$861
M.D. of Willow Creek‡	$3,789,561	5,091	$744

†Total expenditure budgets are used throughout. 1999 budgets are used for Canadian jurisdictions, while 2001 budgets are used for United States counties.

‡Budgets have been converted to United States dollars at an exchange rate of $1.60 Canadian to $1.00 United States.

Source: Alberta Municipal Affairs 2002; Montana County Budgets 2001

CULTURAL RESOURCES

While GNP is perhaps best known for its tremendous natural setting and renowned ecological resources, the Park is also home to many significant cultural resources. The Going-to-the-Sun Road itself is among these important cultural resources, and others are immediately adjacent to the Road corridor. Consequently, federally mandated cultural resource considerations will play an important part in the planning process for Road rehabilitation.

The National Historic Preservation Act (NHPA) of 1966 (as amended), and its implementing federal regulations (36 CFR 800), require federal agencies to consider effects on cultural resources before undertaking any actions. Cultural resources are defined as buildings, structures, objects, sites, or districts that display significant associations to American history, architecture, archaeology, engineering, or culture. Cultural properties may be historic or prehistoric, and may be intact resources or the archaeological remnants of sites. Cultural resources that meet certain federal criteria of significance and integrity may be found eligible for inclusion in the NRHP. If a proposed federal project would adversely affect an NRHP-eligible resource, measures must be developed and implemented to minimize or mitigate those effects. As noted below, a number of NRHP-eligible resources have been identified in the Road corridor.

The planning process for a federal undertaking must include a systematic procedure to identify and locate potentially significant cultural resources within a project's impact area. This is typically a multi-faceted process, including a file and records search for previously recorded cultural properties, as well as field survey to locate previously unrecorded sites. Significant research and fieldwork already have been conducted in the Park, and most of the major cultural resources likely to be affected by Road rehabilitation work are documented. Systematic pedestrian archaeological surveys have also been conducted along much of the Road corridor, except for the segment between The Loop area and Logan Pass. These survey corridors are relatively narrow, however, and some potential staging sites and other areas of potential impact have not been inventoried. Federal regulations mandate the completion of such a survey prior to the beginning of any undertaking in the Road corridor that may impact undisturbed land. Depending on the nature of specific planned work projects, it is anticipated that additional cultural resource survey may be required to determine unrecorded sites or other significant cultural resources that may be present.

Archaeological Resources

Archeological sites are the locations of past human occupation or activity that retain physical evidence of prior use. Sites may be prehistoric (with use predating Euro-American occupation), or historic. Those archeological sites found eligible for the NRHP are typically eligible because they have yielded, or are likely to yield, information important to the study of history or prehistory.

Triple Arches

The immediate Going-to-the-Sun Road corridor includes known historic and prehistoric archaeological sites, and likely includes additional unrecorded sites. The probability of prehistoric sites is greatest along the lower reaches of the Road, where geographic and climatic conditions made extended Native American use far more likely. Higher-elevation locations along the Road corridor may have seen occasional prehistoric use as Native American travel routes, but overall are far less likely to retain physical evidence of such use.

Overall, the likelihood is greater that significant historic archaeological sites will be found along the Going-to-the-Sun Road corridor. These sites may reflect a variety of historic activities in the Park, including:

- The construction and maintenance of the Road itself;
- Pre-1910 occupation and use of the Park by homesteaders and others;
- Visitor accommodations, camping, and other tourism-related activities;
- NPS administrative activities; and
- Historic trails and other travel routes.

Several historic archaeological sites related to the construction and early reconstruction of the Road are known to exist in the Road corridor; few, however, have been formally recorded. Known or potential sites include the locations of former Road Camps, particularly on the west approach to Logan Pass; the locations of abandoned construction equipment; the sites of historic dumps; and other staging areas for historic construction projects. Former alignments of the Road itself (such as along upper McDonald Creek) are also potentially significant sites.

Archaeological sites relating to pre-1910 use of the Park area are more likely to be found in the former or current private inholdings in the Apgar/Lake McDonald area. Tourism-related sites potentially exist at any of the current or former developed areas along the Road, including Apgar, Lake McDonald, Avalanche, Sun Point, and Rising Sun (for example, a sawmill once existed alongside the Road near Lake McDonald Lodge, and the Sun Point area had a variety of historic uses associated with the former Going-to-the-Sun Chalets). NPS administrative activities historically took place at several locations along the Road, and an historic NPS telephone line formerly traversed Logan Pass. Numerous former trails intersect the Road, including old pack trails used during the Road's construction and abandoned tourist trails such as the Alder Trail and the former trail over Logan Pass. Few of these sites have been identified, located, or mapped. To ensure the identification and protection of such sites, Road projects that involve the disturbance of uninventoried, previously undisturbed ground will require the completion of an archaeological inventory prior to the beginning of work. Information on the scope of prior archaeological survey in the Park, and data on previously recorded sites, is on file at the Glacier National Park Archives. To reduce the chance of vandalism at cultural sites, specific locational information for many archaeological sites is not released to the public, and is therefore not included in this report.

Historic Resources

A significant number of historic resources along the Going-to-the-Sun Road corridor are listed in, or eligible for, the NRHP, including the Road itself. The historic significance of the Road has been well recognized by the federal government and others. The Road was listed on the NRHP in 1983; was designated a National Historic Civil Engineering Landmark in 1985; was documented by the Historic American Engineering Record (HAER) in 1990; and was designated a National Historic Landmark by the Secretary of the Interior in 1997. The latter distinction is the most noteworthy and restrictive, and affords the Road and its cultural resources the highest possible level of federal protection.

The Road is considered significant for its history, its design, and its engineering. As an early example of a major national park roadway, the Road represents a pioneering federal attempt to design and construct an automobile road that both harmonized with its environment and showcased its natural surroundings. These design philosophies, as embodied in the Road, became a model for future parkway projects to follow. The engineering and landscape architecture techniques used in the Road further reflected this design philosophy, featuring well-crafted stonework and gently curving walls that blended perfectly with the spectacular natural setting.

Both the NRHP and National Historic Landmark nominations include the length of the road from the foot of Lake McDonald to St. Mary. While the entire roadway corridor between those points is subject to National Historic Landmark provisions, both nominations also include lists of key individual historic structures that are part of the road —

primarily bridges and tunnels. The HAER documentation also recognizes the entire roadway corridor, while further documenting some 17 individual bridges and other structures along the Road (including the now-bypassed Belton Bridge).

The sites specifically documented in the NRHP and HAER materials for the Road represent only a small fraction of the significant historic features associated with the roadway. The Road's important historic engineering features include bridges, culverts, and overpasses; retaining walls and guardwalls; two tunnels; and other structural and design elements. Most of these features were constructed of native stone, and display high-quality craftsmanship and extremely sensitive design. Broader elements of the Road's design are also considered significant, such as its alignment and width. Discussions and evaluations of the Road's historic features are provided in the *Cultural Landscape Report* for the Road (RTI 2002, 2003).

In addition to the Road itself, a number of other resources listed on (or found eligible for) the NRHP exist along the Road corridor; most are buildings or groups of buildings (districts). These resources are listed in Table 26, and are briefly described in the paragraphs that follow. Only those resources located within approximately 0.25 miles (0.4 kilometers) of the current roadway corridor are listed; other NRHP-eligible resources also exist in the broad vicinity of the Road, but beyond that threshold.

The **Headquarters Historic District** includes the original Park headquarters building, its associated historic NPS housing area, and the main Park maintenance facility. The district includes some 73 historic buildings, dating from the 1910s to the 1940s. The original alignment of the Going-to-the-Sun Road (now bypassed) also passes through the district. The current Road alignment, which dates from 1936, bypasses the district about 0.2 miles (0.3 kilometers) to the west. A low hill and heavy forest fully screen the Road from the historic district.

Table 26. Significant historic resources in the Going-to-the-Sun Road corridor.

Name	Location	Status
Headquarters Historic District	E. of roadway, near MP 0.6	NRHP
West Entrance Station	On roadway, MP 0.9	NRHP
Lake McDonald Lodge	W. of roadway, near MP 10.9	NRHP; NHL
Logan Creek Snowshoe Cabin	S. of roadway, MP 20.9	NRHP
Logan Pass Visitor Center	S of roadway, near MP 32.0	Potentially NRHP eligible
South Circle Trail	Crosses roadway, near MP 36.6	NRHP
Baring Creek Fireguard (Snowshoe) Cabin	N. of roadway, MP 39.8	NRHP
Rising Sun Motor Inn	N. of roadway, near MP 43.9	NRHP
St. Mary Visitor Center	N. of roadway, MP 49.5	Potentially NRHP eligible

The **West Entrance Station** is a stone and log structure erected in 1940, and slightly enlarged in the 1960s. An excellent example of NPS rustic architecture, the facility continues to serve as the primary initial contact point for Park visitors arriving from the west.

Lake McDonald Lodge is a handsome, rustic hotel dating from 1913-14. The building is a National Historic Landmark. The Lake McDonald Lodge Historic District, which surrounds the hotel, includes a number of log guest cabins and ancillary buildings. The lodge, known originally as "Lewis Glacier Hotel," has long been the focal point of visitor activity on the west side of the Park. While the current Road alignment bypasses the historic district

Original road construction

to the east, some of its buildings are briefly visible to travelers on the Road. In addition, a former alignment of the Road (now an access lane) passes through the district.

The **Logan Creek** and **Baring Creek Snowshoe Cabins** are single-room log cabins used primarily for winter backcountry patrols. Both are well-preserved examples of NPS rustic architecture. The Logan Creek cabin (1924) was used by the surveyors who laid out the Road's western approach to Logan Pass. Of the two buildings, only the Logan cabin is briefly visible to travelers on the Road.

The **Logan Pass** and **St. Mary Visitor Centers,** both dating from the mid-1960s, are the largest NPS visitor contact facilities along the Road. The buildings may be eligible for listing in the NRHP for their associations with the Mission 66 era — an important NPS-wide development and improvement program (1956-66). They have not been evaluated for NRHP eligibility. The Logan Pass building and its associated parking lot are highly visible from the Road; the St. Mary center is immediately adjacent to the Road and incorporates an entrance station facility for Road travelers.

The **South Circle Trail** crosses beneath the Road at Jackson Glacier Overlook, utilizing a nearly-invisible historic horse underpass. The trail is significant as a primary route of the multi-day horseback excursions that were characteristic of the visitor experience in Glacier between the 1910s and the 1930s. The trail segment crossing the road extends from Sun Point to Piegan Pass and Many Glacier. It is important to note that several other historic trail routes meet or cross the Road; while they have not been formally evaluated, some are certainly NRHP-eligible.

Rising Sun Motor Inn is a small concessionaire facility with buildings dating from 1940 and beyond. The property is considered significant as a well-preserved example of a Park tourist facility geared toward automobile travelers. Historic resources at the site include the original store/restaurant building, a series of guest cabins, and other ancillary structures; only the store building is readily visible from the Road. A non-historic 1960s coffee shop building dominates the view of Rising Sun for Road travelers.

In addition to the significant historic sites noted above, other recorded or unrecorded historic resources may exist in the immediate Road corridor, and some may be NRHP-eligible. A small number of unevaluated architectural resources are known to exist, including small Mission 66 buildings at Avalanche, and a number of inholder-owned summer cabins along Lake McDonald. Other types of resources with potential historic significance include intersecting roads and trails, historic communications systems, former Road alignments, and others.

As with the archaeological resources in the Road corridor, it is possible that additional unrecorded historic resources exist in areas that may be impacted by Road projects. Cultural inventory of unsurveyed areas will be required in order to identify any such resources prior to the beginning of work.

Ethnographic Resources

While the previously discussed cultural resources are tangible and human-made, ethnographic resources are typically far more broad-ranging. By definition, ethnographic resources are tangible or intangible aspects of a cultural system, past or present, that have been identified as significant to a recognized ethnic group. Ethnographic resources can include a tremendous variety of natural and cultural objects, materials, and locations. Examples could include plant materials used in traditional medicine; mineral outcroppings used in the crafting of tools or weapons; locations traditionally associated with vision quests or other cultural ceremonies; and mountains associated with creation stories or religious tradition.

While the NHPA was not specifically constructed to address these resource types, other federal laws and regulations require the consideration of ethnographic values, including the American Indian Religious Freedom Act of 1978 (AIRFA) and the Native American Graves Protection and Repatriation Act. This legislation — and NPS policy — mandate the protection of resources and sites in the Park that are culturally significant to Native American and other ethnic groups.

Significant ethnographic resources within the immediate Going-to-the-Sun Road corridor have not been previously identified, but other sites in Glacier, such as Chief Mountain and Going-to-the-Sun Mountain, have long been recognized as having ethnographic significance. GNP has just completed an ethnographic overview; this and other future research will help increase awareness of ethnographic values in the Park.

Cultural Landscapes

As defined by the NPS, a cultural landscape is "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein), associated with an historic event, activity, or person, or exhibiting other cultural or aesthetic values." The Going-to-the-Sun Road has long been recognized for its careful and uniquely designed spatial relationship with its surrounding geography, and is thus seen as being part of a broader, significant cultural landscape. Similar natural/historic associations exist in the Lake McDonald Lodge area and elsewhere in the Park. While these landscapes have not been documented to National Register standards, they are almost certainly NRHP-eligible.

The cultural landscape concept has a direct bearing on planning actions related to future Road rehabilitation. Projects impacting the natural setting of the Road, or views from or of the Road, are a potential adverse effect on the Road's cultural landscape. Similarly, changes to the Road or its setting could impact the landscape of significant historic resources near the Road, such as Lake McDonald Lodge.

As part of the planning process for future Road rehabilitation, a *Cultural Landscape Report* (RTI 2002) documents the history and landscapes of the Road.

NATURAL RESOURCES

Topography, Geology, and Soils

Topography

GNP is located along the northern spine of the Rocky Mountain chain. The 50-mile (80-kilometer)

Going-to-the-Sun Road spans the Continental Divide and provides views and access to spectacular high mountain scenery. Elevation along the Road ranges from about 3,150 feet (960 meters) at Lake McDonald to 6,640 feet (2,025 meters) at Logan Pass and back down to 4,480 feet (1,365 meters) at St. Mary Lake. A diversity of topographic and landscape features shaped by dramatic geologic processes are present along the Road. Gently sloping glaciated valleys and deep lakes are present at the base of the east and west sides of the steep rugged mountain range bisected by the Going-to-the-Sun Road.

Geology

The geologic material present along the Going-to-the-Sun Road is composed of some of the oldest and best preserved sedimentary rock in the world (Rockwell 1995). Between Lake McDonald and St. Mary Lake the Road crosses through seven geologic formations. Lake McDonald was carved out of the valley by glacial activity and remnants of the unconsolidated gravels deposited by glaciers are evident along this segment of the Road. Active slumps that cross the Road are present in these glacial deposits adjacent to Lake McDonald. The dark gray to black argillite and siltite of the Prichard Formation is evident along McDonald Creek several miles upstream from Lake McDonald (Raup et al. 1983). Further upstream to Avalanche, the Road crosses the Appekunny formation, which has preserved the ripple marks of the deep lake bottom sediments from which it was formed. At Red Rock Point, exposed red argillite and siltite layers of the Grinnell Formation are visible at this popular pullout. As the Road continues to climb east of Red Rock Point, green and gray argillite of the Empire Formation is visible in road cuts. At The Loop, the colorful rocks of Snowslip Formation are present and ripple marks from tidal flat depositions are exposed.

The Going-to-the-Sun Road crosses the Helena Formation

As the Road climbs toward Logan Pass over to the east slope as far as the Jackson Glacier Overlook, the Helena Formation is dominant. The dolomite and limestone rock of the Helena Formation contain an abundance of fossil algae. Near the West Tunnel, a narrow dark igneous sill cuts through the Helena Formation. Many of the steep rockfall hazard areas are included within eroding cliffs of this formation. As the Road continues east from the Jackson Glacier Overlook, it again crosses the Empire and Grinnell Formations. The upper end of St. Mary Lake borders the Appekunny Formation. Near Rising Sun the light colored dolomite and limestone of the Altyn Formation is visible in road cuts. From this point east to the town of St. Mary, geologic material includes a mixture of different rock deposited from landslides, glacier, and alluvial activity.

Soils

The soils along the Going-to-the-Sun Road are a product of the weathering of the parent materials described above and as modified by topography, vegetation, erosion, and climate. There are three major groups of soil common along the Road (Dutton et al. 2001). These include: 1) glacial, landslide, and mixed soils; 2) bedrock soils derived from quartzite and argillite; and 3) bedrock soils derived from limestone. In addition, small areas of alluvial and wet soils are present. Although soil characteristics vary substantially with location, most soils have loamy textures due to wind blown volcanic ash deposits dated from about 7,000 years ago.

Glacial, landslide, and mixed soils formed in glacial deposits contain a mixture of semi-round rock and cobble. These soils are found primarily along the McDonald Creek drainage, Reynolds Creek, and St. Mary Lake. Soil textures include silty clay loams, sandy loams, and clay loams. Soils within this group vary widely over short distances due to mixing and landslides. Coniferous subalpine forest covers most of these soils. Erosion potential is high when these soils are disturbed due to the loamy and silty surface soil textures and limited rock content. Productivity and revegetation potential varies from low to high depending on soil texture, rock content, and water and nutrient holding capacity.

Bedrock soils derived from quartzite and argillite are found on mountaintops and ridges. This soil group is found along the Going-to-the-Sun Road adjacent to Lake McDonald where the Belton Hills border the lake and along the northwest shore of St. Mary Lake. These soils typically have loam to silt loam surfaces with coarse rock fragments in the subsoil. Vegetation cover for these soils near the Road is mostly coniferous forest. Erosion potential is high when vegetation is removed due to the silty and sandy surface soil texture. Subsurface horizons are generally less erosive because of the high rock content. Productivity and revegetation potential is moderate.

Bedrock soils derived from limestone are found on mountainside slopes and ridges from the West Tunnel to Siyeh Bend. Soils in this group vary from shallow to deep depending on the position on the landscape. Loam and sandy loam surface textures are common, with rock content increasing with depth. Large areas of rock outcrop are present with steep rock cliffs and broken loose talus slopes. Soil material is limited where surface rock dominates the landscape. Existing vegetation ranges from coniferous forest at lower elevations to alpine meadows at higher elevations. Erosion potential is moderate, but may range from low to high depending on the soil texture, slope, and the amount of anchoring rock present. Productivity and revegetation potential is generally low to moderate due to the low moisture and nutrient holding capacity, presence of rocks, and the harsh climate at higher elevations.

Other soil types present along the Going-to-the-Sun Road corridor include small areas of alluvial and wet soils. Alluvial soils are found along streams and drainages where soil and rock material are deposited by flowing water. Alluvial soils are found in several locations along the McDonald Creek drainage and adjacent to St. Mary Lake. The composition of alluvial soils varies widely, but is generally characterized by coarse textures and unconsolidated coarse fragments from periods of deposition. These soils may support riparian deciduous vegetation, coniferous forest, or transitional shrubs and grasses. The erosion potential is moderate and these sites are subject to periodic flooding. Productivity and revegetation potential is low where well-drained coarse soils are present and high where finer textured material with high organic matter is present.

Wet soils are found where the water table is shallow near lakes, ponds, seeps, and drainages. These soils are rich in organic matter and have loamy to silty textures. Vegetation on wet soils may include sedges, willows, cottonwoods, and other riparian species. Erosion potential is low and productivity and revegetation is high on wet soils.

Sandy and gravelly alluvial soils are the most susceptible to invasion by exotic weed species, particularly in floodplain locations where periodic disturbances expose bare soil (Dutton et al. 2001). Soils least susceptible to exotic weed invasion are located at higher elevations (>6,000 feet; 1,830 meters), and wet soils, since few exotics can compete with native species in these locations. All other soils are similar in their potential for weed invasion depending on the amount of disturbance and sunlight.

Water Resources

GNP is often referred to as the Crown of the Continent because three watershed divides are located within the Park. The triple divide is located about 7 miles (11 kilometers) south of St. Mary Lake. Streams west of the Continental Divide drain to the Columbia River Basin and the Pacific Ocean, east of the Continental Divide water flows to either the Saskatchewan River and Hudson Bay or the Missouri River and Atlantic Ocean.

The west side of the Going-to-the-Sun Road is located within the McDonald Creek watershed, which drains into the Middle Fork of the Flathead River near West Glacier (Figure 2). The Road parallels McDonald Creek and Lake McDonald throughout the valley until it begins climbing toward Logan Pass. The Road crosses several tributaries to McDonald Creek and Lake McDonald, including Sprague Creek, Snyder Creek, Avalanche Creek, Logan Creek, Haystack Creek, and Alder Creek.

The east side of the Going-to-the-Sun Road falls within the St. Mary River drainage, which is in the Hudson Bay watershed. Reynolds Creek and St. Mary Lake are the primary water features near the Road (Figure 2). Principal tributaries to these drainages crossed by the Road include, Siyeh Creek, Baring Creek, Rose Creek, Two Dog Creek, St. Mary River below the Lake, and Divide Creek.

The majority of the Park's precipitation occurs during the winter months from November to March. Maritime Pacific air masses bring high amounts of snowfall to both sides of the Continental Divide (Rockwell 1995). West Glacier receives about 30 inches (76 centimeters) of precipitation annually and St. Mary about 26 inches (66 centimeters) annually. Along the Continental Divide, average snowfall ranges from about 800 to 1,000 inches (2,032 to 2,540 centimeters) or 100 inches (254 centimeters) of precipitation.

Floodplains

Peak runoff for the streams in the Going-to-the-Sun Road corridor occurs during the spring in response to snowmelt or during summer thunderstorms. The 100- and 500-year floodplains in the Park have only been determined near developed areas along the North and Middle Forks of the Flathead River and lower McDonald Creek. The 100-year floodplain for McDonald Creek may extend into portions of the Apgar Village, but does not include the Going-to-the-Sun Road. Information on floodplain boundaries for other drainages along the Road corridor are incomplete, but previous studies and inferences based on terrain and observations during flood events provide an indication of floodplain areas.

The portions of the Going-to-the-Sun Road likely to lie within the 100-year floodplain include:

Sprague Creek. The 100-year floodplain probably includes portions of the Sprague Campground, picnic ground, and the Going-to-the-Sun Road.

Snyder Creek. Snyder Creek crosses the Road near the Lake McDonald Lodge and previous studies by the U.S. Army Corps of Engineers have estimated the 100-year floodplain (COE 1983). The extent of the floodplain could change with shifts in the Snyder Creek channel or debris blockage at the Snyder Creek Bridge over the Road.

Avalanche/McDonald Creek. The 100-year floodplain includes the picnic area and toilet, a portion of the Going-to-the-Sun Road, but not the campground.

Rose Creek. Rose Creek crosses the Road between the Rising Sun development and St. Mary Lake. The floodplain on Rose Creek is potentially located south of the Road, where the Road acts as a barrier and north of the Road in the Rising Sun development (Land and Water Consulting, Inc. 2001).

Divide Creek and St. Mary River. Divide Creek frequently cuts new channels through lower portions of the flat alluvial floodplain, which results in periodic flooding near the Road. The alluvial fans along Divide Creek to the St. Mary River are considered to be within the 100-year floodplain. This includes a portion of the Going-to-the-Sun Road, but not the St. Mary Visitor Center, according to U.S. Army Corps of Engineer investigations (Omang et al. 1983). However, the Divide Creek channel is very unstable and the floodplain may shift (Smillie and Ellerbroek 1991). The transport and deposition of glacial material by Divide Creek near the Going-to-the-Sun Road bridge crossing have raised the level of the streambed, which further increases the potential for flooding.

Lost Lake near the Going-to-the-Sun Road

Other high gradient drainages that cross the Going-to-the-Sun Road are subject to periodic high flows, channel scouring, debris flow, and local flooding. These smaller streams generally have incised channels, but during periods of high runoff from thunderstorms or rapid snowmelt, streamflow may occasionally flood portions of the Road. The deposition of debris near bridge crossings, such as Logan Creek, has reduced the hydraulic capacity of the bridge, which may increase the potential for flooding.

Water Quality

The water use classification for the streams in GNP is A-1 (Montana Water Quality Act ARM 17.30.608). The A-1 classification denotes high quality water suitable for drinking and culinary food processing following conventional treatment, bathing, swimming, and recreation, growth and propagation of salmonid fishes and aquatic life, waterfowl, furbearers, and agricultural and industrial water supplies (Montana Water Quality Act ARM 17.30.622).

A water quality monitoring program conducted between 1984 and 1990 provides an indication of the baseline water quality in the Going-to-the-Sun Road corridor (Ellis et al. 1992). The study included chemical, physical, and biological sampling of Lake McDonald and St. Mary Lake, as well as other frontcountry and backcountry lakes. Lake McDonald borders the Going-to-the-Sun Road on the west side of the Divide and is located in the lower McDonald Creek watershed. St. Mary Lake borders the Road on the east side of the Divide and extends to the Road terminus. Thus, both lakes are influenced by the Road, recreational activities, other developments, and natural erosion within these watersheds.

The Ellis study (1992) determined that both Lake McDonald and St. Mary Lake have extremely good water quality with no measurable pollutants. These lakes have few dissolved solids because of the low dissolution rates of the bedrock. As a result, the lakes have a low buffering capacity and are sensitive to acidic deposition. Both lakes are very low in nutrients and productivity because of low phosphorus and would be extremely sensitive to phosphorus loading. Phosphorus concentrations in Lake McDonald ranged from <1.0 to 10.5 micrograms/liter (µg/l) and from 1.3 to 7.0 µg/l for St. Mary Lake. Low productivity is indicated by the low amount of phytoplankton (largely algae) and zooplankton (tiny animals) present in both lakes, although St. Mary had higher densities than Lake McDonald.

Water quality is influenced by natural processes as well as human activities. During spring runoff, high water velocities transport sediment and the turbidity of streams increases. The rock flour produced by the erosive action of glaciers contributes to the milky color of streams and the aqua blue and green shades present in lakes. Thunderstorms generate short intense periods of runoff and high gradient drainages and avalanche chutes often carry large volumes of debris and sediment.

Although measurable amounts or trends in pollution were not evident from water quality sampling, human activities in the watershed may be contributing small amounts of pollutants. Evidence of sedimentation from original Road construction was discovered from sampling of lake bottom sediments in Lake McDonald (Spencer 1991). Current possible pollutant contributions to the streams and lakes influenced by the Road include sediment from roadway sanding, hydrocarbon and metal contaminants from vehicle emissions, and deposition and erosion of roadside cut and fill slopes. Other human sources of contaminants are possible at campgrounds, picnic areas, and land disturbances that generate non-point sources of pollution. There is some concern that increases in atmospheric nitrogen concentrations, particularly in alpine and subalpine environments with large annual snowfall could affect the nutrient balance in the Park ecosystem. Snowpack analysis of chemical loading in GNP indicates the potential for significant impacts to the alpine ecosystem if atmospheric nitrogen concentrations increase in the future (U.S. Geological Survey 2001).

Divide Creek, a tributary to lower St. Mary Lake, is the one exception to the high quality waters in the Park. Divide Creek is listed on Montana's Clean Water Act Section 303(d) as water quality impaired because it does not fully meet beneficial uses. Impairment is associated with channel incisement and fish habitat degradation related to flooding and high sediment loads. Currently, the EPA is evaluating the condition of Divide Creek and is establishing a Total Maximum Daily Load (TMDL) of pollutants (e.g., sediments and nutrients). The

TMDL process will include a water quality restoration plan including necessary actions and monitoring to ensure that uses are fully supported.

Vegetation

GNP is located astride the northern-most reach of the Rocky Mountains in the continental United States, and forms a transition area between the intermountain Northwest and the Great Plains. Biodiversity in the Park is very high because the Park is located in a transition zone between continental and Pacific maritime climates. Plants and animals in the colder climes of northern mountains intermingle with plants and animals found in the southern and coastal ranges. Past glaciation has isolated many plant populations, and the varied terrain provides a broad range of microclimates for a wide variety of plant communities on both the east and west sides of the Continental Divide. Consequently, the geographic location and topographic gradients of the Park have fostered and sustained an ecology that includes the plants and animals of a much larger region. The Park is at the core of the "Crown of the Continent" ecosystem, one of the most ecologically intact areas remaining in the temperate regions of the world.

Because of the biological diversity and significance, GNP has been designated as a Biosphere Reserve and Waterton-Glacier International Peace Park has been designated as a World Heritage Site. Natural resources are managed in accordance with NPS policy to "try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems" (NPS 2001b).

GNP supports over 1,100 species of vascular plants (Lesica 2002), about 870 non-vascular plants (DeBolt and McCune 1993; Hermann 1969; Elliott 1987; Habeck 1963), and a diversity of vegetation communities associated with the wide range of elevation, topography, aspect, and moisture. Fire is the dominant ecological disturbance throughout the Park and has undoubtedly influenced the diversity and heterogeneity of the community types and landscape. Other natural disturbances that contribute to diversity include avalanches, landslides, windstorms, floods, diseases, and insect infestations.

The project area includes western red cedar/western hemlock forests on the west side of the Road corridor; subalpine fir/Engelmann spruce forests at the higher elevations; and Douglas-fir forests at lower elevations, especially within the St. Mary Valley. Aspen parklands and fescue grasslands are found at lower elevations on the eastern end of the project area. Riparian areas dominate bottomlands along lakes, rivers, and streams. The distribution of the vegetation communities along the Going-to-the-Sun Road is discussed below.

Western Red Cedar/Western Hemlock Forests

On the west side of the Road corridor, the vegetation within the lower McDonald Valley is dominated by several successional stages of the moist western red cedar/western hemlock forest type. McDonald Valley is the easternmost location in which this forest type exists, reflecting the influence of the Pacific maritime climate. Since red cedar and hemlock do not establish quickly in recently opened stands, areas that have had more recent fires are dominated by pioneering species such as lodgepole pine, western larch, aspen, paper birch, and black cottonwood. As these forests mature, Douglas-fir, western larch, Engelmann spruce, and western white pine become more important, dominating the overstory in various proportions. Western hemlock and western red cedar dominate late seral and old growth stands that are often centuries in age in several locations. The vegetation surrounding the Lake McDonald Lodge includes a complex of 230-year old western red cedar and numerous old growth black cottonwood trees (Barrett 1997). At Avalanche Creek an old-growth stand of the more rare western red cedar/devil's club habitat type is present. The Avalanche site is probably the largest nearly intact cedar/devil's club community in the state and is ranked state and globally "vulnerable" (S3/G3) by the Montana Natural Heritage Program.

Subalpine fir can be found in several successional stages, while a few scattered grand fir occur only in later-seral forests. Common understory species within these forest types include huckleberry, spiraea, snowberry, twinflower, beargrass, round-leaved violet, pinegrass, and queencup beadlily. While most of these forest communities fall into the western red cedar/queencup beadlily habitat type, several areas are within the more rare western red cedar/devil's club and western hemlock/queencup beadlily habitat types due to topography, elevation, slope and climatic influences around Lake McDonald. Scattered Douglas-fir habitat types are also present in this area.

Areas near Apgar and the Park headquarters contain various successional stages of the western red cedar/western hemlock forest type, including forest communities dominated by lodgepole pine and communities dominated by red cedar, hemlock, and other mixed conifers. Other trees regenerating in the understory include western red cedar, western hemlock, western white pine, and Douglas-fir. Black cottonwood and paper birch are present in forest openings.

Old growth western red cedar and western hemlock forest at Avalanche

Subalpine Fir/Engelmann Spruce Forests

As elevation increases from both the McDonald and St. Mary Valleys along the Road, the forest transitions to a subalpine fir/Engelmann spruce forest type. Transition zones prior to The Loop on the west side of the Park encompass tree species from both the western red cedar-western hemlock and Engelmann spruce/subalpine fir forest types. Lower subalpine forests, particularly west of the Continental Divide, may still have Douglas-fir, western larch, and western white pine. Common understory species for these subalpine forest communities include fool's huckleberry, mountain ash, spiraea, arnica, twinflower, queencup beadlily, grouse whortleberry, and arrow-leaved groundsel. Higher elevation forests support beargrass, glacier lily, mountain-heather, and woodrush in the understory. Areas that have had more recent fires have more paper birch, quaking aspen, lodgepole pine, western larch, and scattered Douglas-fir. Tall shrub communities within avalanche chutes dominate most of the upper Road and include species such as green alder, serviceberry, elderberry, fireweed, and cow parsnip. Higher still in elevation near Logan Pass, the subalpine fir and Engelmann spruce take on wind- and frost-stunted shrubby forms called krummholz. Beyond these areas lie diverse alpine meadows, turf communities, wet meadows, talus slopes, and fellfields that support a number of rare plants.

To the east of the Continental Divide, the subalpine fir/Engelmann spruce forests continue along most of the Road. Whitebark pine becomes a part of the overstory near Siyeh Bend and the forest is interspersed with beargrass/low shrub meadows and steep talus slopes. Pockets of limber pine can also be found above and below the road near Sun Point. Engelmann spruce and subalpine fir grow on the lower moist slopes above St. Mary Lake, often with lodgepole pine and sometimes with components of black cottonwood and aspen. Drier spruce/fir forests tend to fall within the subalpine fir/dwarf huckleberry or subalpine fir/twinflower habitat types, while moist spruce/fir forests are generally subalpine fir/queencup beadlily or subalpine fir/grouse whortleberry habitat types.

Douglas-Fir Forests

At lower elevations within the St. Mary Valley, Douglas-fir tends to occupy the warm, dry exposures, forming a mosaic pattern of communities with Engelmann spruce-subalpine fir elements. Douglas-fir forests can be found on the dry mid-slopes, often mixed with lodgepole pine, subalpine fir, Engelmann spruce, and limber pine. The understory also tends to be dry, characterized by species often found in the nearby grasslands, as well as common juniper and kinnikinnik. Fescue grasslands lie to the east of Rising Sun, along both sides of the Road. Lodgepole pine and Douglas-fir have started to invade these meadows along their western front. Grassland vegetation also dominates the understory in the open-canopy Douglas-fir/limber pine areas.

Aspen Parklands

Along the eastern border of the St. Mary Valley, aspen groves intermix with grasslands to form extensive parklands. Aspen, sometimes mixed with black cottonwood, Engelmann spruce, lodgepole pine, and Douglas-fir, extends along the low slope and toeslopes above St. Mary Lake, particularly along the eastern end. The understory of these groves is comprised of snowberry, serviceberry, red-osier dogwood, prickly rose, cow parsnip, western sweet-cicely, showy aster, arnica, western meadowrue, and various grasses.

Fescue Grasslands

Alluvial fans, interspersed within the aspen groves, are dominated by fescue grasslands. The vegetation is comprised of grasses such as Idaho fescue, rough fescue, bluebunch wheatgrass, oatgrass, needlegrass, and sedges. Dominant forbs include silky lupine, slender cinquefoil, yarrow, and balsamroot. These grasslands can also be found as dry outcrops along the mountain slopes. Areas around the St. Mary Visitor Center, St. Mary Flats, and Two Dog Flats are dominated by fescue grassland with isolated shrublands.

Riparian Vegetation

Within the McDonald Valley, McDonald Creek, Snyder Creek, the shoreline of Lake McDonald, Avalanche Creek, Logan Creek, and other west side streams support riparian vegetation. Common riparian forests include western red cedar and

Engelmann spruce with black cottonwood and paper birch in the overstory. Understory plants include mountain maple, red-osier dogwood, alder, willow, and sedges. Similar trees were found along the shoreline of Lake McDonald, although Douglas-fir, Engelmann spruce, and a few subalpine fir seedlings are also present. At popular lakeshore and streambank sites, the understory vegetation is often denuded from human trampling.

Riparian areas are also present along upper subalpine and alpine drainages, streams, and avalanche chutes where forest cover diminishes. Shrubby and herbaceous species dominate these sites and may include plants such as green alder, serviceberry, thimbleberry, elderberry, cow parsnip, three-flowered rush, Glacier lily, alpine bluegrass, mountain heather and sphagnum, and a variety of mosses.

The shoreline of St. Mary Lake falls mostly within the Engelmann spruce-subalpine fir forest type, although scattered black cottonwood and lodgepole pine are present. Willow and alder are most prevalent along the rocky shoreline. Riparian vegetation can also be found along Rose Creek. The creekbed is very rocky but scattered black cottonwood, Engelmann spruce, and some lodgepole pine are scattered in the floodplain. Willows and alder are also present here.

Noxious Weeds

The flora of GNP also includes nearly 130 species of exotic plants (Lesica 2002) or 10 percent of the Park's flora that have been intentionally or inadvertently introduced. A number of these species are increasing in area and density and are threatening native plant communities. They inhibit the perpetuation of native plant communities and consequently impact habitat for wildlife in the Park. Exotics occur in disturbed areas such as roadsides, construction areas, old homesteads, grazed fields, trails, burns, floodplains, and utility sites. Along the Going-to-the-Sun Road weeds are often introduced by vehicles containing weed seed or from construction equipment that hasn't been properly cleaned. The spread of noxious weeds occurs when visitors, construction equipment, animals, wind, and water transport seed and from ground disturbances that remove native vegetation.

Infestations of state-listed noxious weeds are most common at lower elevations of the Going-to-the-Sun Road (GNP exotic database 2001). Within the Lake McDonald Valley, there are 164 acres (66 hectares) of infestation by noxious weeds in the visitor service zone that borders the Road and developments. These include spotted knapweed, oxeye daisy, Canada thistle, houndstongue, leafy spurge, orange hawkweed, St. Johns wort, Dalmatian toadflax, sulfur cinquefoil, and common tansy. Most of these infestations occur along roadside ditches and at developed areas.

In the St. Mary Valley, there are about 310 acres (125 hectares) of noxious weeds located primarily along the Going-to-the-Sun Road, within developed areas, and within the large fescue meadows. Noxious weeds in the St. Mary Valley include spotted knapweed, oxeye daisy, Canada thistle, houndstongue, St. Johns wort, orange hawkweed, and common tansy.

Wetlands

Wetlands, including wet meadows, swamps, marshes, and fens, are scattered throughout the Road geographic area. Within the broad Going-to-the-Sun Road corridor, which incorporates both the Lake McDonald and St. Mary Valley areas, there are approximately 13,527 acres (5,475 hectares) of wetlands. This includes 11,698 acres (4,735 hectares) of lacustrine wetlands, 1,052 acres (425 hectares) of palustrine wetlands, and 776 acres (315 hectares) of riverine wetlands.

Lacustrine communities are associated with areas of deep water and are the most common in the Park. These wetlands are often located in topographical depressions or damned river channels and generally lack substantial amounts of trees or emergent vegetation. These areas include lakes, ponds, and seasonal depressions. Aquatic vegetation, including various pondweeds, cow-lily, water-milfoil, and quillwort are common in lacustrine wetlands.

Palustrine communities include wetlands dominated by trees, shrubs, and persistent emergent plants. This community includes several types of wetlands such as wet meadows, swamps, marshes, bogs, and fens. Wet meadows that occur in depressions in forests and along lake margins are often dominated by bluejoint reedgrass and willows. Swamps are often dominated by alder and willow and are found along streams and beaver impoundments. Marsh vegetation that develops on saturated to flooded soil is typically dominated by sedges and horsetail. Fens develop in wet organic soils of glacial depressions or gentle slopes associated with ground water seepage and are dominated by sedges.

Riverine wetlands are those associated with rivers, streams, and creeks. Water is usually, but not always, flowing in the riverine system. The vegetation of these communities is typically composed of riparian forest, dominated by black cottonwood, spruce, paper birch, and sometimes western red cedar in the overstory. Willow, red-osier dogwood, alder, hawthorn, mountain maple, aster, horsetail, bedstraw, cow parsnip, sweet cicely, and various grasses are common in the understory.

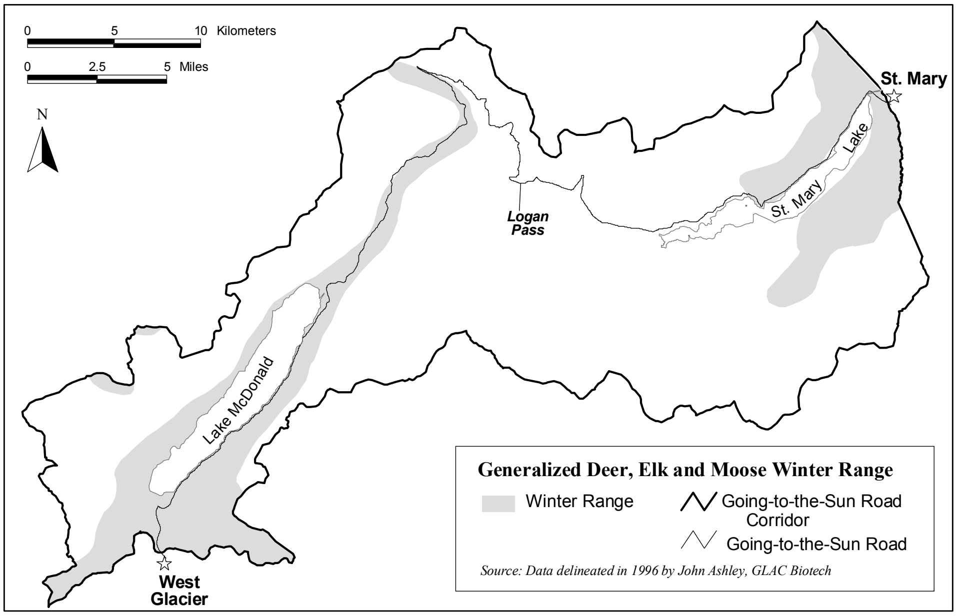
Surveys of potential wetland areas were conducted at selected sites along the Road corridor near developed areas to determine if wetlands are present near proposed rehabilitation and improvement sites (DeArment 2001). Wetland areas near Apgar, Lake McDonald, Logan Pit, Logan Creek, Rising Sun, and several other sites were evaluated. Information from the wetland inventory will be used to identify areas to avoid during rehabilitation.

Wildlife Resources

Over 300 species of terrestrial wildlife occupy GNP, either seasonally or year-round. The Going-to-the-Sun Road corridor crosses a diversity of wildlife habitats from lower elevation montane forests at West Glacier to grasslands at St. Mary to alpine tundra at Logan Pass. Of particular significance to many species of wildlife are riparian areas, travel corridors, avalanche chutes, shrublands, wetlands, meadows, bogs, snags, burns, aspen parklands, old-growth forests, floodplains, mineral licks, birthing areas, hibernacula, den sites, roosts, caves, and cliffs. The Park is one of the few places in the contiguous 48 states that support natural populations of all indigenous carnivores and most of their prey species. Core areas that are large enough to support self-sustaining populations of wide-ranging carnivores, such as wolves, grizzly bears, and lynx, play a key role in maintaining regional biological diversity and native species.

Much of the Going-to-the-Sun Road west of the Continental Divide follows the Lake McDonald Valley, which provides a diversity of habitats valuable for wildlife. Year-round habitat for many species of wildlife can be found in the valley including moose, elk, mule and white-tailed deer, black and grizzly bear, cougar, lynx, fisher, wolverine, marten, and seven of the eight species of reptiles and amphibians that occur in the Park. Deer, elk, and moose winter range is present from West Glacier, around Lake McDonald, and throughout the McDonald Creek drainage adjacent to the Road (Figure 17). Elk use the Apgar area in spring for

Figure 17. Generalized Deer, Elk, and Moose Winter Range.



calving and foraging. The Apgar to West Glacier area also provides a major wildlife travel corridor. Black bear, grizzly bear, elk, deer, mountain lion, fisher, and pine marten have all been observed in this area.

The McDonald Valley contains nesting habitat for bald eagles, golden eagles, osprey, pileated wood-peckers, and barred owls. Upper McDonald Creek, above the inlet of Lake McDonald, has been identified as the single most important harlequin duck breeding stream in Montana with about 10 to 12 annual nesting pairs. Additional harlequin duck habitat is present along lower McDonald Creek, lower Snyder Creek, Avalanche Creek, and streams on the east side of the Divide (Figure 18). Muskrat, beaver, mink, river otters, raptors, and waterfowl make use of the highly productive aquatic and riparian habitats along Lower McDonald Creek. Lake McDonald is also a staging area for harlequin ducks, common loons, and numerous other waterfowl.

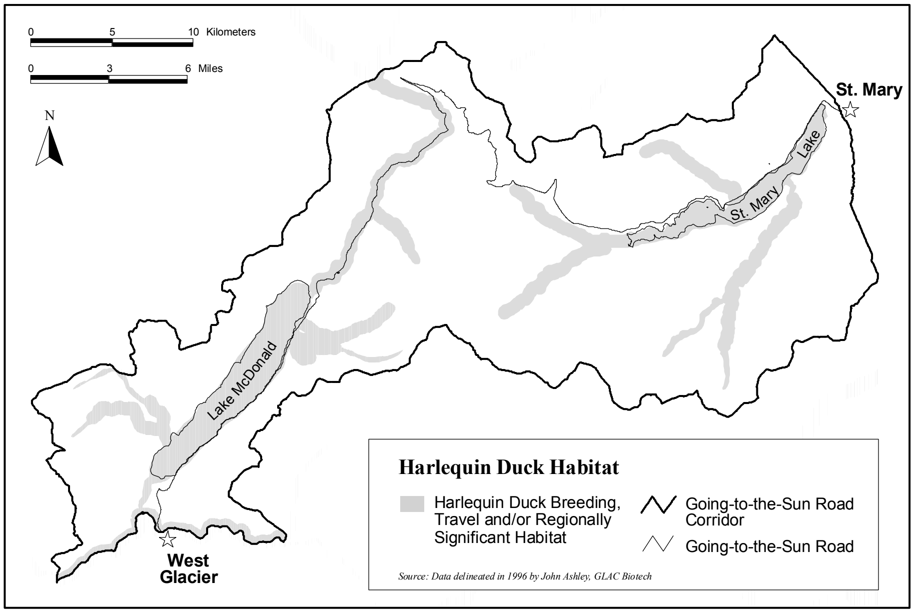
The biannual raptor migration through the Park is a significant event. During the autumn of 1996, over 3,000 raptors were observed from a single location in the McDonald Valley (Yates et al. 2001). About 92 percent of the observations were golden eagles and the remainder were bald eagles. The migration of golden eagles through the Park may be one of the largest golden eagle migrations in North America. Several golden eagle nest sites are located near the Going-to-the-Sun Road. Habitat for other raptors, including Cooper's hawk and northern goshawk, is also present along the Road corridor.

Mountain goats and bighorn sheep are commonly found on rock slopes and cliffs along the Road from near The Loop to Siyeh Bend. They forage on grassy slopes and occasionally along the Road shoulder, which can cause traffic congestion.

Mountain goat

Mountain goat and bighorn sheep activity between Big Bend and Logan Pass is greatest in the summer and between The Loop and Big Bend is greatest in the late summer and fall. Black bear, mountain lion, wolverine, and coyotes are commonly found throughout the length of the Road. Other mammals common to the area include Columbian ground squirrel, hoary marmot, mule deer, golden-mantled ground squirrel, red squirrel, and marten.

Figure 18. Harlequin Duck Habitat.



Because the east side of GNP lies in a transition zone between the Northern Rocky Mountain and Northern Great Plains ecosystems and between the sharply contrasting Pacific Maritime and Continental climatic regimes, wildlife habitat along the east front is notably diverse. The St. Mary Valley provides excellent forage and cover for a variety of wildlife species including grizzly and black bears, mountain lions, lynx, wolverine, coyotes, gray wolves, bald and golden eagles, fisher, marten, and all six ungulate species found in the Park. Boreal toads, spotted frogs, long-toed salamanders, and both species of garter snake occur in the St. Mary Valley and are closely associated with the area's aquatic ecosystems. The east side of the Park provides excellent winter range for bighorn sheep and mountain goats because the strong winds and sparse vegetation leave the south facing slopes relatively snow-free in winter. Bighorn sheep and mountain goats winter in the St. Mary Valley near Rising Sun, often foraging above the Going-to-the-Sun Road. The fescue grasslands scattered throughout the St. Mary Valley provide critical winter range for elk and deer (Figure 17).

Harlequin duck

The St. Mary elk herd, the largest elk herd in the Park, has historically spent most winters (excepting the harshest) inside of the Park in the St. Mary Valley. More recently, elk have been leaving the St. Mary Valley in late fall to winter out on the plains east of the Park as habitat security levels on the Blackfeet Reservation have risen. An important spring elk calving area lies northeast of the St. Mary campground, and each year the Blackfeet Tribal Fish and Game Department places an access closure on the area to protect elk from human disturbance at this sensitive time. Elk calving also occurs between Rising Sun and the St. Mary campground. In summer, the St. Mary elk herd disperses along the east side of Glacier from Marias Pass north to the Canadian border.

Review of the earliest Park records suggests that wildlife composition for mammals and birds has changed little since GNP was established, however, several native species are no longer present and other non-native wildlife species have become established. The mountain bison disappeared from the area before the establishment of GNP, and the woodland caribou population disappeared by the 1930's. Non-native species currently present in the Park include raccoon, ring-necked pheasant, wild turkey, rock dove, European starling, and house sparrow. Management of exotic animal species is undertaken wherever such species have a substantial impact on Park resources or human health and when there is a reasonable expectation that these species can be controlled (NPS 2001b). None of the above mentioned species is widespread or abundant, and control actions have not been implemented in the Park.

Aquatic Resources

The natural aquatic systems and associated indigenous fisheries of the Park have been dramatically altered in the last century by introductions and invasion of non-native fish. Although all of the native species are still present in the Park's lakes and streams, species composition and relative abundances have changed significantly. Stocking of non-native sport fish in Park waters began in 1912 and was not terminated until 1972.

The ways in which altered fish communities have affected associated amphibian, aquatic invertebrate, and terrestrial vertebrate populations are not easily described due to a lack of historic data. There is concern that changes in the abundance of native fish may negatively affect the native predators that depend on them, such as bald eagles, river otters, and osprey. Although fish are no longer stocked in the Park's waters, the introduction, invasion, and establishment of non-native fish species have seriously compromised the Park's aquatic systems (Marnell 1988). As aquatic and terrestrial habitats outside of the Park become more degraded, and as inbreeding with non-native species becomes more prevalent, headwater Parks like Glacier become increasingly important as refuge for pure genetic stocks of fish.

Currently the streams and lakes along the Going-to-the-Sun Road corridor west of the Continental Divide support 11 known native fish species including: westslope cutthroat trout, bull trout, mountain whitefish, pygmy whitefish, redside shiner, peamouth, northern pike minnow, longnose sucker, largescale sucker, slimy sculpin, and shorthead sculpin. Five non-native fish species are still present west of the Continental Divide in the Park (rainbow trout, eastern brook trout, kokanee salmon, lake whitefish, and lake trout).

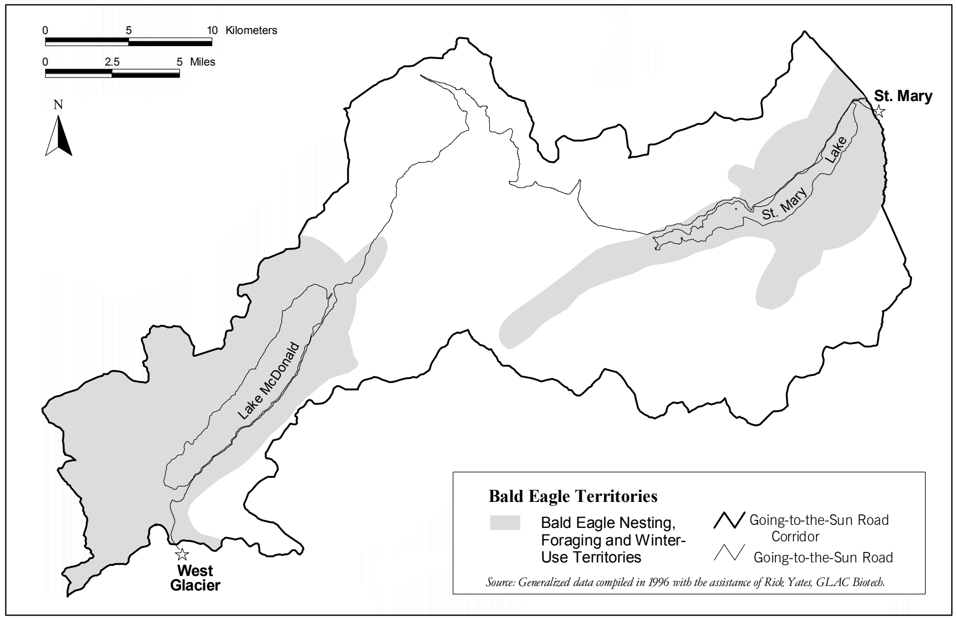
Aquatic habitats along the west half of the Road also provide habitat for amphibious and aquatic invertebrates, vertebrates, and macroinvertebrates. Known amphibious species include long-toed salamanders, tailed frogs, boreal toads, Pacific tree frogs, Columbia spotted frogs, and painted turtles. Several hundred aquatic invertebrate species have been identified in the Park, and scientists believe that many aquatic invertebrate and plankton species are yet to be discovered. Three other aquatic species are known from this area including Columbia spotted frog, boreal toad, and long-toed salamander.

Threatened and Endangered Species and Species of Concern

Threatened and Endangered Species

The U.S. Fish and Wildlife Service (FWS) has identified eight threatened, endangered, and candidate species that may be present in the vicinity of GNP (Table 27). Five of these species are known to occur throughout the Going-to-the-Sun Road corridor, including bald eagle, grizzly bear, lynx, gray wolf, and bull trout.

Figure 19. Bald Eagle Territories.



Bald Eagle. Bald eagles use portions of GNP on a year-round basis as nesting and wintering residents (Yates 1989) and as seasonal migrants (McClelland et al. 1994; Yates et al. 2001) (Figure 19). Two bald eagle nesting territories are located within the Going-to-the-Sun Road geographic area, one at Lake McDonald and one at St. Mary Lake. The inlets of Lake McDonald and adjacent areas provide foraging, roosting, and wintering habitat for resident and migrant bald eagles. The outlet of Lake McDonald also provides an important bald eagle wintering and roosting area. Wintering and roosting habitat at St. Mary Lake is found where large trees are present and near open water where fish and waterfowl are available. GNP also is within a major bald eagle migration corridor and use along the western side of the Park is extensive in the spring and fall (McClelland et al. 1994).

The bald eagle nesting season in GNP extends from early March through late September. The Montana Bald Eagle Management Plan recommends restrictions on human activity within 0.25 miles (400 meters) of bald eagle nesting, roosting, and primary foraging areas during specific stages of the nesting cycle (Montana Bald Eagle Working Group 1994). Restrictions on activity are implemented during the spring in the Lake McDonald and St. Mary Lake bald eagle nest-site management zones. Foraging habitat outside of nest-site management zones is also important, especially for non-breeding, wintering, and migrant bald eagles (Montana Bald Eagle Working Group 1994).

Bald eagle

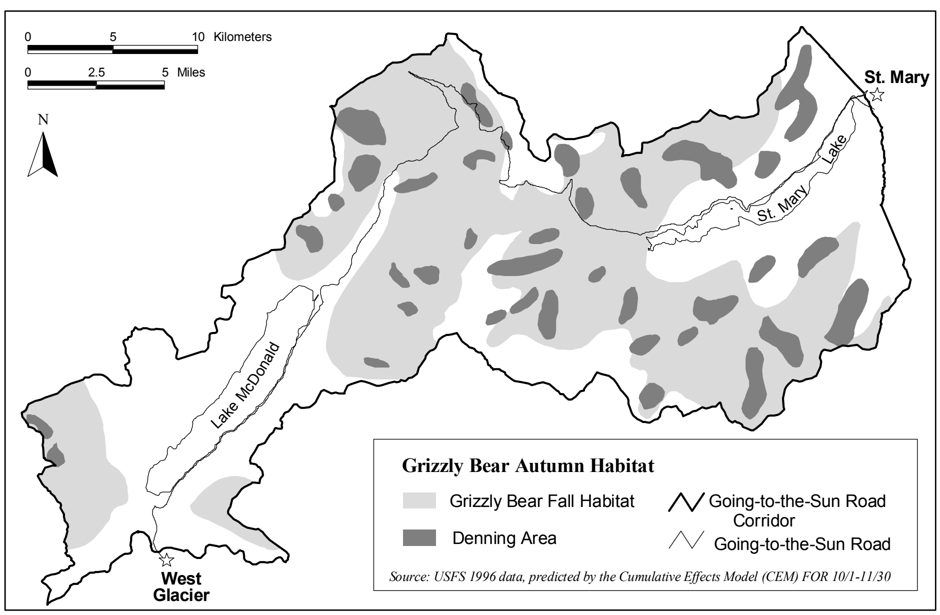
Grizzly Bear. GNP is part of the recovery area for the threatened grizzly bear in the Northern Continental Divide Ecosystem, and has the highest known density in the recovery area. Preliminary results from a recent study using sign surveys and DNA fingerprinting indicate there is a minimum of 178 individual grizzly bears inhabiting GNP with a total estimated population of 323 individuals (Kendall, pers. comm. 2002). Precise population estimates and trends are difficult to establish due to the lack of intensive population level research within the Park and the inherent problems of counting the widely distributed and reclusive grizzly bear.

Grizzly bear

Grizzly bears require large areas of undeveloped habitat (including a mixture of forests, moist meadows, grasslands, and riparian habitats) and have home ranges of 50 to 500 square miles **(**130 to 1,300 square kilometers) (FWS 1993). Grizzly bear seasonal movements and habitat use are tied to the availability of different food sources. In spring, grizzly bears feed on dead ungulates and early greening herbaceous vegetation at lower elevations (Martinka 1972). Riparian areas within the McDonald Creek Valley are highly suitable spring grizzly bear habitat. During the summer, some bears move to higher elevations in search of glacier lilies and other roots, berries, and army cutworm moths (White et al. 1998). During the huckleberry season in the late summer and early autumn, bears forage at upper elevation sites, including avalanche chutes east and west of Logan Pass (Figure 20). During the winter, grizzly bears hibernate in dens away from human disturbance, typically at higher elevations on steep slopes where wind and topography cause an accumulation of deep snow (Mace and Waller 1997).

In addition to diverse foraging habitat, grizzly bears require natural habitat that provides security cover for travel between foraging sites. Examples of these types of travel corridors are found in the Logan

Figure 20. Grizzly Bear Autumn Habitat.



Creek area, the McDonald Valley near Apgar, and at the head and foot of Lake McDonald. Grizzlies are wide-ranging and require a substantial amount of solitude from human interactions (Brown 1985).

Grizzly bear/human inter-action is a management concern that can threaten the safety of visitors as well as that of wild bears. Bears that are familiar with humans have the potential to become habituated to human presence and may become attracted to visitor use areas (Jope 1985). Frequenting human use areas may further habituate bears to the presence of people and will increase the risk of contributing to bear/human encounters. Habituated bears are at great risk of also becoming food-conditioned and may aggressively seek human food at developed areas. Habituated bears are usually relocated from developed areas, and food-conditioned bears are oftentimes removed from the population.

Table 27. Federally listed threatened, endangered, and candidate species evaluated for potential occurrence near the Going-to-the-Sun Road.

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence near the Road
Bald eagle	*Haliaeetus leucocephalus*	FT	Open water, large trees for nesting or roosting	Present, two nest sites in the Road corridor at Lake McDonald and St. Mary Lake and a roost site near Lake McDonald
Grizzly bear	*Ursus arctos*	FE	Diversity of habitats including coniferous forest, avalanche chutes, riparian areas, meadows	Present, suitable habitat throughout the Park
Gray wolf	*Canis lupus*	FE	Forests and meadows where an adequate ungulate prey base is available	Found in North Fork area and McDonald Valley; range may include portions of the western Road corridor and St. Mary area
Lynx	*Lynx canadensis*	FT	Coniferous subalpine forest	Present, observations and tracks observed on both sides of the Park
Bull trout	*Salvelinus confluentus*	FT	Lakes and rivers	Present in McDonald Creek, Lake McDonald, and St. Mary drainage
Water howellia	*Howellia aquatilis*	FT	Vernal glacial ponds and oxbow sloughs	Suitable habitat, but no known populations in the Park
Spalding's catchfly	*Silene spaldingii*	FT	Open rough fescue and bluebunch wheatgrass grasslands	No suitable habitat
Slender moonwort	*Botrychium lineare*	FC	Open meadows, under trees, roadside ditches, limestone cliffs	Possible, suitable habitat present

FE = Federally Endangered; FT = Federally Threatened; FC = Federal Candidate

Source: FWS 2001

Gray Wolf. The natural landscapes in GNP contain some of the most secure and productive wolf habitat in northwest Montana. After a long absence, wolves from Canada began recolonizing the Park in the 1980's (Rockwell 1995; Ream et al. 1989). Wolves have been reported from every major drainage in the Park, but their activity has been mostly concentrated in the North Fork area. Two wolf packs with a total of 10 to 33 wolves have maintained home ranges in the North Fork area throughout the 1990s. Recent sightings document two wolf packs occupying the North Fork and a third pack in the McDonald Valley area. Additional sightings and historic records for the east side of the Park suggest wolves are in the process of recolonizing the area. Pack activity has recently been observed in the St. Mary, Many Glacier, and Two Medicine areas. In 2001, a wolf den was located about 2-miles from the Road. Within the Going-to-the-Sun Road corridor, four wolf sightings were recorded in 2002 in the Lake McDonald valley and wolf activity could expand into the project area (Elze 2002). Despite fluctuating wolf numbers since 1986, the Park's established wolf population continues to serve as a source for natural recolonization in northwest Montana and southern Canada (Boyd-Herger 1997).

Gray wolves are wide-ranging and their distribution is tied primarily to that of their principal prey (deer, elk, and moose). Key components of wolf habitat are: 1) a sufficient, year-round prey base of ungulates and alternate prey; 2) suitable and somewhat secluded denning and rendezvous sites; and 3) sufficient space with minimal exposure to humans (FWS 1987). Wolves are especially sensitive to disturbance from humans at den and rendezvous sites during the breeding period. Human activity near den sites can lead to pack displacement or physiological stress perhaps resulting in reproductive failure or pup mortality (Mech et al. 1991).

Lynx. Historically lynx may have been more common throughout GNP; documented sightings declined since the 1960's but appear to be increasing in recent years, perhaps due to an increased interest in the species. Systematic surveys since 1994 detected lynx in many of the Park drainages, including the St. Mary and McDonald valleys. Winter snow track surveys in 1998-99 and 199-2000 revealed Canada lynx track in the McDonald Creek drainage (NPS files). DNA sampling for lynx documented at least 6 individuals in 2000, one from Granite Park near the Road (Edmonds, 2002). The only Canada lynx sighting recorded within the Going-to-the-Sun Road corridor in 2002 was at Logan Pass (Elze 2002). Twenty-eight lynx sightings were recorded outside of the Road corridor in 2002, with 22 lynx tracks detected in the Middle Fork of the Flathead drainage. The number of lynx currently present in the Park is not known.

Lynx habitat generally is described as climax boreal forest with a dense undercover of thickets and windfalls (Ruediger et al. 2000). Advanced successional stages of forests and dense conifer stands often are preferred habitats of lynx for denning and foraging respectively. Large amounts of woody debris and minimal human disturbance are important features of denning sites (Brittel et al. 1989). Lynx generally forage in dense young conifer forests or mature forest in more open stands especially, where their primary prey, snowshoe hare

Lynx

(*Lepus americanus*), is abundant. Travel corridors are thought to be an important factor in lynx habitat because of their large and variable home ranges, generally 3 to 285 square miles (8 to 738 square kilometers) (Ruediger et al. 2000). Travel cover includes contiguous vegetation cover over 6 feet (2 meters) tall (Brittel et al. 1989), and lynx generally do not cross openings greater than 300 feet (100 meters) wide (Koehler 1990). Lynx are most susceptible to disturbance during the denning period and while newborns are developing (May–August) (Joslin and Youmans 1999). Generalized lynx habitat has been delineated in GNP, but there is little information on occupancy or population numbers.

The primary risk factors for lynx near GNP are: wildland fire management policies that preclude natural disturbance processes, roads and highways, winter recreational trails, habitat degradation by non-native plant invasive species, incidental or illegal shooting and trapping, competition or predation as influenced by human activities, and human developments that degrade and fragment habitat.

Bull Trout. The North Fork and Middle Fork of the Flathead River drainages and portions of the Hudson Bay drainage, which includes the Belly River and St. Mary drainages, contain lake and stream habitat for bull trout. Within the Going-to-the-Sun Road corridor, bull trout are present in Lake McDonald and McDonald Creek on the west side of the Park and in St. Mary Lake and Divide Creek on the east side of the Park. Bull trout have experienced significant population declines in the Lake McDonald/Flathead drainage due to competition and hybridization with introduced, non-native fish species such as lake trout and eastern brook trout. Bull trout populations west of the Continental Divide are currently at a high risk of extirpation due to displacement by lake trout (Fredenberg 2000). Present fishing regulations prohibit the taking of any bull trout in GNP.

Bull trout exhibit three distinct life-history forms—resident, fluvial, and adfluvial. Resident bull trout spend their entire lives in small tributaries, whereas fluvial and adfluvial forms hatch in small tributary streams then migrate into larger rivers (fluvial) or lakes (adfluvial). Spawning occurs in third and fourth order streams between late August and early November (FWS 1998). Eggs and fry typically over-winter in spawning streams until the following spring. Specific habitat requirements of bull trout include abundant cover for adult fish during spawning, low levels of fine sediment in the incubation environment, cold summer water temperatures and channel stability for juveniles, and open migration routes between seasonally important habitats (FWS 1998).

Plants. There are no known federally listed threatened or endangered plants in the Park. Suitable wetland habitat for the federally threatened water howellia is present in the Park, but it has not been observed. Spalding's catchfly is present in the Upper Flathead River drainage, but no potential habitat for the species has been identified in the Park. Slender moonwort is a candidate plant species for federal listing, that has been located in the Park, but not within the Going-to-the-Sun Road corridor, although suitable habitat is present.

Species of Concern

Species of concern to GNP are those species that are rare, endemic, disjunct, vulnerable to extirpation, in need of further research, or likely to become threatened or endangered if limiting factors are not reversed. Likewise, a species may be of concern because of characteristics that make them particularly sensitive to human activities or natural events. The species of concern list for GNP includes species that are listed as "Species of Special Concern" by the Montana Natural Heritage Program (MNHP), "Priority Species" by Partners in Flight, and "Sensitive Species" by the U.S. Forest Service (USFS). In addition, species of concern may also include big game, upland game birds, waterfowl, carnivores, predators and furbearers whose populations are protected in the Park but subject to hunting and trapping outside of the Park. A complete list of wildlife and plants of concern is included in Appendix C.

Wildlife and Aquatic Species. There are 63 wildlife and aquatic species of concern that are known to use or inhabit the Going-to-the-Sun Road corridor.

Coniferous forests near the Road may support several species of concern including fisher, wolverine, Clark's nutcracker, golden eagle, Hammond's flycatcher, pileated woodpecker, and three-toed woodpecker. Numerous species of concern may use riparian and wetland habitat along McDonald Creek, Reynolds Creek, and their tributaries including, northern bog lemming, silver-haired and hoary bats, harlequin duck, red-eyed vireo, willow flycatcher, black-backed woodpecker, and boreal toads. Ptarmigans and bighorn sheep are found in alpine habitats near Logan Pass. Wolverine use forest mosaic and subalpine talus sites and also frequent ungulate winter range in search of carrion. From January to October 2002, there were 36 reported sightings of wolverines in the Going-to-the-Sun Road corridor and 76 sightings outside of the Road corridor (Elze 2002). Lake McDonald and St. Mary Lake provide habitat for horned grebe, common loon, and trumpeter swan. The St. Mary drainage also supports several aquatic species including Rocky Mountain capshell, shorthead sculpin, spoonhead sculpin, and trout-perch. Westslope cutthroat trout is found on both sides of the Park in lakes and streams. Grasslands near St. Mary may support ferruginous hawk and swift fox.


Rocky Mountain bighorn sheep

Plants. There are 74 plant species of special concern, as designated by the MNHP, located in the Going-to-the-Sun Road geographic area (Appendix C). This includes 39 species of vascular plants, 33 mosses, and 2 lichens. Plants of special concern are found in all of the habitats present along the Road including coniferous forest, streamside riparian areas, moist meadows, dry grasslands, and alpine tundra. Many of the rare plants are found in wetlands, bogs, and peatlands. The steep rocky slopes adjacent to the Road at higher elevations support a variety of rare vascular plants and mosses adapted to wet rocks and limestone outcrops.

Air Quality

GNP is classified as a mandatory Class I area under the Federal Clean Air Act (42 USC 7401 *et seq.*). This most stringent air quality classification is aimed at protecting parks and wilderness areas from air quality degradation. The act gives federal land managers the responsibility for protecting air quality and related values, including visibility, plants, animals, soils, water quality, cultural and historic structures and objects, and visitor health from adverse air pollution impacts. The Clean Air Act defines mandatory Class I areas as national parks over 6,000 acres (2,428 hectares) and wilderness areas over 5,000 acres (2,023 hectares) designated as of the date of the act.

Existing air quality is considered good in the Park. The annual visibility levels at the Park are approximately 52 miles (84 kilometers), which is less than typical in the Central Rocky Mountains but greater than many eastern sites. Impaired visibility results from concentrations of fine particles suspended in the ambient air. Fine aerosol and coarse aerosol concentrations averaged 5.5 micrograms per square meter ($\mu g/m^3$) each. There are no strong seasonal variations except for nitrate, which showed a strong winter peak, and coarse mass, which peaked in winter. Organics are by far the largest contributor to fine particle mass (58.4 percent) followed by sulfate (17.9 percent), soil (10.4 percent), light-absorbing carbon (7.7 percent), and nitrate (5.6 percent). The organic and soot particles originate from vegetative burning and urban sources; sulfates and nitrates originate from sources of sulfur dioxide and nitrogen oxides, such as power plants; and coarse mass and soils come from wind blown dust.

Visibility is affected by wildfires, prescribed fires, and industrial emissions from sources in the northern states and Canadian provinces on the boundary (IAQAB 1998). Dust from unpaved roads in the Park also affects visibility. Sulfuric compounds from industrial emissions, including sulfur dioxide and ammonium sulfate, also can contribute to local haze. When inversions occur, visibility problems in the Park can be more severe. Flathead County, which includes the part of the Park west of the Continental Divide, is currently out of compliance with Montana standards for particulate emissions. Montana is required to develop a state implementation plan to attain the particulate standard.

Sulfate and nitrate ion concentrations in precipitation measured at the Park are comparable on average to other sites in the northwestern United States but are very low compared to most sites in the eastern United States. In 1997, the Park reported a sulfate ion concentration of 0.3 milligrams per liter (mg/L) and a nitrate ion concentration of 0.5 mg/L.

The annual maximum 1-year ozone levels at GNP are lower than those measured at most of the other monitoring sites in the national park system. Between 1992 and 1997, the Park's annual daily maximum 1-hour concentrations varied between 58 and 77 parts per billion (ppb). The Park's peak ozone levels are comparable to those measured at other national park system sites in the Pacific Northwest but are significantly lower than those measured in national parks system sites in southern California and in the northeast and east-central United States. In addition, the Park's ozone levels are well below the U.S. Environmental Protection Agency (EPA) 8-hour average ozone standard designed to protect human health.

Winter inversions cause local increases in carbon monoxide at Kalispell, 13 miles (21 kilometers) south of West Glacier. Emissions from automobiles, wood-burning stoves, and the Columbia Falls Aluminum Company, combined with winter meteorological conditions, cause seasonal increases in carbon monoxide.

The main sources of pollutants surrounding the Park west of the Continental Divide are industrialized areas south and west of the Park, including Columbia Falls Aluminum Company, Plum Creek Lumber, Stoltze Land and Lumber, and Pack and Company. These sources are under the authority of the state of Montana, which works closely with the Park on air quality issues. On the east side of the Park, airborne pollutants are often associated with a northern airflow.

Visual Resources

The Road is characterized by majestic views as it follows the shore of Lake McDonald and climbs through subalpine slopes to the summit at Logan Pass. From Logan Pass, the Road winds down the east side of the Continental Divide along St. Mary Lake to the community of St. Mary. The panoramic views of the natural environment provided by the Road are complemented by the excellent examples of craftsmanship used in Road construction. The Road boasts numerous complex retaining walls, long stretches of protective guardwalls, and a stone arch half-bridge and stone bridges that blend into the surroundings.

The Going-to-the-Sun Road is a key component of a complex and dramatic visual landscape. The Road offers spectacular views of mountains, lakes, streams, and forestland well beyond the roadway corridor. Important cultural landscapes such as historically significant engineering features are observable throughout the Road. In addition, the Road is visible to Park users other than motorists from vantage points along trails, lake shorelines, lodges, campgrounds, and other visitor facilities. In discussing the visual landscape of the Road corridor, views both of the Road and from the Road, for both distant and short-range views, come into play. These varied scenic opportunities are examined in detail in the *Cultural Landscape Report* for the Road, which was prepared in conjunction with the Road rehabilitation planning effort (RTI 2002).

Views of the Road and its immediate setting are available throughout the roadway corridor. For motorists, short-range views of the Road are ubiquitous, demonstrating the Road's unique engineering and the surrounding natural environment. Defining visual qualities of the Road include its relative narrowness and often-tight curvature; the use of rustic designs and natural materials in walls and railings; distinctive signage; and pullouts. These elements distinguish the Road from driving experiences elsewhere. The high elevation portions of the Road create a dramatic cut across the steep landscape visible from trails, picnic sites, and other locations off the Road corridor.

While some visual qualities of the Road are present throughout its length, specific roadway characteristics vary significantly in response to the Road's changing natural setting. Logan Pass provides the Road's most spectacular and characteristic visual features. Here, views of the Road emphasize narrowness and curvature, with often-limited sight lines and virtually no shoulders. Road-related engineering features, such as retaining walls and guardwalls, are very frequent, and often highly visible to travelers. The design of these structures, and their use of native materials, provide the Road with some of its most noteworthy visual qualities and integrate the route into its dramatic natural setting. Another distinguishing element of the Road is the fairly constant 6 percent grade on either side of the pass.

The lower segments of the Road provide a less complicated topography requiring fewer engineering features with broader curvature, visible shoulders, and improved sight lines; however, a number of characteristic engineering features exists in these areas, and the Road's width, signage, and other features continue to mark the route as a national park roadway.

More distant views of the Road are relatively limited for motorists. Vegetation and topography obscure most panoramic vistas of the immediate roadway corridor, except for the Alpine section of the Road, where the exposed, cliffside alignment makes the Road a prominent feature of the Logan Pass approach. On the western approach to Logan Pass, the Road is several miles away, over 2,000 feet

(600 meters) above, and clearly visible to eastbound travelers on the McDonald Valley floor. Hikers and mountain climbers experience similar views of the Road from a number of locations including the popular Highline Trail.

The Road also provides views of the natural and cultural features beyond the Road corridor. For much of its length, the Road provides dramatic visual exposure to the Park's natural and scenic features, successfully fulfilling its primary design mission and maintaining its role as a primary visitor attraction in Glacier.

The *Cultural Landscape Report* (RTI 2002) identified seven "landscape segments" for the Road, each with its own distinguishing visual characteristics. These segments are summarized in Table 28 and shown in Figure 21.

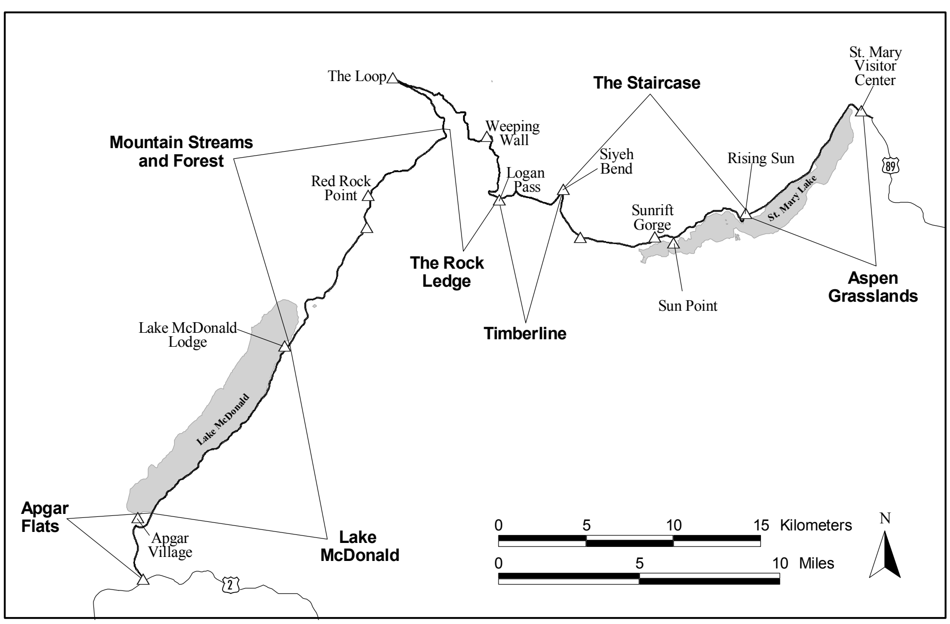
Table 28. Going-to-the-Sun Road landscape segments (west to east).

Name	Location
Apgar Flats	West Glacier to the foot of Lake McDonald
Lake McDonald	Foot of Lake McDonald to Lake McDonald Lodge
Mountain Streams and Forests	Lake McDonald Lodge to base of Logan Pass grade
The Rock Ledge	Base of Logan Pass grade to Logan Pass
Timberline	Logan Pass to Siyeh Bend
The Staircase	Siyeh Bend to Rising Sun
Aspen Grasslands	Rising Sun to St. Mary

The **Apgar Flats** segment is the western gateway to GNP and the first exposure to the Road for most Park visitors. A combination of 1930s and 1960s construction projects, this segment displays little of the visual character that marks the remainder of the Road. The roadway is relatively wide, with broad, sweeping curves and almost no visible engineering features. The forests surrounding the Road inhibit scenic views in nearly all directions, focusing visual attention on the roadway itself. The Headquarters and Apgar areas are nearby, but are not visible from the Road.

With the **Lake McDonald** segment, the visual character of the roadway changes significantly as it follows the southeastern shore of the Park's largest lake. This segment, on an historic alignment largely dating from the 1930s, features a narrow width and near-constant curvature. The visual character of the Lake McDonald segment is defined by the Road's tight placement between lake-shore and hillside. The intermittent views of Lake McDonald include the first glimpses for eastbound travelers of the Park's famous mountain peaks. Views of the roadway itself

Figure 21. Cultural Landscape Segments.



are limited to the immediate area. The segment ends at Lake McDonald Lodge, a National Historic Landmark only briefly visible through the forest.

The **Mountain Streams and Forests** segment marks the Road's transition from lakeshore to streamside and canyon surroundings. The increasing closeness of the Park's mountains is a defining characteristic of this segment, and eastbound travelers are treated to intermittent but spectacular vistas of Glacier's peaks. These panoramas are juxtaposed with shorter-distance views of cascading McDonald Creek and nearby forests. A visual sense of the Road's engineering quality also begins to emerge here, with the presence of the first stone guardwalls, retaining walls, and bridges. Occasional long straight-aways help make the roadway visible, and frame some of the segment's best vistas. Eastbound travelers on the segment can also view the Road alignment ascending Logan Pass on the cliffs far above.

The **Rock Ledge** segment begins as the Road starts its ascent to Logan Pass just east of Logan Creek. With little change from the 1920s, this alignment climbs to the Pass. This segment is easily the most spectacular, and dramatically displays the visual and engineering qualities for which the Road is famous. The Road here is characterized by a very narrow width, largely without shoulders, heavy curvature, and long stretches of stone guard and retaining walls. Views from the Road are expansive, with broad mountain vistas to the north, views down McDonald Creek to the west, and of Logan Pass to the south. Both close-range and distant views of the Road and its historic stonework are also afforded, providing strong visual reflections of the route's complex, dramatic, and sensitive engineering.

The **Timberline** segment represents the eastern counterpart to the Rock Ledge ascent to Logan Pass. As with the Rock Ledge segment, the Timberline segment includes cliffside construction with significant exposure, but the roadway is wider, curves are broader, and the rockwork generally less prominent. Distant views predominate, although the panoramas are less broad than those to the west. The relatively direct alignment and lack of trees combine to make the Road visible in this area.

The **Staircase** segment begins where the Road reenters the forest at Siyeh Bend. This segment includes long straight-aways to the west, and narrow, relatively tight curves along the north shore of St. Mary Lake. Views are intermittent, although the lakeshore portion of the segment includes spectacular vistas of St. Mary Lake and the mountains beyond. Significant masonry engineering features exist on this segment, although they are less visually prominent than those nearer Logan Pass. Medium-range views of the Road are relatively frequent, both in the straight-aways and along the St. Mary lakeshore.

The **Aspen Grasslands** segment again provides a transition between Park and non-park driving experiences. Here, the roadway is relatively straight, with few engineering features. The grassland setting affords numerous distant views, including exceptional vistas of the Park mountains for westbound travelers. The Road itself is also readily apparent, although the straightforward engineering of the segment limits its visual interest.

Natural Soundscape and Lightscape

An important policy of the NPS is "to preserve, to the greatest extent possible, the natural soundscapes of parks" (USDI 2001). The natural soundscapes exist in the absence of human-caused sound. They are an important resource and have intrinsic value as a part of the unique environment of the Park. Natural sounds of wind, water, animals, and other natural phenomena predominate through most of the

Park. Natural sounds occur within and beyond the range of sounds that humans can perceive. Examples of such natural sounds include sounds produced by: wind in the trees, falling water, the rustling of leaves, the song of a bird, the call of an animal, and the buzz of an insect. Natural quiet exists when the sounds of these natural components of the Park prevail.

Artificial noise in the Park originates from human activities and varies depending on time and location. Sources of noise in the Park include road traffic, motorboats, scenic air tours, railroad traffic, developed area activity, and that generated by general maintenance and administrative activities (e.g., chainsaw work, helicopter flights, emergency vehicle sirens). Elevated noise levels are generally concentrated in visitor service zones near campgrounds, lodges, roads, and developed areas. Noise from commercial, private, and military aircraft can be heard throughout the Park. Future development outside the Park, including mineral development, logging, and new construction, also may lead to increased noise within the Park.

Noise is most elevated in the visitor service zones adjacent to the Going-to-the-Sun Road, especially in the Apgar Village, Lake McDonald, and Rising Sun developed areas. Traffic, motorboats, people, and music can contribute to noise in these areas. Noise along the Road is primarily from vehicles and people. The backcountry is dominated by natural quiet. The only baseline data for measured levels of noise in GNP were gathered by a 1984 study of seismic activity in the North Fork (NPS 1993c). The study indicated an extremely low background level of noise.

There are no major metropolitan areas within 125 miles (200 kilometers) of the Park that substantially affect ambient light conditions. The night sky in GNP remains in a near natural condition. Within the Park, night lighting is limited to developed areas near lodges, stores, and administrative facilities.

About 95 percent of the Park is proposed as wilderness, where natural quiet and natural light are considered important resources. NPS strives to preserve the natural sounds and light associated with the biological resources of the Park. Activities causing excessive noise or unnecessary natural sounds or light are monitored, and actions are taken to prevent or minimize unnatural sounds and light that adversely affect Park resources, values, or visitors enjoyment of them.

Wilderness and Wild and Scenic Rivers

Over 95 percent of GNP has been proposed for wilderness designation, but formal designation has not been signed. NPS policy is to manage proposed wilderness as wilderness until the land is either formally designated or formally rejected by Congress. The Going-to-the-Sun Road, as well as other primary roads in the Park are not included in the proposed wilderness designation. The Road does provide access to proposed wilderness via trailheads.

The three forks of the Flathead River were designated by Congress in 1976 as part of the Wild and Scenic River System. Both the North and Middle Forks of the Flathead River border the Park. Only the Middle Fork intersects the Going-to-the-Sun Road near West Glacier. The high water line on the Park side of the Middle Fork is the property boundary for the Park and the start of the Going-to-the-Sun Road. Recreation opportunities on the Middle Fork include boating, fishing, and scenic viewing.

This page intentionally left blank.

Chapter 4 Environmental Consequences

INTRODUCTION

This chapter provides an analysis of the potential environmental effects of the Preferred Alternative and other alternatives on the resources discussed in Chapter 3. Potential impacts were identified for each of the alternatives based on a review of relevant scientific literature, previously prepared environmental documents, field investigations, and the best professional judgment of NPS staff and other resource specialists.

St. Mary Bridge under construction, showing ring stone being placed

John Zoss, Final Construction report (1934-1935) on St. Mary's River in "Development & Maintenance: Report; Situation" folder 6, box 116, GNPA

Included in this chapter is a discussion of the methods that were used to identify and evaluate the types and degree of impact for each of the resources. This chapter is organized by resource, and is the scientific and analytical basis for the comparison of alternatives. Resource impacts are often similar between alternatives, but differences in impacts are identified and compared as appropriate. This chapter should be reviewed jointly with Chapter 2, which identifies the alternatives and mitigation measures that would be implemented by the NPS to avoid or minimize environmental effects. In addition, the impact analysis for each alternative is used as the basis for consideration of potential impairment to Park resources and values, as required by NPS Management Policies and Director's Order 12.

METHODS

The determination of impacts is evaluated at several levels. Impacts are described in terms of:

Type: Either beneficial or adverse. Unless otherwise noted as beneficial, impacts are adverse.

Intensity: The intensity of the impacts varies for each resource and ranges from negligible, to minor, to moderate, to major. Threshold descriptions for the intensity of impacts are described in Table 29.

Context: Effects are 1) site-specific at the location of the action; 2) localized in the general vicinity of the action; 3) widespread throughout the Park; or 4) regional outside of the Park.

Duration: Effects are either short term or long term. Defining short- and long-term effects for the proposed rehabilitation of the Road is complicated by the fact that all alternatives require multiple years to complete, with rehabilitation work ranging from 6 to 50 years. In addition, the work on the Road, while concentrated in the Alpine section, would be conducted throughout its 50-mile (80-kilometer) length. Thus in any given year, different segments of the Road would undergo rehabilitation. Because of the varying types of impacts, the duration for determining whether an impact is short term or long term varies by resource and is further defined in Table 29.

Impacts are also identified as direct, indirect or cumulative. Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther removed from the place, but are still reasonably foreseeable. Cumulative impacts are further described in the following section.

CUMULATIVE EFFECTS

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to 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 can result from individually minor, but collectively significant actions taking place over time. The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act, require assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are considered for all alternatives including No Action.

Cumulative effects were determined by combining the impacts of each alternative with potential other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or foreseeable future projects within or near Glacier National Park. Reasonably foreseeable future activities analyzed in this EIS are those actions independent of rehabilitation of the Going-to-the-Sun Road. The cumulative effects analysis area includes GNP; Flathead, Glacier, and Lake counties; and southwest Alberta, as appropriate for each resource. Past actions and reasonably foreseeable activities that may have a cumulative impact are discussed below and an analysis of cumulative effects is included in subsequent sections for each resource.

Table 29. Impact threshold definitions and duration.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
SOCIOECONOMIC RESOURCES	No effects would occur or the effects to socioeconomic conditions would be below or at the level of detection. The effect would be slight.	Effects to socioeconomic conditions may be detectable, but within the range of typical year to year variations under existing circumstances. Effects unlikely to persist substantially beyond the duration of direct actions under the alternatives.	Effects to socioeconomic conditions would be readily apparent and somewhat greater than typical year-to-year variations. Effects unlikely to persist substantially beyond the duration of direct actions under the alternatives.	Effects to socioeconomic conditions would be readily apparent and likely at least twice as large as typical year-to-year variations.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.
ARCHEOLOGICAL RESOURCES	Impact is at the lowest levels of detection — barely measurable with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of Section 106, the determination of effect would be no adverse effect.	Disturbance of a site(s) is confined to a small area with little, if any, loss of important information potential. For purposes of Section 106, the determination of effect would be no adverse effect.	Disturbance of the site(s) would not result in a substantial loss of important information. For purposes of Section 106, the determination of effect would be adverse effect or no adverse effect.	Disturbance of the site(s) is substantial and results in the loss of most or all of the site and its potential to yield important information. For purposes of Section 106, the determination of effect would be adverse effect.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.
HISTORIC	Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact would not affect the character defining features of a National Register of Historic Places eligible or listed structure or building. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact would alter a character defining feature(s) of the structure or building but would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact would alter a character defining feature(s) of the structure or building, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be adverse effect.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.

Table 29 continued.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
ETHNOGRAPHIC	Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of beliefs and practices. There would be no change to a group's body of beliefs and practices. For purposes of Section 106, the determination of effect on Traditional Cultural Properties would be no adverse effect.	Impact(s) would be slight but noticeable and would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of beliefs and practices. For purposes of Section 106, the determination of effect on Traditional Cultural Properties would be no adverse effect.	Impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's beliefs and practices, even though the group's beliefs and practices would survive. For purposes of Section 106, the determination of effect on Traditional Cultural Properties would be adverse effect or no adverse effect.	Impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices, to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For purposes of Section 106, the determination of effect on Traditional Cultural Properties would be adverse effect.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.
CULTURAL LANDSCAPE	Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact would not affect the character defining features of a National Register of Historic Places eligible or listed cultural landscape. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact would alter a character defining feature(s) of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be either a no adverse effect or adverse effect.	Impact would alter a character defining feature(s) of the cultural landscape, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be adverse effect.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.

Table 29 continued.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
TOPOGRAPHY, GEOLOGY, AND SOILS	There would be no perceptible change to the landscape or geologic formations. Soils would not be affected or the effect would be below or at the lower end of detection. Any effects to soil productivity or fertility would be slight.	The effects to the landscape, geologic formations, and soils would be detectable. Changes to the landscape and geologic features would be small in size and area. Effects to soil productivity or fertility would be small, as would the area affected.	The effect to the landscape, geology, and soils would be readily apparent. Effects would result in a change to the landscape, geology, and soil character over a relatively wide area or multiple locations.	The effect on the landscape, geology, and soils would be readily apparent and would substantially change the character of these resources over a large area.	Short term—Effects last less than 3 years. Long term—Effects last more than 3 years.
WATER RESOURCES AND WATER QUALITY	Neither water quality nor hydrology would be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and local.	Changes in water quality or hydrology would be measurable, although the changes would be small and the effects would be localized.	Changes in water quality or hydrology would be measurable but would be relatively local.	Changes in water quality or hydrology would be readily measurable, would have substantial consequences, and would be noticed on a regional scale.	Short term—Effects last less than 1 year. Long term—Effects last more than 1 year.
FLOODPLAINS	Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and local.	Changes in floodplains would be measurable, although the changes would be small and the effects would be localized.	Changes in floodplains would be measurable and long term but would be relatively local.	Changes in floodplains would be readily measurable, have substantial consequences, and would be noticed on a regional scale.	Short term—Effects last less than 1 year. Long term—Effects last more than 1 year.

Table 29 continued.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
VEGETATION	No native vegetation would be affected or some individual native plants could be affected, but there would be no effect on native species populations. The effects would be on a small scale.	Some individual native plants would be affected over a relatively small area and minor portion of that species' population. A minor introduction or spread of non-native plant species is possible over a small area and eradication or control would be easily achieved.	Some individual native plants would be affected over a relatively wide area or multiple sites and would be readily noticeable. There would be limited impact to the species population, but for individual species, a sizeable segment of the species' population could be affected. The introduction or spread of non-native plant species would occur at multiple locations and extensive weed control measures would need to be implemented.	A considerable effect on native plant populations would occur over a relatively large area. A widespread introduction or spread of non-native plant species would occur resulting in the need for aggressive weed control and the likely establishment of exotic species.	Short term—Effects last less than 3 years. Long term—Effects last more than 3 years.
WETLANDS	Wetlands would not be directly affected. Incidental indirect impacts would be slight and not measurable.	A minor temporary impact on wetlands of less than 1 acre would occur. Affected wetlands would be readily restored with no loss in function or values.	A direct loss of wetlands of 1 to 3 acres would occur. Wetland mitigation would be required to replace the impacted wetland.	The direct loss of more than 3 acres of wetlands would occur.	Short term—Effects last less than 3 years. Long term—Effects last more than 3 years.
WILDLIFE AND AQUATIC RESOURCES	Wildlife and aquatic resources would not be affected or the changes would be so slight that they would not be of any measurable or perceptible consequence to the species' population.	Effects to individual wildlife and aquatic species are possible, although the effects would be localized, and would be small and of little consequence to the species' population.	Effects to individual wildlife and aquatic species are likely and localized, with consequences at the population level.	Effects to wildlife and aquatic resources would have substantial consequences to species populations in the region.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.

Table 29 continued.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN	No federally listed species would be affected or an individual of a listed species or its critical habitat would be affected, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a "no effect" determination in U.S. Fish and Wildlife Service terms.	An individual(s) of a listed species or its critical habitat would be affected, but the change would be small. Minor effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "not likely to adversely affect" the species.	An individual or population of a listed species, or its critical habitat would be noticeably affected. The effect could have some long-term consequence to the individual, population, or habitat. Moderate effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely…" or "not likely to adversely affect" the species.	An individual or population of a listed species, or its critical habitat, would be noticeably affected with a long-term, vital consequence to the individual, population, or habitat. Major effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely to adversely affect" the species or critical habitat.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.
AIR QUALITY	There would be no measurable change in existing air quality or visibility.	An introduction of solid airborne pollutants would occur. There may be slight detectable impacts to visibility at localized sites.	An introduction of airborne pollutants would be readily measurable. Impacts to visibility would be readily observable and widespread.	An introduction of airborne pollutants would be readily measurable. Visibility in the Park or surrounding areas would be reduced and air quality standards may be exceeded.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation.
VISUAL RESOURCES	No fixed, short-term or long-term changes to the views of or from the roadway corridor would occur. Some transient visual changes may occur, caused by temporary alterations in vehicular traffic patterns or by the movement of equipment.	Changes to visual resources would be short term and non-substantive only, and would be limited to the immediate right-of-way of the Road. Only limited mitigation or interpretive measures would be required.	Short-term changes to visual resources may occur both within and beyond the roadway right-of-way, but long-term changes would be limited to the roadway corridor itself. Substantive changes would be limited to a small number of major project sites.	Both short-term and long-term changes may occur both within and beyond the roadway corridor, and some of these changes may be substantive throughout.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the rehabilitation period.

Table 29 continued.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
NATURAL SOUNDSCAPE AND LIGHTSCAPE	There would be no introductions of artificial noise or light into the Park.	A short-term introduction of artificial noise and light would occur at localized sites. The effect would be readily detectable, but would not adversely affect Park visitors or wildlife.	A widespread introduction of noise and light would be readily detectable and would adversely affect nearby visitors and wildlife.	A long-term introduction of noise and light would occur that would adversely affect visitors and wildlife.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the Road rehabilitation period.
WILDERNESS AND WILD AND SCENIC RIVERS	There would be no effect on the proposed wilderness status of Park lands or effects to wild and scenic river use or designation.	An indirect disturbance to wilderness values or wild and scenic river use may occur from project actions.	A direct loss or disturbance to proposed wilderness lands or wild scenic rivers would occur.	A loss or disturbance to proposed wilderness lands or wild and scenic river designation would occur. Wilderness and wild and scenic river values would be diminished.	Short term—Effects extend only through the period of Road rehabilitation. Long term—Effects extend beyond the Road rehabilitation period.
ENVIRONMENTAL JUSTICE	Socioeconomic resource impacts would be negligible and/or share of impacts borne by low income and minority populations is not significantly larger than the study area average.	Socioeconomic resource impacts would be minor and share of impacts borne by low income and minority populations is significantly larger than the study area average.	Socioeconomic resource impacts would be moderate and share of impacts borne by low income and minority populations is significantly larger than study area average.	Socioeconomic resource impacts would be major and share of impacts borne by low income and minority populations is significantly larger than the study area average.	

Past Actions

A variety of past activities, including the original construction of the Going-to-the-Sun Road, have modified resources in the project area. Other principal developments along the Road include campgrounds, lodges, visitor centers, boating facilities, parking areas, and trails. Outside the Park, the natural environment has been modified by roads, residential and commercial development, agricultural practices, water storage projects, and other land use changes. The description of the affected environment in Chapter 3 is the baseline condition of resources as modified by past actions.

Reasonably Foreseeable Activities

There are several reasonably foreseeable activities that, in conjunction with the proposed rehabilitation of the Going-to-the-Sun Road, may result in cumulative effects. For the purpose of this analysis, cumulative effects from actions likely to occur within the next 10 years have been considered.

Reasonably foreseeable activities located outside of the Park include regional highway and transportation projects, National Forest activities, and regional population growth. The cumulative effect of these activities relate primarily to visitor use and experience and the regional and local economy with limited impact on natural or cultural resources. The same is true for Lewis & Clark Bicentennial Commemoration activities and the Glacier National Park Centennial anniversary, which may result in a temporary increase in Park visitation. Activities within the Park potentially affecting natural and cultural resources include other Park transportation projects and facility improvements. Table 30 summarizes the reasonably foreseeable activities within a 10-year window, and Figure 22 shows their geographic extent. Reasonably foreseeable activities are discussed below.

Highway and Transportation Projects Outside the Park

Several highway reconstruction, rehabilitation, and paving/surfacing projects are planned on roads outside of GNP. Some of these roads are primary travel routes to the Park and could affect visitor access or add to construction delays. Most reconstruction efforts would maintain 2-lane, 2-way traffic, although extended delays may be needed for some projects.

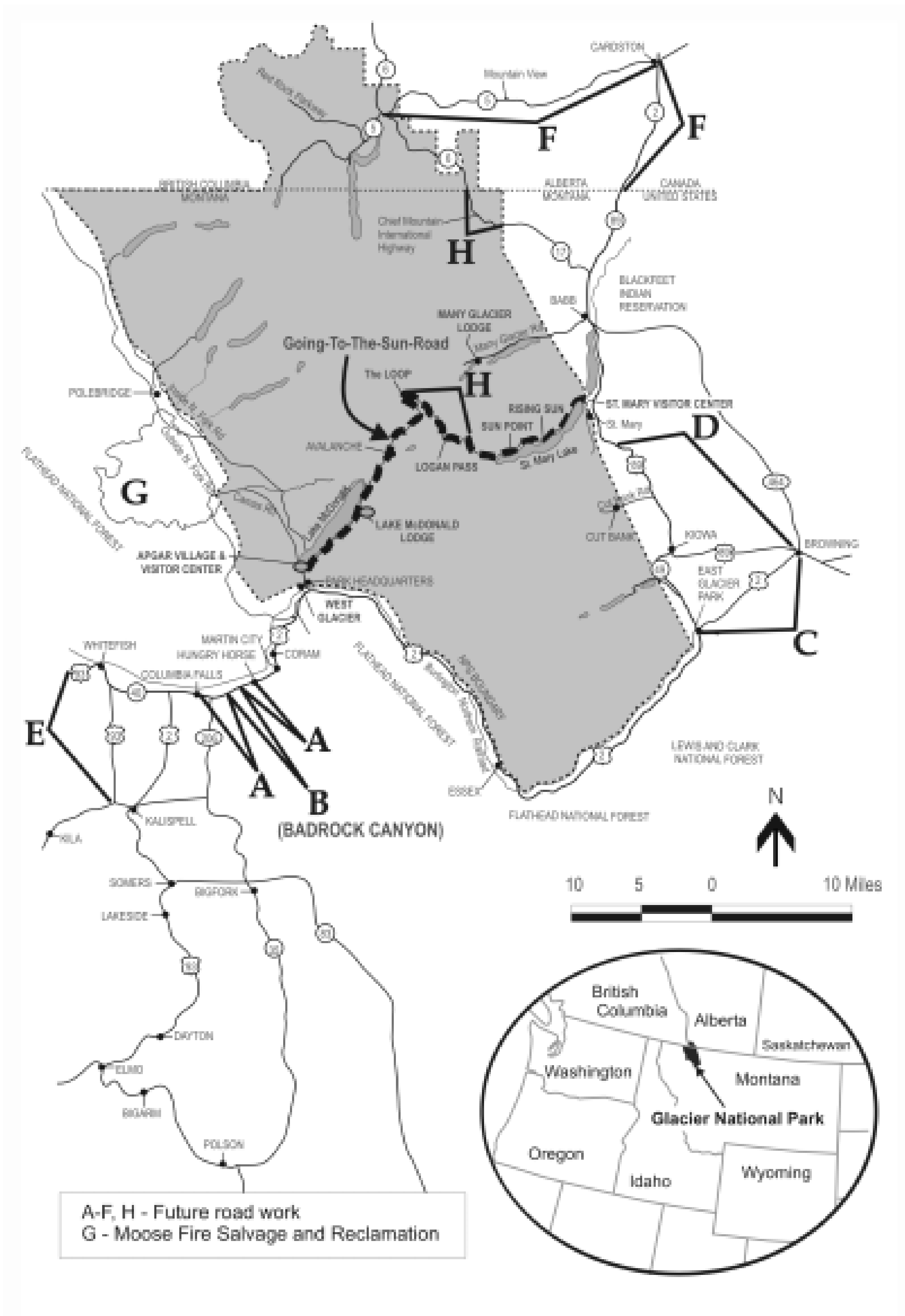
Highway 2, which provides access to both the West and East Entrances to the Park, has several segments planned for reconstruction. A 2-mile (3-kilometer) segment of Highway 2 from Columbia Falls east to Badrock Canyon is planned for reconstruction in 2003 (Figure 22, Segment A). Roadwork on Highway 2 between Hungry Horse and Badrock Canyon is scheduled to begin in 2005 and continue through 2006. According to MDOT, the reconstruction should not result in significant delays because 2-lane, 2-way traffic flows would be maintained (Brazda, pers. comm. 2002). Reconstruction of a 1.5-mile (2.4 kilometer) portion of Highway 2 within Badrock Canyon has not been scheduled, but implementation likely would occur within the next 10 years (Figure 22, Segment B). Work on the Badrock Canyon segment could cause substantial travel delays. Rock blasting may necessitate temporary road closures for up to 2 hours. Minor resurfacing projects are planned for other portions of Highway 2 in the vicinity of GNP, and 2-lane, 2-way traffic would be maintained during most of these projects (Brazda, pers. comm. 2002).

Table 30. Reasonably foreseeable future actions.

Map ID*	Action	Location	Schedule	Planned activity
Regional Highway and Transportation Projects				
A	Highway 2 reconstruction	Columbia Falls to Badrock Canyon and Badrock Canyon to Hungry Horse	2003; 2005 to 2006	Highway reconstruction on entry road to GNP; 2-lane, 2-way traffic maintained with minimal traffic delays
B	Highway 2 reconstruction	Badrock Canyon	2006 to 2010	Highway reconstruction on entry road to GNP; 2-hour blasting delays possible
C	Highway 2 reconstruction	Blackfeet Reservation	2002 to 2009	Highway reconstruction on entry road to GNP; 2-lane, 2-way traffic maintained with minimal delays
D	Highway 89 reconstruction	Blackfeet Reservation	2002 to 2012	Highway reconstruction on entry road to GNP; 2-lane, 2-way traffic maintained with minimal delays
E	Highway 93 reconstruction	Kalispell, Whitefish	2003 to 2006	Highway reconstruction; 2-lane, 2-way traffic maintained with minimal delays
F	Alberta Highways 2 and 5	Alberta, Canada	2002 to 2004	Paving and intersection widening; minimal delays
National Forest Activities				
G	Timber sales and forest rehabilitation	Flathead National Forest	2002 to 2005	Additional logging truck activity during salvage activities; forest rehabilitation efforts associated with the Moose fire
Glacier National Park Activities				
H	Roadwork	GNP	2004 to 2006	Retaining wall repairs on alpine sections of the Road and roadwork on Chief Mountain slide (State Highway 17)
—	Planned and proposed visitor use improvements	GNP	2004 to 2012	Multiple improvements to existing facilities at Apgar Village, Lake McDonald Lodge, Rising Sun, Many Glacier, Swiftcurrent, and other service areas in the Park
—	GNP Centennial activities	GNP	2010	Possible increase in visitors to GNP and the region
—	Commercial Services Plan	GNP	2003	Management direction for concession operations and commercial facilities
Regional Activities				
—	Lewis & Clark Bicentennial activities	GNP, adjoining communities	2005 to 2006	Possible increase in visitors to GNP and the region
—	Population growth	Northwest Montana	On-going	Possible increase in visitors to GNP and the region

*See Figure 22 for geographic extent of these actions.

Figure 22. Geographic Extent of Reasonably Foreseeable Activities.



Portions of Highway 2 on the Blackfeet Reservation east of GNP also are proposed for reconstruction or resurfacing activities (Figure 22, Segment C). The Two Medicine River Bridge near East Glacier National Park will be under reconstruction from 2002 to 2007. Reconstruction on portions of Highway 2 between Browning and Cut Bank will be completed between 2002 and 2009. Minor traffic delays are anticipated for these projects (White, pers. comm. 2002; Johnson, pers. comm. 2002).

There are two scheduled projects on Highway 89 through the Blackfeet Reservation between 2002 and 2012 (Figure 22, Segment D). Highway 89 provides access to GNP along the east side of the Park. The first segment of Road improvements is from Browning north to the Hudson Bay Divide, which is about 8 miles (13 kilometers) south of the town of St. Mary. The second segment is the 10-mile section from Browning south to the Two Medicine River. Some traffic delays are anticipated with both reconstruction projects (White, pers. comm. 2002; Harris, pers. comm. 2002; Johnson, pers. comm. 2002).

Portions of Highway 93 between Kalispell and Whitefish are scheduled for reconstruction between 2003 and 2006 (Figure 22, Segment E). Two planned projects that may potentially cause minor delays are planned within or immediately adjacent to the town of Kalispell. A third project on Highway 93, near the town of Whitefish, is scheduled to begin in about 2006. This is a full reconstruction project and may result in minor traffic delays. Several other traffic projects are planned through 2006, but traffic flow would be maintained and delays would be minimal (Johnson, pers. comm. 2002; Brazda, pers. comm. 2002).

Two Canadian highways managed by the Government of Alberta, Transportation Department, have planned road projects between 2002 and 2004. Planned roadwork includes road reconstruction of Highway 2, which links the Alberta town of Cardston to Highway 89 in Montana and paving and intersection widening for Highway 5, an east/west corridor connecting WLNP and the town of Cardston (Mondeville, pers. comm. 2002).

National Forest Activities

Activities on Flathead National Forest, which is located south and west of GNP, also may result in cumulative effects. Timber sales to salvage areas damaged by the 2001 Moose fire may occur between 2002 and 2005 and would result in increased truck traffic on the Outside North Fork Road and Highway 2 (Figure 22, Area G) (Carlin, pers. comm. 2002). In addition, forest rehabilitation of the burn area may result in increased traffic and heavy machinery on area roads (Rowley and DeHerrera 2001).

Glacier National Park Activities

Construction work on the Going-to-the-Sun Road and other road segments within GNP is planned for 2004 to 2006, and includes retaining wall repair (Going-to-the-Sun Road) and slide remediation on the Chief Mountain Road (Figure 22, Segment H).

Improvements at Apgar near West Glacier are expected to be implemented from 2004 to 2006. Roads, parking, and trails would be rehabilitated within the existing visitor service zone.

The Park is also developing a *Commercial Services Plan* to direct concession operations, which include a variety of visitor use services such as lodging, retail sales, private vehicle transits, and horseback riding over the next 10 years. A decision on which components of the CSP would be implemented or if the Plan would be implemented is not expected until 2003.

Special Events

Two forthcoming special events may impact the number of visitors and traffic to GNP.

Lewis & Clark Bicentennial Commemoration. The years 2005 and 2006 will mark the 200th anniversary of the passage of Lewis and Clark through Montana. Studies on behalf of the Montana Tourism Advisory Council and the Institute for Tourism and Recreation Research at the University of Montana project the Commemoration will result in a large increase in the number of out-of-state visitors to Montana. Under various scenarios, these studies suggest an increase in annual out-of-state visitors from approximately 9 million visitors at present to between 12 and 16 million per year between 2005 through 2006. (Estimation and Awareness Study 2001).

Glacier National Park Centennial. Year 2010 will mark the 100th anniversary of the establishment of Glacier as a national park. At present, the GNP Centennial is not anticipated to be a major tourist draw comparable to the Lewis & Clark Bicentennial Commemoration. (Haverfield, pers. comm. 2002; Edgar, pers. comm. 2002; Miller, pers. comm. 2002).

Regional Population Growth

Portions of the study area experienced substantial population growth during the 1990s. Both Flathead County and Lake County are projected to continue to grow more rapidly over the next 25 years than the statewide average growth rate, although growth is expected to be slower in the future than during the past decade. Total population of the Montana portions of the study area is expected to increase from 92,403 in 2000 to 114,225 by 2025 (see Chapter 3 for further information).

IMPAIRMENT OF PARK RESOURCES AND VALUES

In addition to determining the environmental consequences of the Preferred and other alternatives, NPS policy requires analysis of potential effects to determine whether actions would impair park resources (USDI 2001).

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment 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. An impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute an impairment to the extent 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 GMP or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

SOCIOECONOMIC RESOURCES

The following section of this chapter describes potential impacts of rehabilitation of the Going-to-the-Sun Road on the socioeconomic environment. The focus of this discussion is primarily on the study area, which includes three Montana counties (Flathead County, Glacier County, and Lake County) as well as southwest Alberta (Census District 3). Potential statewide impacts in Montana are also discussed.

This section addresses the following topics:

- Methodology for socioeconomic assessment
- Projected impacts on visitation, visitor experience, and local spending
- Projected economic impacts from construction activity
- Project impacts on Park operations
- Fiscal and community impacts
- Environmental justice
- Cumulative impacts
- Summary and comparison of direct and indirect socioeconomic impacts from Road rehabilitation

Methodology for Socioeconomic Assessment

Over the past several years, public comments at scoping meetings, the work of the CAC, and the socioeconomic studies prepared for GNP by Washington Infrastructure Services have consistently identified two primary areas of potential socioeconomic impact associated with Going-to-the-Sun Road rehabilitation. These areas are reductions in visitor spending and increases in construction activity. A third area, potential changes in Park operations, has not been a major topic of previous discussion or examination, but is also addressed below. The study area for the socioeconomic analysis as described in Chapter 3 includes Flathead, Glacier, and Lake counties, Montana, and the southwestern Alberta municipal districts of Willow Creek, Pincher Creek, and Cardston.

Potential changes in the quality of the visitor experience at GNP during construction cannot be directly quantified. However, these changes in visitor experience can be directly linked to visitor behavior based on responses to the 2000 and 2002 visitor surveys. In particular, a proportion of the visitors surveyed indicated they would not visit the Park under conditions anticipated under some of the rehabilitation alternatives. Further, visitors surveyed also provided responses to questions indicating the potential effectiveness of mitigation strategies. These proportionate responses to traffic disruption and the mitigation measures described in Chapter 2, along with projections of baseline visitation described in Chapter 3, were used to quantify anticipated changes in visitation resulting from the alternatives.

In particular, visitor day estimates for Alternatives 2, 3 and 4 were estimated as reductions from the baseline established by Alternative 1. Such visitor day reductions were calculated by multiplying the number of parties estimated to either 1) completely cancel their trip to GNP or 2) significantly reduce the length of their trip as a result of Road rehabilitation, times the average party size and the average trip length.

Responses to specific questions from the 2002 visitor survey were used in conjunction with the number of baseline visitors during the applicable seasons to estimate visitation changes for each alternative. For example, the number of parties canceling their trips under Alternative 4 was based on two analyses:

1) The number of survey respondents that said they would not visit GNP if they knew in advance that Logan Pass would only be accessible from one side of the Park, and

2) The duration of the season when such road conditions would be expected to occur.

In this case, access to Logan Pass from one direction only under Alternative 4 could be anticipated to affect about 60 percent of visitors during the peak season (Monday through Thursday only) and any visitors wishing to visit during the shoulder seasons.

The effects of Alternative 3 on the road conditions that would be experienced by visitors are more complex and difficult to capture in a survey question. For Alternative 3, the number of parties canceling their trips was estimated from survey responses to a question in the 2002 visitor survey regarding the effect of traffic congestion and traffic limitations. Responses to this question are believed to provide the most reliable indicator available of how visitors might respond to the effects of Alternative 3. The period of time that such conditions would be in effect during each season was then applied to the estimated proportion of visitors who would not come to GNP or who would shorten their visits in response to such road conditions. For Alternatives 3 and 4, negative visitor impacts associated with road rehabilitation were assumed to be partially offset by visitor service mitigation efforts. In a similar fashion, responses to relevant questions from the 2002 visitor survey were used to estimate the mitigating impacts of visitor service improvements.

Profiles of typical visitor expenditures, by day, were then applied to changes in visitation to estimate direct impacts on sales (output) in the surrounding regional economies. In calculating impacts on the regional economy within the study area, only expenditures by non-local visitors were included. It was also assumed, based on responses to the visitor surveys, that non-local visitors who opt to not visit GNP during Road rehabilitation would not come to the study area anyway for other reasons.

The direct impacts from additional construction expenditures were estimated by developing estimates of labor and goods and service purchasing requirements from the cost projections for each alternative developed by Washington Infrastructure Services, Inc. Interviews with Park staff, FHWA and local Job Service representatives were used to estimate the proportion of these jobs and purchasing needs that would be filled within the study area economy.

The analysis of direct impacts on visitation and from construction resulted in a quantification of the anticipated changes in study area output (sales) and employment associated with each alternative. These direct effects were then incorporated into the regional economic modeling system (IMPLAN) originally developed by the U.S. Forest Service in order to estimate secondary (indirect and induced) economic impacts associated with changes in visitation and additional construction activity. Again, these impacts are presented in terms of jobs and annual output (sales) within the study area and across the state of Montana.

Potential environmental justice issues were evaluated according to their definition under Executive Order 12898, dated February 11, 1994. The Executive Order calls for identification of minority and low-income populations within the impact area, which was achieved based on comparison of socioeconomic data for portions of the study area relative to the State of Montana as a whole. The Executive Order then calls for determination of whether these areas would bear disproportionate impacts from the proposed action, which was evaluated based on projected net economic effects of the alternatives on the minority and low-income populations within the study area, relative to projected net economic effects of the alternatives across the study area as a whole.

Further details on the methods, models, and assumptions used for the economic analysis are included in Appendix B.

Projected Impacts on Visitor Experience, Visitation, and Local Spending

More than 1.7 million people visit GNP in a typical year. Spending by these visitors for lodging, food, gasoline, souvenirs, and other items is an important part of the economic base in the study area.

Some respondents to the 2000 and 2002 visitor surveys said that they would not visit GNP if rehabilitation limits access to portions of the Road or results in substantial delays (WIS 2001b, Coley-Forrest 2002). Other respondents indicated that while they would still come to the Park under such conditions, they might shorten their stay in the area. This section summarizes the projected effects of each Road rehabilitation alternative, including: changes in the visitor experience at GNP; reductions in park visitation; corresponding reductions in visitor spending; and local economic impacts. For Alternative 1, baseline projections of visitation, visitor expenditures, and the local job base supported by these expenditures are presented. For Alternatives 2, 3, and 4, impacts are presented in terms of incremental changes from the baseline.

Alternative 1 (Repair As Needed)

Alternative 1 maintains the current status quo in Road repair operations and represents the baseline in terms of the visitor experience and future visitation levels. The following discussion for Alternative 1 provides baseline information on visitor projections, visitor expenditures, economic output, and employment. The succeeding sections for other alternatives discuss the change in these economic indicators compared to the baseline with implementation of the Rehabilitation Plan over different periods of time.

Baseline Visitation Projections. Factors ranging from national economic conditions to local forest fires may influence Park visitation levels. Because these factors are highly uncertain, predicting future Park visitation levels is difficult. However, long-term visitation forecasts are required to assess future visitation impacts for the duration of all Road construction alternatives. Dr. Thomas Obremski, a statistician with the University of Denver, developed visitation forecasts through the year 2020 for this analysis. Dr. Obremski used a statistical model in which annual visitation in a given year is predicted using information about the previous year's visitation levels (WIS 2001b). Table 31 presents forecasts for both the annual number of visitors and the annual number of parties (those arriving in a single vehicle) taking trips to the Park. Totals for the year 2000 represent actual NPS visitation counts and estimates for the number of parties. Visitation totals for later years are forecasted estimates from Dr. Obremski's model.

Table 31. Alternative 1 (baseline) projections of GNP visitation.

Year	Number of Visitors
2000	1,729,000
2001	1,688,000
2002	1,826,000
2003	1,845,000
2004	1,855,000
2005	1,861,000
2006-2020 (Annual)	1,868,000

Source: WIS 2001b; BBC 2003.

From 2001 through 2006, visitation is projected to grow only slightly, increasing from 1.7 million to about 1.9 million visitors. This corresponds to an annual growth rate of 0.6 percent. Park visitation is forecast to remain constant after 2006 through 2020.

Geographic Distribution of Baseline Visitor Expenditure Projections. Visitor expenditures provide a direct infusion of money into communities surrounding GNP. Annual visitor expenditures within each geographic region are assumed to grow proportionately with overall visitation projections. Because the visitation growth rate is slow, annual output projections change very little over the 50-year time horizon. Annual visitor expenditures are also assumed to be distributed geographically according to current travel patterns.

Under the baseline scenario (Alternative 1), average annual visitor expenditures across the next 50 years are projected to equal about $57 million in Flathead County, $39 million in Glacier County, $21 million in Lake County, and $18 million in southwest Alberta. Total visitor expenditures across this fifty-year period are forecast to equal $2.8 billion in Flathead County, $1.9 billion in Glacier County, $1.0 billion in Lake County, and $0.9 billion for Census District 3 in southwest Alberta. Alternative 1 visitor expenditures are included in Table B-9 of Appendix B.

Geographic Distribution of Baseline Visitor Economic Output. Visitor expenditures stimulate additional, secondary expenditures as local firms purchase supplies and employees spend their wages. This process is referred to as the multiplier effect. Adding the visitor expenditures (direct impact) to the increased secondary spending in the local economy (secondary impact) yields the total increase in local output generated by GNP visitors. The total increase in local output is referred to as the total economic impact or total change in output throughout the remainder of this document.

Average annual total economic output across the next 50 years are projected to equal about $79 million in Flathead County, $47 million in Glacier County, $29 million in Lake County and $25 million in southwest Alberta. Over the next 50 years, this translates to a cumulative total economic output to the State of Montana as a whole of nearly $8.5 billion. Alternative 1 total economic expenditures are shown in Table B-9 of Appendix B.

Geographic Distribution of Baseline Jobs. Baseline visitor spending is estimated to support approximately 2,000 jobs in Flathead County, 1,200 jobs in Glacier County, 800 jobs in Lake County and 500 supporting jobs in southwest Alberta. For the State of Montana as a whole, the total number of jobs supported by baseline visitor expenditures for the Park is over 4,200. A table of jobs supported by visitor expenditures is included in Appendix B, Table B-10.

Projected Impacts on Visitation, Expenditures, and Employment. Because Alternative 1 continues current Road rehabilitation efforts and has little or no predictable effect on the visitor experience, no visitor days are projected to be lost due to trip cancellation or trip length reduction. Alternative 1 also does not include any plans to upgrade visitor services. Although Alternative 1 represents a continuation of current Road maintenance and repair activity and is treated as the socioeconomic baseline, it is possible that in the absence of proactive rehabilitation of the Road, it will suffer one or more catastrophic failures during the 50-year period of this alternative. If a segment of the Road should fail, access to Logan Pass (and passage across the Park) could be cut off altogether from at least one direction for an indeterminate period. In such an event, impacts on visitation could be larger than the estimated effects under any of the other alternatives.

Alternative 2 (Priority Rehabilitation)

While the Alpine segment of the Road is the most challenging and costly to rehabilitate, it also contains half of the 14 designated points of interest along the Road. Impacts on visitor experience and visitor use for rehabilitation of the Alpine segment are substantial, while impacts for rehabilitation of the rest of the Road are assumed negligible. This alternative includes only minimal upgrades to visitor use facilities and no visitor development strategies to reduce impacts. Potential impacts on the number of visitors and the quality of the visitor experience are possible from construction delays.

Projected Impacts on Visitation, Expenditures, and Employment. Under Alternative 2, the estimated reduction in visitors due to trip cancellation or trip length reduction is about 4 percent compared to baseline conditions. Table 32 presents projections of reductions to visitation, visitor expenditures, and the reduced number of direct and secondary jobs in the study area over the 20-year duration of the Road rehabilitation. The largest visitor reductions come from local and non-local day visitors (BBC 2003).

Under this alternative, annual visitor days are projected to fall by about 72,000 and annual expenditure levels are projected to fall by about $5.6 million relative to Alternative 1. A loss of about 200 jobs is projected to occur due to the reduction in visitor spending. These annual totals represent a decline of about 4.8 percent in annual visitor expenditure levels and a decline of roughly 4.6 percent of annual supporting jobs for the Montana study area compared to Alternative 1. All impacts under this alternative are projected to end in or shortly after year 2023, once Road rehabilitation has been completed.

Geographic Distribution of Visitor Expenditure Impacts. Alternative 2 is projected to result in an estimated total annual economic loss of about $3.3 million in Flathead County, $2.0 million in Glacier County, $1.2 million in Lake County and $1.9 million in southwest Alberta. Over the 20-year construction period, this translates to a total cumulative economic loss of $67 million in Flathead County, $40 million in Glacier County, $24 million in Lake County and $38 million for Census District 3 in southwest Alberta. Table 33 summarizes these results.

Total (i.e., direct and secondary) economic output for the State of Montana is reduced by $7 million annually. Over the life of the construction project, this translates to a decline in total output in the State of Montana as a whole of about $141 million. All but about 8 percent of the output reduction for the State of Montana occurs within the three-county local impact area. For Flathead, Glacier, and Lake counties, projected annual output reductions represent about a 4.0 percent decrease from Alternative 1. Appendix B (Table B-11) includes

Table 32. Projected study area effects on Park visitation, annual expenditures, and tourism-related employment for Alternative 2.

Year	Visitors	Direct Annual Expenditures (20002 Dollars) ‡	Jobs†		
			Direct	Secondary	Total
2004	-71,800	-$5,630,000	-150	-50	-200
2005	-72,100	-$5,650,000	-150	-50	-200
2006	-72,200	-$5,660,000	-150	-50	-200
2007 – 2023 (Annual Impacts)	-72,300	-$5,670,000	-150	-50	-200

†The calculated direct effect expenditure and job totals in this table have been updated to 2002 levels using IMPLAN deflators derived from the most recent Bureau of Labor Statistics Growth Model.

Source: BBC 2003.

Table 33. Projected annual effects on visitor expenditures for Alternative 2 (millions of year 2002 dollars).

Year	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004-2011†	-$4.8	-$7.0	-$2.4	-$3.3	-$1.6	-$2.0	-$0.9	-$1.2	-$0.8	-$1.9
2012-2023† (Annual Impacts)	-$4.9	-$7.1	-$2.4	-$3.3	-$1.6	-$2.0	-$0.9	-$1.2	-$0.8	-$1.9
Total	-$97.5	-$141.4	-$47.3	-$66.8	-$32.3	-$39.6	-$18.0	-$24.4	-$15.7	-$38.5

†Annual values for 2004 to 2011 and 2012 to 2023 are similar. Appendix B includes details for all years.

Source: BBC 2003.

additional detail on annual impacts by geographic area.

Geographic Distribution of Job Impacts. Alternative 2 results in an estimated annual loss of 84 jobs in Flathead County, 50 jobs in Glacier County, 34 jobs in Lake County and 24 jobs in southwest Alberta. For the State of Montana as a whole, an annual reduction of 178 jobs is projected. See Appendix B (Table B-12) for impacts on jobs by geographic location.

Alternative 3—Preferred (Shared Use)

The primary impacts on the visitor experience and visitation levels from Road rehabilitation under this alternative will result from the additional delays during the peak season and the restricted Road access during the shoulder season. Negative visitor impacts resulting from these delays will be offset to some degree by the additional visitor services.

Delays and access restrictions should be similar on all Road segments, although the Alpine segment would take longer to rehabilitate due to logistical challenges.

Projected Impacts on Visitation, Expenditures, and Employment. Impacts on visitor experience and the number of visitor days projected to be lost under Alternative 3 are partly offset by mitigation measures to upgrade visitor services within the Park. With visitor service mitigation measures implemented, the reduction in visitors resulting from Road rehabilitation are estimated at about 119,000 per year, or 6.4 percent fewer visitors than in the baseline scenario. Table 34 presents projections of visitation reductions, visitor expenditure reductions, and the number of direct and secondary jobs roughly supported by these expenditure levels over the projected 8-year life of the rehabilitation project. All impacts under this alternative are assumed to end in or shortly after year 2011 once Road rehabilitation has been completed.

Under Alternative 3, annual direct expenditure levels in the study area are projected to fall by about $9 million with about 42 percent of the impact occurring in Flathead County. Including multiplier effects, the economic impact is projected to correspond to about 330 jobs. (Table 34). These totals represent a decline of about 6.6 percent in both annual visitor expenditure levels and annual supporting jobs for the Montana study area. All impacts under this alternative are assumed to end in or shortly after year 2011 once Road rehabilitation has been completed.

Geographic Distribution of Visitor Expenditure Impacts. With mitigation, Alternative 3 is projected to result in an estimated annual loss of $5.3 million in total output (i.e., direct and secondary) in Flathead County, $3.1 million in Glacier County, $1.9 million in Lake County and $3.0 million in southwest Alberta (Table 35). Total output in the State of Montana is reduced by about $11 million annually.

Over the 8-year construction period, these impacts translate to a reduction in total output of $43 million in Flathead County, $25 million in Glacier County, $16 million in Lake County, and $24 million for Census District 3 in southwest Alberta. The State of Montana is projected to lose about $90 million in total spending over the life of the construction project.

Table 34. Projected study area effects on Park visitation, annual expenditures, and tourism-related employment for Alternative 3.

Year	Visitors	Direct Annual Expenditures (2002 Dollars)‡	Jobs†		
			Direct	Secondary	Total
2004	-118,500	-$8,960,000	-250	-80	-330
2005	-118,900	-$8,990,000	-250	-80	-330
2006	-119,100	-$9,010,000	-250	-80	-330
2007	-119,200	-$9,020,000	-250	-80	-330
2008	-119,300	-$9,030,000	-250	-80	-330
2009 – 2011 (Annual Impacts)	-119,400	-$9,040,000	-250	-80	-330

†The calculated direct effect expenditure and job totals in this table have been updated to 2002 levels using IMPLAN deflators derived from the most recent Bureau of Labor Statistics Growth Model.

Source: BBC 2003.

Table 35. Projected annual effects on visitor expenditures for Alternative 3 (millions of year 2002 dollars).

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004-2011† Annual Impacts	-$7.7	-$11.2	-$3.7	-$5.3	-$2.6	-$3.1	-$1.4	-$1.9	-$1.2	-$3.0
Total	-$62.1	-$90.0	-$30.1	-$42.5	-$20.5	-$25.2	-$11.4	-$15.5	-$10.0	-$24.5

†Annual values for 2004 to 2011 are similar. Appendix B includes details for all years.

Source: BBC 2003.

For Flathead, Glacier, and Lake counties, projected annual expenditure reductions represent a 6.6 percent decrease from baseline conditions in Alternative 1. Table B-13 in Appendix B include additional detail on annual impacts by geographic area.

Geographic Distribution of Job Impacts. Implementation of Alternative 3 results in an estimated annual loss of 134 jobs in Flathead County, 80 jobs in Glacier County, 53 jobs in Lake County and 42 jobs in southwest Alberta. An annual reduction of 283 jobs is projected for the State of Montana as a whole. Appendix B (Table B-14) shows impacts on jobs by geographic location.

Alternative 4 (Accelerated Completion)

Alternative 4 is the most aggressive alternative under consideration and attempts to complete rehabilitation of the Road as quickly as possible. This alternative is the most efficient from a construction standpoint. Complete rehabilitation of the Road is projected to take 7 years.

While this alternative maximizes construction efficiency, it also has the largest impacts on the visitor experience and visitor use. This alternative goes further than Alternative 3 in that traffic suspensions on individual Road segments occur throughout both the peak and shoulder visitation seasons. Since the Road remains the preeminent attraction within Park boundaries, traffic suspensions have the greatest potential for prompting a loss of visitor days.

Projected Impacts on Visitation, Expenditures, and Employment. As with Alternative 3, impacts on the visitor experience and visitor use resulting from these delays would be offset to some degree by the improved visitor services provided as mitigation. Under Alternative 4, the reduction in visitors due to trip cancellation or trip length reduction is estimated to be about 11 percent. This translates to an annual reduction of about 208,000 visitors assuming implementation of the visitor service mitigation measures. The largest reductions come from local and non-local day visitors. Table 36 presents projections of visitation reductions, visitor expenditure reductions and the number of direct and secondary jobs supported by these expenditure levels within the study area over the projected 7-year life of the rehabilitation project.

Under this alternative, annual visitor expenditure levels are projected to fall by just over $16 million, corresponding to about 590 jobs after multiplier effects are included. These annual totals represent a decline of approximately 12 percent in annual visitor expenditure levels and a decline of about 12 percent of annual supporting jobs for the Montana study area

Table 36. Projected study area effects on Park visitation, annual expenditures, and tourism-related employment for Alternative 4.

Year	Visitors	Direct Annual Expenditures (2002 Dollars)†	Jobs†		
			Direct	Secondary	Total
2004	-207,100	-$16,140,000	-440	-150	-590
2005	-207,800	-$16,190,000	-440	-150	-590
2006	-208,100	-$16,210,000	-440	-150	-590
2007	-208,300	-$16,230,000	-440	-150	-590
2008	-208,400	-$16,240,000	-440	-150	-590
2009	-208,500	-$16,250,000	-440	-150	-590
2010	-208,500	-$16,250,000	-440	-150	-590

†The calculated direct effect expenditure and job totals in this table have been updated to 2002 levels using IMPLAN deflators derived from the most recent Bureau of Labor Statistics Growth Model.

Source: BBC 2003.

relative to the baseline in Alternative 1. Note that all impacts under this alternative are assumed to end in or shortly after year 2010, once Road rehabilitation has been completed.

Geographic Distribution of Visitor Expenditure Impacts. Alternative 4 is projected to result in an estimated annual loss of $9.5 million in total output in Flathead County, $5.6 million in Glacier County, $3.5 million in Lake County, and $4.6 million in southwest Alberta (Table 37). Over the 7-year construction period, this translates to a reduction in direct and secondary output of $67 million in Flathead County, $40 million in Glacier County, $25 million in Lake County, and $33 million for Census District 3 in southwest Alberta.

Total output for the State of Montana is reduced by over $20 million annually. Over the life of the construction project, this translates to a decline in total output in the State of Montana of $142 million. For Flathead, Glacier and Lake counties, projected annual output reductions represent a 12 percent decrease from the baseline. Table B-15 in Appendix B includes additional information on annual economic impacts by geographic area.

Table 37. Projected annual effects on visitor expenditures for Alternative 4 (million of year 2002 dollars).

Year	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004-2010† Annual Impacts	-$13.9	-$20.2	-$6.7	-$9.5	-$4.6	-$5.6	-$2.6	-$3.5	-$1.9	-$4.6
Total	-$98.2	-$142.3	-$47.6	-$67.3	-$32.5	-$39.8	-$18.1	-$24.5	-$13.3	-$32.5

Geographic Distribution of Job Impacts. Implementation of Alternative 4 results in an estimated annual loss of about 241 jobs in Flathead County, 144 jobs in Glacier County, 96 jobs in Lake County, and 85 jobs in southwest Alberta. An annual reduction of 510 jobs is projected for the State of Montana as a whole. Table B-16 in Appendix B show effects on jobs by geographic location.

Summary of Overall Visitation Impacts

Table 38 summarizes, by alternative, projected changes in the number of visitors, visitor expenditures, and total visitation related employment. Annual visitation reductions from the baseline range from about 72,000 under Alternative 2 to 208,000 under Alternative 4. Reductions in visitation related expenditures and employment range from around 4 percent under Alternative 2 to 12 percent under Alternative 4.

Projected Economic Impacts From Construction Activity

In contrast to current repair as needed practices for the Road (which are embodied in Alternative 1), the other alternatives would involve substantial increases in construction activity. Alternative 2 would more than double current annual Road repair expenditures over a 20-year period, while Alternatives 3 and 4 would increase average annual expenditures to about 6 times current levels for a 7- to 8-year period.

These increases in construction expenditures would be used to hire labor, purchase materials, and rent or purchase equipment, as well as for design and engineering services. Much of the labor may be hired from within the study area workforce, while some specialized workers may be brought in from other areas. Local hiring, temporary location of non-local workers, and any local purchases of supplies, equipment or services all have socioeconomic implications for the study area.

The following section summarizes the direct and secondary construction impacts associated with each rehabilitation alternative. For Alternative 1, baseline projections of construction expenditures, labor cost per employee, and the local job base supported by these expenditures are presented. The negligible incremental impacts associated with Alternative 1 are then briefly discussed. For Alternatives 2, 3, and 4, the incremental impacts from this baseline are presented, expressed both in changes in regional output and corresponding changes in regional employment levels.

Table 38. Summary of average annual visitation-related effects.

Average Annual Effects†	Number of Visitors	Visitor Expenditures‡ (2002 dollars)	Total Visitation Related Employment‡
Alternative 1 (Baseline)	1,866,800	$134,719,000	4,750
Alternative 2	-72,300	-$5,667,000	-200
Alternative 3	-119,200	-$9,016,000	-330
Alternative 4	-208,100	-$15,928,000	-590

†Duration of effects varies by alternative. Baseline period is 50 years; Alternative 1 is 50 years; Alternative 2 is 20 years; Alternative 3 is 8 years; Alternative 4 is 7 years. Effects of each alternative are incremental to the baseline.

‡Visitation-related employment includes secondary (indirect and induced) economic effects.

Alternative 1 (Repair as Needed)

The Park's Road construction budget would be maintained at an annual level of approximately $2 million, and total rehabilitation of the Road over 50 years is projected to cost about $112 million in constant 2002 dollars. This alternative would involve no increase in the Park's construction budget.

Baseline Construction Expenditure Projections. Table 39 provides projections of baseline construction related expenditures. Expenditures are further separated into annual expenditures on design and engineering, construction equipment, construction materials and labor, all expressed in terms of 2002 dollars. Finally, the table depicts labor cost per construction employee and the number of local and non-local construction jobs supported by this activity.

Annual expenditure totals of $336,000 for design and engineering, $565,000 for equipment, $$635,800 for materials and $700,000 for labor are projected under this alternative. The expenditure totals do not vary across years, because the Park's annual construction budget is projected to remain constant over the 50-year construction period under this alternative. Across the 50-year construction time horizon, annual expenditure totals translate to cumulative expenditures of about $17 million for design and engineering, $28 million for equipment, nearly $32 million for materials, and nearly $35 million for labor.

Annual average labor costs per employee are projected at $25,000. The total number of annual construction related jobs is projected to be 30. These jobs are estimated to be split equally between the Montana portions of the local impact area and other Montana counties.

Geographic Distribution of Baseline Construction Expenditures. Table 40 describes the geographic distribution of the direct and secondary impacts of estimated baseline construction expenditures for each of the Montana counties in the local impact area and for the State of Montana as a whole. Over

Table 39. Projected Alternative 1 (baseline) annual construction activity by category (2002 dollars).

Year	Expenditures				Labor Cost/ Employee	Direct Jobs†	
	Design/ Engineering	Equipment	Materials	Labor		Local	Non-Local
2004 - 2053	$336,000	$565,000	$635,000	$700,000	$25,000	15	15
Total	$16,796,000	$28,236,000	$31,772,000	$34,996,000	$1,248,000	750	750

†Jobs are head count during construction season, not full-time equivalents.

Source: BBC 2003.

Table 40. Projected baseline annual effects on construction expenditures for Alternative 1 (2002 dollars).

Year	State of Montana		Flathead County		Glacier County		Lake County	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004-2053	$1,626,000	$2,302,000	$980,000	$1,363,000	$615,000	$727,000	$28,000	$33,000
Total	$81,276,000	$115,076,000	$48,984,000	$68,172,000	$30,732,000	$36,348,000	$1,404,000	$1,664,000

Source: BBC 2003.

the next 50 years, direct and secondary economic output resulting from construction expenditures is projected to total approximately $1.4 million annually in Flathead County, $0.7 million in Glacier County, and just over $30,000 in Lake County. Note that no construction impact is projected for Census District 3 in southwest Alberta as it is anticipated that all construction firms and workers will come from the United States. Over the next 50 years, these annual projection totals translate to a cumulative total in direct and secondary construction related economic output of about $68 million in Flathead County, $36 million in Glacier County, and $1.7 million in Lake County.

Direct and secondary construction related economic output for the State of Montana is projected to be about $2.3 million annually. This translates to a cumulative total of direct and secondary construction related economic output in the State of Montana as a whole of just over $115 million.

Projected Construction Impacts. Because Alternative 1 assumes that Road rehabilitation operations within the Park would remain unchanged relative to the existing baseline, no additional expenditures or economic impacts are projected for any of the Montana counties in the local impact area, Census District 3 in Alberta, or for the State of Montana as a whole under this alternative.

Alternative 2 (Priority Rehabilitation)

The annual Road construction budget would be about $5 million for Alternative 2. Total rehabilitation of the Road is projected to cost about $102 million in constant 2002 dollars.

Construction Expenditure Projections. Table 41 provides detailed annual projections of expenditures on design and engineering, construction equipment, construction materials and labor, all expressed in terms of 2002 dollars. The table also includes projections of labor cost per construction employee and the number of local and non-local construction jobs supported under Alternative 2. The increase in jobs is less than the increase in overall construction expenditures because a significant portion of the expenditure increases is targeted for non-labor inputs such as equipment, materials, and design/engineering.

Annual expenditure totals of $2.1 million for design and engineering, $898,000 for equipment, $1.0 million for materials, and $1.1 million for labor are projected under this alternative. As under Alternative 1, the expenditure totals do not vary across years, because the Park's annual construction budget is projected to remain constant over the 20-year construction period under this alternative. Across this construction time horizon, annual expenditure totals translate to cumulative expenditures of just over $42 million for design and

Table 41. Projected construction expenditure for Alternative 2 (2002 dollars).

Annual Expenditures	Expenditures				Labor Cost/Employee	Direct Jobs†	
	Design/ Engineering	Equipment	Materials	Labor		Local	Non Local
2004-2020	$2,101,000	$898,000	$1,011,000	$1,113,000	$25,000	20	20
Total	$42,016,000	$17,950,000	$20,218,000	$22,256,000	$499,000	400	400

†Jobs are head count during construction season, not full-time equivalents.

Source: BBC 2003.

engineering, about $18 million for equipment, $20 million for materials and over $22 million for labor.

Annual average labor costs per employee are projected at $25,000, based on an 18-week construction season. The total number of annual construction related jobs is projected to be 40. These jobs are anticipated to be split equally between the Montana portions of the local impact area and other Montana counties.

Geographic Distribution of Construction Expenditure Impacts. Table 42 describes the geographic distribution of the direct and secondary impacts of estimated construction expenditures, over and above the baseline, for each of the Montana counties in the local impact area and for the State of Montana as a whole. Additional direct and secondary economic output due to construction expenditures is projected to total over $1.6 million annually in Flathead County, $0.7 million in Glacier County, and $17,000 in Lake County. Over the 20-year projected construction period for this alternative, annual projection totals translate to a cumulative total of additional direct and secondary construction related output of approximately $31 million in Flathead County, $15 million in Glacier County, and $340,000 in Lake County.

Direct and secondary construction related economic output for the State of Montana as a whole is projected to be about $2.4 million annually for Alternative 2. This translates to a cumulative total in the State of Montana, including the three study area counties, of just over $48 million over the 20-year rehabilitation period.

The impacts on construction employment and purchasing within the study area can also be examined in terms of numbers of jobs. On average, annual rehabilitation activity under Alternative 2 is estimated to directly support about 10 more construction jobs than the baseline, Alternative 1. Secondary economic effects resulting from Alternative 2 would support an additional 10 jobs divided between Flathead County and Glacier County.

Alternative 3—Preferred (Shared Use)

The Park's Road construction budget would increase to approximately $12 million annually for Alternative 3. Total rehabilitation of the Road is projected to cost about $98 million in constant 2002 dollars.

Construction Expenditure Projections. Table 43 provides detailed annual projections of expenditures on design and engineering, construction equipment, construction materials and labor, all expressed in terms of 2002 dollars. The table also includes projections of labor cost per construction employee and the number of local and non-local construction jobs supported under Alternative 3.

Projections of annual construction expenditures under Alternative 3 differ markedly from the projections developed for Alternatives 1 and 2 in

Table 42. Projected effects on construction expenditures for Alternative 2 (2002 dollars).

Annual Expenditures	State of Montana		Flathead County		Glacier County		Lake County	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004-2023	$1,780,000	$2,400,000	$1,138,000	$1,558,000	$627,000	$740,000	$14,000	$17,000
Total	$35,602,000	$47,991,000	$22,753,000	$31,160,000	$12,542,000	$14,806,000	$272,000	$340,000

Source: BBC 2003.

Table 43. Projected construction expenditures for Alternative 3 (2002 dollars).

Year	Expenditures				Labor Cost/ Employee	Direct Jobs†	
	Design/ Engineering	Equipment	Materials	Labor		Local	Non-Local
2004	$5,110,000	$2,360,000	$2,659,000	$2,928,000	$29,000	50	50
2005	$5,524,000	$3,592,000	$4,047,000	$4,456,000	$29,000	75	75
2006	$5,478,000	$3,454,000	$3,891,000	$4,284,000	$29,000	75	75
2007 – 2011‡	$4,840,000	$1,562,000	$1,760,000	$1,938,000	$29,000	35	35
Total	$40,312,000	$17,216,000	$19,395,000	$21,355,000	$233,000	375	375

†Jobs are head count during construction season, not full-time equivalents.
‡Annual values for 2007 to 2011 are similar.

Source: BBC 2003.

that they vary significantly across the 8-year construction period, peaking during the second and third years before declining to a constant level in years four through eight. Annual expenditures for design and engineering peak at $5.5 million before leveling off at $4.8 million while equipment expenditures peak at nearly $3.6 million before leveling off at $1.6 million. Similarly, annual materials expenditures range from $1.8 million to $4.0 million, and labor expenditures range from $1.9 million to $4.5 million. Across the 8-year construction time horizon, annual expenditure totals translate to cumulative expenditures of just over $40 million for design and engineering, over $17 million for equipment, $19 million for materials and $21 million for labor.

Annual average labor costs per employee are projected at $29,000. The additional cost per worker as compared to that used for Alternatives 1 and 2 is due to the assumption that construction workers would work a 21-week season as opposed to an 18-week season under the other alternatives because a significant portion of the work would be completed during the spring and fall shoulder seasons. The total number of annual construction related jobs ranges from 150 during peak years before leveling off to around 70. These jobs are anticipated to be split equally between the Montana portions of the local impact area and other Montana counties.

Geographic Distribution of Construction Expenditure Impacts. Table 44 describes the geographic distribution of the direct and secondary impacts to the local study area of estimated construction expenditures, over and above the current baseline expenditures, for each of the Montana counties in the local impact area and for the State of Montana as a whole. Over the 8-year construction period, additional direct and secondary economic output due to construction expenditures is projected to range from $3.2 to $7.6 million annually in Flathead County, from $1.7 million to nearly $4.2 million in Glacier County, and from $55,000 to $165,000 in Lake County. Over the 8-year projected construction period for this alternative, these annual totals translate to a cumulative total of additional direct and secondary output due to construction related spending of roughly $36 million in Flathead County, $19 million in Glacier County, and $700,000 in Lake County.

Table 44. Projected effects on construction expenditures for Alternative 3 (2002 dollars).

Year	State of Montana		Flathead County		Glacier County		Lake County	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004	$5,827,000	$8,116,000	$3,584,000	$4,959,000	$2,152,000	$2,544,000	$83,000	$98,000
2005	$9,063,000	$12,698,000	$5,534,000	$7,674,000	$3,376,000	$4,208,000	$139,000	$165,000
2006	$8,699,000	$12,181,000	$5,315,000	$7,368,000	$3,239,000	$4,036,000	$132,000	$157,000
2007 – 2011†	$3,731,000	$5,147,000	$2,320,000	$3,201,000	$1,359,000	$1,693,000	$46,000	$55,000
Total	$43,245,000	$58,731,000	$26,035,000	$36,005,000	$15,564,000	$19,391,000	$581,000	$695,000

†Annual values for 2007 to 2011 are similar.
Source: BBC 2003.

Direct and secondary output due to construction related spending for the State of Montana is projected to range from $5.1 to $12.7 million annually for Alternative 3. Over the 8-year construction period, this translates to a cumulative total in the State of Montana, including the three study area counties, of nearly $59 million.

The impacts on construction employment and purchasing within the study area can also be examined in terms of numbers of jobs. On average, annual rehabilitation activity under Alternative 3 is estimated to directly support about 50 construction jobs in the State of Montana, including approximately 30 jobs in Flathead County and 20 jobs in Glacier County. The peak impacts would occur during the second and third years of construction, when about 45 construction jobs in Flathead County and 30 construction jobs in Glacier County would be supported by this alternative.

Including secondary economic effects, Alternative 3 would support an average of approximately 90 jobs across the state, including nearly 50 jobs in Flathead County and about 30 jobs in Glacier County. During the second and third years of this alternative, total employment impacts would peak at about 85 jobs supported in Flathead County and about 40 jobs supported in Glacier County.

Alternative 4 (Accelerated Completion)

The Park's Road construction budget would increase to approximately $12 million annually for Alternative 4. Total rehabilitation of the Road is projected to cost about $81 million in constant 2002 dollars.

Construction Expenditure Projections. Table 45 provides detailed annual projections of expenditures on design and engineering, construction equipment, construction materials and labor, all expressed in terms of 2002 dollars. The table also includes projections of labor cost per construction employee and the number of local and non-local construction jobs available under Alternative 4.

Projections of annual construction expenditures under Alternative 4, like those for Alternative 3, vary significantly across the 7-year construction period. Expenditures peak during the second year before declining to a constant level in years five through seven. Annual expenditures for design and engineering peak at $5.2 million before leveling off at $4.5 million while equipment expenditures peak at nearly $3.2 million before leveling off to $1.3

Table 45. Projected expenditures for Alternative 4 (2002 dollars).

Year	Expenditures				Labor Cost/ Employee	Direct Jobs†	
	Design Engineering	Equipment	Materials	Labor		Local	Non Local
2004	$4,975,000	$2,584,000	$2,950,000	$3,093,000	$25,000	60	60
2005	$5,197,000	$3,248,000	$3,709,000	$3,888,000	$25,000	75	75
2006	$4,975,000	$2,584,000	$2,950,000	$3,093,000	$25,000	60	60
2007	$4,766,000	$1,956,000	$2,233,000	$2,341,000	$25,000	45	45
2008 – 2010‡	$4,545,000	$1,292,000	$1,476,000	$1,546,000	$25,000	30	30
Total	$33,548,000	$14,249,000	$16,270,000	$17,054,000	$175,000	330	330

†Jobs are head count during construction season, not full-time equivalents.

‡Annual values for 2008 to 2010 are similar.

Source: BBC 2003.

million. Similarly, annual materials expenditures range from nearly $1.5 million to $3.7 million, and labor expenditures range from $1.5 million to nearly $3.9 million. Across the 7-year construction time horizon, annual expenditure totals translate to cumulative expenditures of just over $33.5 million for design and engineering, approximately $14 million for equipment, $16.2 million for materials and over $17.1 million for labor.

Annual average labor costs per employee are projected at $25,000. The total number of annual construction related jobs ranges from 150 during peak years before leveling off to around 60. These jobs are assumed to be split equally between the Montana portions of the local impact area and other Montana counties.

Geographic Distribution of Construction Expenditure Impacts. Table 46 describes the geographic distribution of the direct and secondary impacts of estimated construction expenditures, over and above the baseline, for each of the Montana counties in the local impact area and for the State of Montana as a whole. Over the 7-year construction period, additional direct and secondary economic output due to construction expenditures is projected to range from $2.8 to $7.3 million annually in Flathead County, from $1.4 million to nearly $3.8 million in Glacier County, and from $40,000 to $149,000 in Lake County. Over the 7-year projected construction period for this alternative, these annual totals translate to a cumulative total of additional direct and secondary economic output of approximately $31 million in Flathead County, $16 million in Glacier County, and nearly $600,000 in Lake County.

Direct and secondary construction related output for the State of Montana is projected to range from $4.4 million to $12.1 million annually for Alternative 4. Over the 7-year construction period, this translates to a cumulative total of economic output in the State of Montana of $51 million.

The impacts on construction employment and purchasing within the study area can also be examined in terms of numbers of jobs. On average, annual rehabilitation activity under Alternative 4 is estimated to directly support about 50 construction jobs in the State of Montana, including approximately 30 jobs in Flathead County and 20 jobs in Glacier County. The peak impacts would occur during the second year of construction, when

Table 46. Projected construction expenditures for Alternative 4 (2002 dollars).

Year	State of Montana		Flathead County		Glacier County		Lake County	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004	$6,764,000	$9,445,000	$4,168,000	$5,775,000	$2,494,000	$2,952,000	$93,000	$111,000
2005	$8,603,000	$12,052,000	$5,280,000	$7,323,000	$3,187,000	$3,771,000	$125,000	$149,000
2006	$6,764,000	$9,445,000	$4,168,000	$5,775,000	$2,494,000	$2,952,000	$93,000	$111,000
2007	$5,024,000	$6,980,000	$3,115,000	$4,309,000	$1,838,000	$2,175,000	$64,000	$76,000
2008 – 2010†	$3,186,000	$4,373,000	$2,004,000	$2,760,000	$1,146,000	$1,355,000	$33,000	$40,000
Total	$36,712,000	$51,040,000	$22,741,000	$31,461,000	$13,449,000	$15,914,000	$475,000	$568,000

†Annual values for 2008 to 2010 are similar.

Source: BBC 2003.

about 45 construction jobs in Flathead County and 30 construction jobs in Glacier County would be supported by this alternative.

Including secondary economic effects, Alternative 4 would support an average of approximately 90 jobs across the state, including nearly 50 jobs in Flathead County and about 30 jobs in Glacier County. During the second year of this alternative, total employment impacts would peak at about 80 jobs supported in Flathead County and about 40 jobs supported in Glacier County.

Summary of Overall Construction Impacts

Table 47 summarizes, by alternative, projected changes in direct construction spending, total construction related regional output, and total construction related employment. Annual construction expenditures to the baseline range from $2.2 million under Alternative 1 to $12.2 million for Alternative 3. Annual employment ranges from 30 jobs under Alternative 1 to 94 jobs under Alternatives 3 and 4.

Projected Impacts on Park Operations

Changes in Park Operations

With annual baseline funding of about $10 million, additional special projects funding of nearly $20 million, and about 130 full time and up to 390 part time workers on staff, NPS operations at GNP also contribute to the economy in the study area. Park revenues and operations are expected to experience a variety of impacts under the alternatives. Some of these impacts tend to offset one another.

Park Revenues. While entrance fees could be impacted by changes in visitation under the alternatives, such impacts are expected to be negligible in the context of overall Park revenues. Although 80 percent of entrance fees and concession franchise fees at GNP are ultimately returned to the Park by the NPS, such fees comprise a very small portion of overall funding. The vast majority of GNP revenues are comprised of special project funds and the annual baseline appropriation. The former (special project funds) would likely increase substantially under the proactive Road rehabilitation alternatives (Babb, pers. comm. 2002).

Table 47. Summary of Average Annual Construction-Related Effects

Average Annual Effects†	Direct Construction Spending (2002 dollars)	Total Regional Output‡ (2002 dollars)	Total Employment‡
Alternative 1 (Baseline)	$2,209,080	$2,301,520	30
Alternative 2	$5,122,000	$4,701,084	40
Alternative 3	$12,248,870	$9,642,925	94
Alternative 4	$11,555,756	$9,592,966	94

†Duration of effects varies by alternative. Baseline period is 50 years; Alternative 1 is 50 years; Alternative 2 is 20 years; Alternative 3 is 8 years; Alternative 4 is 7 years. Effects of each alternative are incremental to the baseline.

‡Construction-related expenditures and employment include secondary (indirect and induced) economic effects. A substantial portion of the construction jobs created is expected to be filled by non-local workers.

Park Operations and Employment. Park staffing levels may experience a negligible increase under Alternative 2 and a minor to moderate increase under either Alternative 3 or Alternative 4. If there are fewer visitors, and less revenues from entrance fees, as a result of Road rehabilitation, the Park would be inclined to reduce the number of seasonal positions hired. However, this potential reduction in visitor service staffing is expected to be offset by the need for additional staff to implement the socioeconomic mitigation measures described in Chapter 2. GNP also indicated it anticipates a need for more rangers and an increase in construction related staff under the proactive rehabilitation alternatives (Babb, pers. comm. 2002).

Fiscal and Community Impacts

Impacts on Public Revenues and Expenditures

Fiscal impacts are expected to be negligible under any of the four potential alternatives.

Local Government Revenues. From a revenue standpoint, the principal revenue source for local governments in the study area is property taxes. Interviews with local government representatives indicated they did not anticipate any impact on their revenues from changes in visitation or construction activity associated with Road rehabilitation. This perception was reinforced by study team interviews with local governments near Yellowstone National Park and Yosemite National Park. Though these parks had experienced multiple year visitation reductions due to wildfires and Road construction, local government representatives indicated there was no perceptible effect on the local property tax base.

Service Requirements and Costs. Local government representatives also indicated they generally did not expect a change in service requirements or costs under any of the alternatives. The modest magnitude of the construction workforce requirements relative to the size of the surrounding communities indicated that changes in service demands would likely be negligible. The lone potential exception to this finding was to note concerns that if a substantial portion of the construction workforce was actually housed in campgrounds near the entrances to the Park, some additional law enforcement services might be required (Barron, pers. comm. 2002; Dupont, pers. comm. 2002; Racine, pers. comm. 2002).

Impacts on Community Facilities and Services

Impacts on other community facilities and services are also expected to be negligible, with the possible exception of local housing.

Housing. As described in Chapter 3, housing markets in close proximity to GNP are either tight (Flathead County) or constrained by law (Blackfeet Reservation portions of Glacier County). Park staff have also indicated it will not be possible to house any portion of the construction workforce within the Park itself (Babb, pers. comm. 2002).

It appears the most likely housing options for construction workers from outside the study area would be to either rent motel rooms proximate to the Park (if visitation reductions during rehabilitation make sufficient rooms available), rent housing in more distant communities (such as Libby and Cut Bank), or stay in private campgrounds near the Park. As noted earlier, the latter housing option may place additional demands on local law enforcement.

Environmental Justice

The study area contains large portions of two Indian Reservations — the Glacier County portions of the Blackfeet Reservation and the Lake County portions of the Salish and Kootenai Reservation. Although economic data specific to the reservations is somewhat limited, both areas clearly qualify as low-income populations. The Blackfeet Reservation, in particular, has reported unemployment levels of 70 percent or higher. In fact, Glacier County and Lake County, as a whole, could each be classified as low-income areas. The 1999 per-capita income level in Glacier County was approximately 31 percent below the state average in Montana, while the 1999 per-capita income level in Lake County was approximately 22 percent below the state average.

The data and modeling used to analyze the spatial distribution of economic impacts from changes in visitation and construction activities associated with the alternatives is not sufficiently precise to provide an estimate of the proportion of the impacts that would fall on the tribal land areas within the study area counties. However, given that each reservation comprises the majority of the corresponding county's land area and population and that Lake County and Glacier County as a whole can be considered low-income areas, the distribution of impacts by county provides insight into the potential for disproportionate impacts.

Table 48 depicts projected impacts to output (sales) per capita in Glacier County and Lake County and the study area as a whole for each alternative. Comparison of the low income areas to the study area as a whole indicates that disproportionate impacts from reductions in visitation are likely in Glacier County under Alternative 2, and likely in both Glacier and Lake Counties under Alternative 3 and Alternative 4.

This finding results from several factors, including the limited economic base in Glacier County, the likelihood that relatively little of the construction expenditures will take place in more distant Lake County and the larger and more diversified economy in other portions of the study area (especially Flathead County), which diminishes the proportionate impacts in that area.

Table 48 also suggests, however, that the disproportionate impacts from changes in visitation in Glacier County may be substantially offset by the economic stimulus provided by Road construction activity and employment. Efforts to ensure participation by members of the Blackfeet Tribe, and the Salish and Kootenai Tribes in Lake County, in

Table 48. Potential for disproportionate impacts on low income areas and minority populations from each alternative.

Alternatives	Average Impact on Annual Output per Capita†		
	Study Area	Low Income Areas	
		Glacier County	Lake County
Alternative 1 (Baseline)			
From Changes in Visitation‡	$0	$0	$0
From Construction Activity	$0	$0	$0
Net Impact	$0	$0	$0
Alternative 2			
From Changes in Visitation‡	-$54	-$149	-$46
From Construction Activity	$15	$56	$1
Net Impact	-$40	-$94	-$45
Alternative 3			
From Changes in Visitation‡	-$67	-$238	-$73
From Construction Activity	$44	$174	$3
Net Impact	-$23	-$64	-$70
Alternative 4			
From Changes in Visitation‡	-$121	-$429	-$132
From Construction Activity	$44	$172	$3
Net Impact	-$77	-$258	-$129

†Impacts are annual averages over duration of construction period measured in 2002 dollars. Impacts per capita are relative to 2000 population in each area.

‡Visitation impact includes mitigation, as described in this chapter.

Source: BBC 2003.

the construction effort would be an important means of mitigating environmental justice concerns. Highway construction projects in GNP are designed, awarded, and administered by the Western Federal Lands Highway Division of the Federal Highway Administration. As described further in Appendix B, contractors could be required to implement hiring goals among the target population and to include an enhancement for minority employment for laborers and all construction trades

Cumulative Impacts

The following summarizes the study team's assessment of potential cumulative socioeconomic impacts from the reasonably foreseeable future actions and events described earlier in this chapter.

Highway and Transportation Projects

In each of the counties within the local impact area, county representatives raised concerns about how traffic congestion resulting from Road rehabilitation would exacerbate delays resulting from other planned highway expansion projects. The representatives of Flathead and Lake counties on the western side (Smith and Johnson, pers. comm. 2002) were focused on the Highway 89 reconstruction projects while Glacier county representatives were more concerned about planned reconstructions along Highway 2 (Overn, pers. comm. 2002).

Tribal representatives likewise noted the potential for additional impacts from Road construction projects. The Salish and Kootenai Tribes operate a local community college that offers a well-respected heavy equipment operator certificate. While such projects may provide employment opportunities for tribal members or other graduates of this program, they may also reduce the potential labor supply for Road rehabilitation (McDonald, pers. comm. 2002).

If Road rehabilitation overlaps with one or more of these planned highway projects, traffic delays and visitor frustration may be increased. If such delays substantially diminish the visitor experience in the local impact area, it is possible that visitation numbers will decline.

National Forest Activities

Anticipated increases in traffic due to either timber salvage operations or forest rehabilitation efforts resulting from the 2001 Moose fire could result in short-term increases in congestion along certain access routes to GNP. Overall, however, a Flathead County Commissioner noted that the forest products industry was declining rapidly in their area (Gipe, pers. comm. 2002). To the extent that activity on National Forest land remains constant or is even declining, little potential exists for significant cumulative effects from interaction with Road rehabilitation alternatives.

Lewis & Clark Bicentennial Commemoration

Community leaders in the study area expect that the impacts on visitation to their communities and the Park from the Commemoration will be less than proportionate to the projected increases in statewide visitation in the statewide studies. There appears to be general skepticism that the Commemoration will draw as many additional visitors to Montana as the studies have suggested. Further, although there are two documented Lewis and Clark historical sites proximate to the eastern side of the Park (Camp Disappointment and the "Fight site"), the Lewis and Clark expedition was a substantial distance south of the Park when they crossed the mountains and traveled through the far western portions of Montana (Haverfield, pers. comm. 2002; Edgar, pers. comm. 2002; Miller, pers. comm. 2002).

Although the magnitude of additional visitation to the Park may be less than the 30 to 80 percent projected increases in statewide visitation, it appears likely there could be a substantial increase in visitors during the bicentennial period — perhaps especially pronounced on the eastern side of the Park. Great Falls is the center of activity and planning for the Commemoration and it is reasonable to expect that a sizeable proportion of additional visitors to Montana will also wish to visit the Park.

If Road rehabilitation is underway during the Commemoration, traffic delays and visitor frustration may be increased by larger visitor numbers. Anticipated local economic impacts due to reduced visitation during rehabilitation may, however, be at least partly and temporarily offset by the additional visitation resulting from the Commemoration. If the visitor experience is substantially diminished by Road rehabilitation, it is possible that repeat visits further in the future by those who visit the Park for the first time during the Lewis & Clark Bicentennial Commemoration may be diminished. Further, any opportunity for "windfall" local economic benefits from added visitation during the Lewis & Clark Bicentennial Commemoration may be somewhat reduced by Road rehabilitation.

Glacier National Park Centennial

Community leaders in the study area expect the Glacier National Park Centennial celebration to have virtually no impact on visitation to their communities and the Park. The fact that the Park's centennial will be celebrated in 2010 is virtually unknown among the local population, perhaps because it is still 8 years away.

To the extent that local representatives are underestimating the degree to which the celebration will draw additional visitors to the Park, many of the same impacts discussed above under the Lewis & Clark Bicentennial Commemoration will be applicable here. While local economic impacts from reduced visitation may be partly offset by the additional visitation resulting from the celebration, the potential for reductions in repeat visitors does exist.

Regional Population Growth

Growth of the population in the study area can be expected to increase the number of visitors to the Park. Rapid residential growth can also place strains on local infrastructure and government services. Interviews in Flathead County indicated the past decade of rapid growth in rural portions of the county has increased demands for government services without corresponding increases in revenues (Haverfield pers. comm. 2002; DuPont pers. comm. 2002; Johnson, pers. comm. 2002).

None of the Road rehabilitation alternatives however, are expected to increase long-term population growth in the study area. While some construction workers would be brought to the area on a seasonal basis during the construction period, the numbers of these workers are relatively small compared with the overall population of the study area counties and any effects would be short-term in nature.

Conclusion

Table 49 summarizes the estimated direct and indirect impacts on economic output in the three Montana county and Southwest Alberta study area from changes in visitation and construction under each of the rehabilitation alternatives. Indirect impacts in other parts of Montana are not included in Table 49. Other than the Repair as Needed Alternative, Alternative 2 has the smallest impacts from changes in visitation during the rehabilitation period, with direct impacts on output in tourism-related portions of the study area economy averaging about \$5.7 million per year and economy-wide impacts from changes in visitation averaging about \$8.5 million per year. These impacts would, however, continue to occur over the 20-year duration of this alternative, while impacts under Alternatives 3 and 4 would occur only during the 8- and 7- year periods of construction activity under those alternatives (respectively).

Net impacts on the study area economy can be calculated by combining the anticipated reduction in tourism related output with the expected increases in output in construction related activity. While the net impact calculation is useful in comparing alternatives, it is important to recognize that the effects on visitation and construction do not exactly offset one another. Different businesses are affected by visitation and construction and an economic stimulus to the local construction sector does not necessarily reduce the impact on local tourism

Table 49. Summary and comparison of average annual direct and indirect effects of Road rehabilitation alternatives on study area economic output (2002 dollars).

Economic Sector	Alternative 1 Repair as Needed† (No Action) Baseline	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Completion
From Changes in Visitation				
Tourism Economy				
Direct Impact	$135,000,000	- $5,700,000	- $9,000,000	- $15,900,000
Indirect Impact	$46,000,000	- $2,800,000	- $4,500,000	- $7,500,000
Total Economy	$181,000,000	- $8,500,000	- $13,500,000	- $23,400,000
From Construction Related Spending				
Construction Sector				
Direct Impact	$1,600,000	+ $1,800,000	+ $5,300,000	+ $5,200,000
Indirect Impact	$500,000	+ $500,000	+ $1,600,000	+ $1,600,000
Total Economy	$2,100,000	+ $2,300,000	+ $6,900,000	+ $6,800,000
Net Economic Impact				
Net Annual Total Impact	**$183,100,000**	**- $6,200,000**	**- $6,600,000**	**- $16,600,000**

†Alternative 1 is considered the baseline. Although there would be potential future impacts on visitation if segments of the Road fail, the timing and magnitude of these impacts cannot be projected.

Source: BBC 2003.

related businesses. While up to one half of the construction related jobs are expected to be filled by individuals who normally reside outside the study area, most of the tourism related jobs are likely held by local residents, with the exception of staffing at facilities operated by the Park's concessionaire Glacier Park Incorporated. In general, the construction jobs created by the alternatives are higher paying, but far less permanent, than the tourism related jobs in the study area.

When the positive economic stimulus of construction jobs and construction related purchases of materials and supplies is included, the net economic effects on study area output are similar between Alternative 2 and Alternative 3 at between $6 million and $7 million per year, while net impacts of Alternative 4 are considerably larger at over $16 million per year. Alternative 2 impacts would occur throughout a 20 year long rehabilitation period, while impacts under Alternative 3 and Alternative 4 would extend over much shorter periods of time.

The magnitude of the economic impact estimates can be evaluated by comparison with baseline data for the study area. Based on 1999 data from the IMPLAN model, BBC estimates that annual tourism-related output in the study area economy is approximately $250 to $300 million. Total annual economic output in the study area across all sectors is estimated at approximately $5 billion.

Consequently, the estimated impacts from changes in visitation range from about 2 percent reduction in tourism-related economic activity in the study area under Alternative 2, to about 3 percent for Alternative 3, to about a 5 percent reduction under Alternative 4. Estimated total impacts of all of the alternatives on study area output, including construction and secondary effects, are small relative to the size of the economy as a whole. Even the most adverse net impacts, under Alternative 4, represent less than 1 percent of total study area economic activity.

The net socioeconomic impacts of each alternative, except Alternative 1, which represents the baseline for comparison, are negative. Duration of the impacts is expected to match, or extend slightly beyond, the construction period for each alternative.

Table 50 provides a summary assessment of the intensity of the socioeconomic effects of each alternative. The classification of the intensity of the impacts in this table is based on the impact thresholds provided in Table 29.

CULTURAL RESOURCES

Methodology for Cultural Resource Effects

The EIS analysis of the Going-to-the-Sun Road cultural resource issues was based primarily on a comprehensive inventory of the Road's cultural features conducted during the summer of 2000 (RTI 2001). This inventory identified the historic features of the Road, described their condition, and evaluated their significance. Additional information was obtained from a review of the *Engineering Study* completed for the Road in 2001 (WIS 2001a), which provided broad-based information on needed rehabilitation and described possible design solutions. Recently completed Road rehabilitation projects were also examined, to gauge the impact of such projects on the Road's cultural resources.

Effects Common to all Alternatives

Nearly the entire length of the Going-to-the-Sun Road is recognized as a National Historic Landmark, and most of the Road's engineering features are considered historically significant and contribute to its designation as a National Historic Landmark. Other recognized historic resources are adjacent to the Road or nearby. Consequently, any substantive Road rehabilitation program would almost inevitably impact cultural resources. The status of the Going-to-the-Sun Road as a National Historic Landmark requires that the NPS carefully consider all potential impacts to the historic values of the Road during its rehabilitation. While the majority of these impacts would be to the features of the Road itself, the Road's proximity to other significant historic properties means that potential impacts to adjoining cultural resources must be considered, as well.

In the absence of needed rehabilitation, the historical features along the Road will continue to deteriorate. These impacts are currently moderate in scope, but the potential for future major damage to an unrehabilitated Road feature exists.

As discussed in Chapter 3, cultural resources on or near the Road may be categorized into one of four broad groupings, each of which would be impacted differently by Road rehabilitation:

- Archaeological resources (prehistoric and historic);
- Historic resources (the Road itself, related engineering features, nearby buildings/districts);
- Ethnographic resources; and

Table 50. Assessment of socioeconomic impacts associated with Road rehabilitation.

	Alternative 1 Repair as Needed (No Action)	Alternative 2 Priority Rehabilitation	Alternative 3 Shared Use (Preferred)	Alternative 4 Accelerated Competition
Visitor Experience/Visitor Use	Negligible Adverse†	Minor Adverse	Minor Adverse	Moderate Adverse
Tourism Economy	Negligible Adverse†	Minor Adverse	Minor Adverse	Moderate Adverse
Overall Economy	Negligible Adverse†	Negligible Adverse	Negligible Adverse	Minor Adverse
Fiscal Impacts	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Park Operations	Negligible Adverse†	Minor Adverse	Moderate Adverse	Moderate Adverse
Community Impacts	Negligible Adverse	Negligible Adverse	Minor Adverse	Minor Adverse
Environmental Justice	Negligible Adverse	Negligible Adverse	Negligible Adverse	Moderate Adverse

†Eventual failure of the Road under Alternative 1 could have major impacts on visitor experience/visitor use, the tourism economy, and Park operations and moderate impacts on the overall economy of the study area. The timing and nature of such Road failure cannot, however, be predicted.

Source: BBC 2003.

- Cultural landscapes (including the Road corridor and nearby historic districts)

Since prior archaeological inventory has been completed along most of the Road corridor, and few sites were found, Road rehabilitation for all alternatives would have a negligible effect on known archaeological resources. Impacts to previously unidentified archaeological sites would be avoided by conducting archaeological survey in unsurveyed areas that may be impacted, and by avoiding any sites that are identified.

Road rehabilitation activities would primarily impact historic resources, in particular the historic structures and engineering features of the Road itself. The precise, site-related impacts to individual features would be dependent on specific project designs. Final designs would be developed with a consideration for preserving the historic significance of Road features. Modification to individual features would combine to affect the overall historic character of the entire roadway.

Short-term adverse impacts of rehabilitation work may include temporary changes to the historic setting of cultural features (caused by the presence of construction equipment or material, for example), or to their "integrity of association" (the spatial or visual relationship of historic features to their site or to other features). Some short-term impacts would be more substantial, such as the likely need to disassemble some historic stone walls as an intermediate step in their rehabilitation. Careful design of individual rehabilitation projects would minimize long-term damage to historically significant resources. Overall, such short-term impacts would be considered as minor to moderate.

Impacts to recognized historic resources other than the roadway itself would be limited by avoiding those resources during rehabilitation work. Any impacts to such features would be short term, and negligible.

Long-term impacts to the cultural features of the Road — both beneficial and adverse — may also result from the rehabilitation process. Adverse impacts may occur when necessary rehabilitation steps lessen the historic integrity of a significant cultural resource. Because rehabilitation projects would be planned in accordance with The Secretary of the Interior's *Standards for the Treatment of Historic Properties*, such impacts would occur only when no practical rehabilitation alternative is available. The overall nature and level of these potential impacts would be a reflection of future, site-specific design decisions; however, some examples of possible adverse impacts include the following:

- The introduction of non-historic materials into a structure during its rehabilitation;
- Changing the historic design or engineering of an historic feature;
- Altering the size, scale, or placement of an historic feature;
- Replacement of an historic feature with a modern structure; or
- Adding a structure or feature where none historically existed.

Because of the precarious location and deteriorated condition of many of the Road's historic features, some of these adverse impacts would be unavoidable for some individual cultural resources. The planned use of appropriate design and construction philosophies, however, would limit most such impacts to negligible or moderate. A series of recommendations addressing the treatment of cultural resources during rehabilitation are found in the *Cultural Landscape Report* for the Road (RTI 2002). In consultation with SHPO, the NPS has agreed that Section 106 compliance would be conducted separately for each phase of final design and construction to determine potential adverse effects. If, during the course of final design, an unavoidable adverse effect is identified, the NPS would work with SHPO and the Advisory Council on Historic Preservation to determine mitigation requirements.

Beneficial, long-term impacts to the cultural resources of the Road would result from the completed rehabilitation of damaged or decayed historic roadway features. Because of the substantial level of damage evident to many of these features, and the likelihood that additional deterioration will occur, rehabilitation of the Road would result in a moderate to major long-term beneficial impact to these cultural resources.

Road rehabilitation activities would be unlikely to impact the ethnographic values of the Park, since work would primarily be limited to the already-disturbed roadway corridor. Any ethnographic impact that does take place would be short term and negligible.

The cultural landscapes that may be impacted by Road rehabilitation includes the roadway corridor itself. The impact of Road rehabilitation to the cultural landscape of the Road may be characterized as the total impact to the historic features of the Road, as described above. These would include minor to moderate short-term adverse impacts caused by construction work, and a moderate to major long-term beneficial impact resulting from the completed rehabilitation of historically significant roadway features. Impacts to other cultural landscapes would be negligible because disruptive construction activities would be designed to avoid these locations.

Effects of Alternative 1 (Repair As Needed)

For Alternative 1, long-term cultural resource impacts resulting from Road rehabilitation would be as described above, but the 50-year rehabilitation time frame would increase adverse cultural resource impacts caused by damage and decay to unrehabilitated roadway features. Under Alternative 1, these adverse impacts would combine and increase over time, with the potential to ultimately become major in scope. The potential for catastrophic Road failure and loss of historic structural features is greatest for this alternative because of the extended rehabilitation period. Alternative 1 would also lengthen the time period in which adverse impacts are present, and the delay in the completion of rehabilitation would postpone the long-term, beneficial impacts of the work.

Overall, adverse impacts to cultural resources would be greatest under Alternative 1.

Effects of Alternative 2 (Priority Rehabilitation)

The Alternative 2 rehabilitation process would produce overall cultural resource impacts similar to those described under Alternative 1, but because the rehabilitation period would be reduced to 20 years, the duration and severity of adverse impacts associated with deterioration of historic features would be somewhat reduced, but would still be moderate to major. These adverse impacts, however, would remain greater than those found under Alternatives 3 and 4. A moderate, long-term beneficial improvement to cultural resources would occur following rehabilitation.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion).

The short-term and long-term cultural resource impacts under Alternatives 3 and 4 would be similar to those described as common to all alternatives. However, these alternatives would complete rehabilitation work in less than 8 years and, thus, provide the best opportunity to preserve the historic structural features before significant further deterioration occurs.

Additional impacts would take place under these alternatives, however, as a result of the planned visitor use improvements at several locations along the Road. Adverse cultural resource impacts would result from the construction of modern improvements in the historic roadway corridor. In most cases, these impacts would be negligible to minor because visitor use improvements are located primarily within and adjacent to existing roadside developments; however, improvements located in visual proximity to historically significant resources have the potential to affect them. Careful siting and design of visitor use improvements would be used to minimize adverse impacts.

Cumulative Effects

Other Road improvements, developments, and planned activities in the Park may also affect cultural resources in and near the Road corridor. If the Park's CSP is implemented, this may result in beneficial or adverse impacts to cultural resources near the Road at the developed areas of Apgar, Lake McDonald, and Rising Sun depending on the nature of the improvement. No major future actions impacting cultural resources are currently foreseen for other portions of the roadway corridor.

Because the potential adverse cultural resource impacts caused by the proposed Road rehabilitation are short-term, and are outweighed by long-term, beneficial impacts, the proposed rehabilitation would have a positive cumulative effect on cultural resources for all alternatives. The additional visitor use improvements specified in Alternatives 3 and 4, when added to other actions, would have a minor adverse cumulative effect on cultural resources because proposed improvements occur primarily within existing facilities.

Conclusion

For all alternatives, adverse short-term cultural resource impacts would result both from the rehabilitation process itself and from additional deterioration caused by the failure to perform needed rehabilitation in a timely manner. In general, these impacts would be minor to moderate. They would be most pronounced under Alternative 1, and least severe under Alternatives 3 and 4.

Long-term adverse impacts for all alternatives are possible if engineering requirements force the modification of one or more historic Road feature, but adherence to The Secretary of the Interior's *Standards for the Treatment of Historic Properties* will limit these impacts. Any adverse impacts would be outweighed by the long-term benefit resulting from the rehabilitation of the Road's historic engineering features and maintenance of its status as a National Historic Landmark. Beneficial, long-term impacts would be realized most quickly under Alternatives 3 and 4. The proposed visitor use improvements specified under Alternatives 3 and 4 would create negligible to minor long-term adverse impacts at the development locations.

NATURAL RESOURCES

Topography, Geology, and Soils

Methodology for Topography, Geology, and Soil Effects

Previous studies and investigations within the Park that characterize existing geologic and soil resource conditions were used to identify potential effects on topography, geology, and soils. Potential impacts were qualitatively and quantitatively estimated based on anticipated levels of earthwork, excavation, and soil disturbance from proposed Road rehabilitation and other improvements.

Topography and Geology

Effects Common to All Alternatives. Rehabilitation work for all alternatives would be conducted primarily within or adjacent to the existing Road. Repair and rehabilitation of retaining walls, guardwalls, and the roadway surface would result in minor impacts to the topography and geologic formations. No substantial earthwork or excavation outside of the existing roadway prism is anticipated, except at localized sites as necessary to implement rehabilitation repairs. Removing or formalizing informal pullouts would result in a minor beneficial long-term effect by stabilizing off-shoulder gravel pullouts by paving or revegetating. Selective site-specific rock scaling would not substantially alter existing rock outcrops, but would have a minor long-term effect to roadside geology. Vista clearing would not affect slope stability and would have a negligible short-term effect on topography and geology throughout the Road corridor. Overall, Road rehabilitation would result in minor short-term and long-term effects to the landscape and geologic features present on the Road. Effects would be detectable, but not readily apparent.

Effects of Alternative 1 (Repair as Needed). Implementation of rehabilitation work on the Road over 50 years would have minor to moderate long-term effects on topography and geology primarily in the higher elevation portions of the Road. Erosion of roadway cut and fill slopes would result in instability and could lead to Road failure with damage to local geologic features and a change to the landscape.

Effects of Alternative 2 (Priority Rehabilitation). Effects on topography and geology would be similar to Alternative 1, although Road deficiencies would be repaired in 20 years, and instabilities and erosion concerns would be addressed sooner.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Implementation of needed Road rehabilitation within a shorter time frame than Alternatives 2 and 3 would provide for correction of roadway instabilities and erosion that could damage geologic and landscape features.

Additional visitor use improvements implemented with Alternatives 3 and 4 would affect topography and geology at localized sites. Grading and drainage work to improve pullouts and parking areas, and construct slow-moving traffic turnouts would only result in minor long-term changes to the topography and associated geology since all work would be conducted within and adjacent to existing disturbances. Construction of transit parking areas near Apgar would result in a moderate long-term change in the landscape for both alternatives, but parking sites would be located on relatively flat terrain to minimize earthwork. Construction of new short trails and rehabilitation of existing trails would be done to minimize ground and surface disturbance with only minor long-term effects to topography and geology. Formalizing or reclaiming social trails near pullouts would prevent further damage to the landscape. Other proposed improvements to toilets, and visitor orientation, information and interpretation sites would have negligible to minor long-term effects on topography and geology.

Soils

Effects Common to All Alternatives. Disturbance to soil resources from excavation, grading, and compaction during rehabilitation activities would be similar for all alternatives. Minor short-term disturbance of soil resources outside of the existing Road prism would be needed at some locations to access the base of retaining walls, install culverts, and conduct other roadway repairs. Rock scaling at site-specific locations may result in minor short-term disturbances to soil resources, but revegetation of disturbed areas would minimize long-term effects. Only minor short-term disturbances to soil resources would occur at staging areas within the Park since these areas have been previously disturbed. Paving or revegetating informal pullouts would be a beneficial minor long-term improvement by reducing erosion. Roadside vegetation clearing would have a negligible short-term effect on soil resources because trees and shrubs would be selectively removed with minimal surface disturbance.

Overall, a minor short-term loss of soil material from wind and water erosion would be likely at localized sites along the Road during construction and until disturbed areas can be revegetated. Erosion and sediment control best management practices (BMPs) would be implemented to minimize soil loss. A minor short-term loss in soil productivity would occur from disruption of soil biological processes and changes in the soil physical properties from construction disturbance and compaction. Topsoil salvage, replacement, and revegetation would minimize the long-term effect on soil productivity.

Effects of Alternative 1 (Repair as Needed). Implementation of rehabilitation over 50 years would delay drainage and slope stability improvements. This would lead to continued erosion and loss of soil material and productivity and would have a moderate long-term adverse impact on soil resources at site-specific locations.

Effects of Alternative 2 (Priority Rehabilitation). Extending needed repairs to drainage and slope stability over 20 years would result in a moderate long-term loss in soil and soil productivity similar to Alternative 1.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Moderate long-term soil disturbance and loss would occur for Alternatives 3 and 4 from implementation of visitor use improvements such as construction of slow-moving vehicle turnouts, new pullouts and parking areas, and trail construction. Most pullout improvements would occur within existing areas of disturbance and would result in minor short-term soil disturbance. Construction of up to six slow-moving vehicle turnouts would result in the long-term loss of soil productivity on about 0.2 acres (0.08 hectares). Proposed improvements to the Wild Goose Island pullout would have a long-term adverse effect on about 0.75 acre (0.3 hectares), although abandoned parking areas at the Wild Goose Island Overlook would be reclaimed. The use of the Sun Point parking area for an oversized vehicle turnaround following Road rehabilitation would have only a minor site-specific effect on soil resources because this area has been previously disturbed.

Proposed trail construction and rehabilitation at existing pullouts would result in a moderate, long-term, site-specific effects to soil resources on about 1.5 acres (0.6 hectares). Trails would be located and maintained to minimize erosion. Formalizing existing social trails at pullouts, such as the trail at Red Rock Point, Lunch Creek, and Big Bend, would have a beneficial moderate long-term effect to soil resources by eliminating multiple social trails and reducing erosion. Construction of a transit parking area near Apgar would result in moderate long-term loss in soil productivity on 5 acres (2 hectares). Proposed paving of the parking lots would minimize long-term erosion. Reconfiguration of the existing St. Mary Visitor Center parking lot to designate transit parking spaces would have a negligible short-term effect on soil resources for both Alternatives 3 and 4 because no new ground disturbance would be necessary.

Other visitor use improvements including installation of visitor orientation stations, toilets, and exhibits would have negligible to minor short-term effects on soil resources at specific sites because of the limited area of disturbance. For all visitor use improvements, erosion control BMPs would be used to minimize the loss of soil resources.

Cumulative Effects

In addition to other regional highway projects, the Preferred Alternative and other alternatives would have a minor cumulative effect on topographic, geologic, and soil resources. Timber salvage and restoration activities at the Moose Fire site on Flathead National Forest may result in an increase in soil erosion, but the incremental effect on regional soil loss from Road rehabilitation when combined with the potential loss from timber salvage would not add appreciably to the cumulative effect. Disturbances from implementation of other transportation improvement projects in GNP would occur within or adjacent to existing roads to minimize the creation of new developments. Other future improvements in the Park, such as implementation of improvements to lodges and concessioner facilities could introduce new ground disturbances. The combined impact of past actions, the proposed and alternative actions, and foreseeable future projects inside and outside of the Park would have a minor cumulative effect on soil, topography, and geologic resources.

Conclusion

Rehabilitation of the Road would result in minor short-term effects to topography, geology, and soils from excavation, temporary soil disturbance, and a minor long-term effect from rock scaling for all alternatives. Moderate levels of long-term loss in soil productivity and geologic impacts are possible for Alternatives 1 and 2 if rehabilitation work is delayed and existing erosion or subsequent Road failure causes resource damage. Implementation of additional visitor use improvements for Alternatives 3 and 4 would result in similar minor short-term effects for most improvements. A moderate long-term loss of soil productivity (2.2 acres; 0.9 hectares) for Alternatives 3 and 4 would occur from construction of new pullouts and trails and rehabilitation of existing facilities. A similar loss in soil productivity would occur from construction of a 5-acre (2-hectare) transit parking area near Apgar for Alternatives 3 and 4.

There would be no major adverse impact to topography, geology, or soils whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Water Resources

Methodology for Water Resource Effects

Potential effects to hydrology and water quality were qualitatively estimated based on the amount of soil disturbance, proximity of construction activities to streams and lakes, and planned mitigation measures to control runoff and prevent sedimentation. Floodplain effects were determined based on previous NPS and FHWA studies.

Hydrology and Water Quality

Effects Common to All Alternatives. There would be no measurable change in surface runoff or ground water hydrology for any of the alternatives. An overall moderate long-term beneficial effect on surface hydrology and water quality would occur from drainage improvements that collect and dissipate roadway runoff, protect drainage inlets, and outlets, and direct runoff to minimize erosion.

All of the alternatives have the potential for short-term increases in stream sedimentation and turbidity from erosion of disturbed soils near active work sites. The greatest potential for impacts to water quality occur where the Road borders or crosses creeks, streams, and lakes including McDonald Creek, Lake McDonald, and St. Mary Lake. Unavoidable minor short-term introduction of sediment into watercourses is possible for some roadwork, such as culvert replacement, bridge repairs, or drainage improvements. Vista clearing would have a negligible short-term effect on water resources because of the limited surface disturbance.

Proposed rehabilitation of the Road within the Divide Creek watershed is not expected to exacerbate the existing impaired water quality in this drainage. Road improvements would not increase streamflow, contribute to channel incisement, or degrade aquatic habitat. Short-term increases in sedimentation are possible during construction, but no long-term adverse effects are anticipated.

Atmospheric deposition of particulates into streams and lakes may increase due to dust from construction equipment and vehicles. Expected sediment increases would not result in measurable water quality degradation or loss of beneficial uses. Effects to water quality for all alternatives would be minimized by the planned implementation of erosion and sediment control BMPs to prevent erosion and contain sediment within work zones.

Effects of Alternative 1 (Repair as Needed). Under the Repair as Needed alternative, drainage improvements to the Road would be implemented over 50 years. Although repairs would address inadequate roadway drainage, existing adverse effects to surface water and water quality would continue until improvements are implemented. Further roadside erosion and poor drainage would continue and are likely to contribute to moderate long-term adverse impacts on water quality at localized sites.

Effects of Alternative 2 (Priority Rehabilitation). This alternative would rehabilitate the Road over 20 years and would address existing deficiencies in roadway drainage. Similar to Alternative 1, improvements would not be implemented soon enough to prevent further impacts to water quality as the Road continues to deteriorate. Moderate long-term adverse impacts to water quality would continue until repairs are implemented.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Implementation of additional visitor use improvements for Alternatives 3 and 4 also have the potential to affect hydrology and water quality. Proposed pullout improvements would be mostly confined to small work zones with minor direct short-term impacts to water resources possible during construction. Improvements at the Wild Goose Island pullout would also increase impermeable surface, but revegetation of abandoned parking areas would partially offset impacts. Slow-moving vehicle turnouts would be located to avoid direct impacts to water bodies. Implementation of erosion control measures including revegetation of disturbed areas would minimize potential effects for all visitor use improvements. As a result, only minor, short-term disturbances to surface hydrology and water quality are likely. No long-term adverse impacts from these improvements are anticipated, although the increased impermeable surface would result in a long-term minor increase in runoff near areas of new pavement.

Proposed trail improvements and construction of new short trails would have a minor short-term effect to water quality during construction, but stabilization techniques, and reclamation of disturbed areas would minimize this effect. Rehabilitation of social trails at locations including Red Rock Point, Lunch Rock, Wild Goose Island Overlook, and other pullouts would have minor to moderate long-term beneficial effects on water quality by reducing erosion, particularly on trails that lead to water features.

The construction of transit staging areas for Alternatives 3 and 4 would have negligible long-term effects on hydrology and water quality. The additional paved parking near Apgar (5 acres; 2 hectares) would increase localized runoff due to the additional impermeable surface area. This site would be located away from water sources, and drainage control measures would capture and dissipate runoff to minimize effects to water quality.

Both the Logan Pit and Sun Point construction staging areas are located near water features and have the potential for generating sediment or other contaminants in runoff waters. Drainage control structural measures would be used to capture and dissipate runoff as appropriate and vegetated buffers would be maintained between the staging area and open water. These measures would be maintained for post-rehabilitation use of Logan Pit as a maintenance yard and Sun Point as a picnic area and oversized vehicle turnaround. Adverse impacts to water quality from both of these sites is expected to be short term and minor.

Proposed toilet rehabilitation and new facilities would have negligible short-term effect on water resources adjacent to the Road. Toilets would be installed to standards to prevent leakage and ground water contamination and scheduled maintenance of these facilities would protect water resources.

Other proposed visitor use improvements such as the east side orientation station and pullout exhibits would have negligible short-term effects on hydrology and water quality.

Floodplains

Effects Common to All Alternatives. Portions of the Going-to-the-Sun Road are subject to periodic flooding and proposed rehabilitation work for all alternatives would not add to the potential for increased flooding or long-term damage. Planned use of low water crossings at Divide Creek would have a moderate to major beneficial effect by protecting the Road from periodic flood damage and allowing a more natural dispersion of flood flows. Overall, Road rehabilitation would have a negligible short-term effect on localized flooding because other than Divide Creek, there would be no substantial changes to the roadway location or elevation.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). There would be no additional effects to floodplains other than those common to all alternatives.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Proposed visitor use improvements would not result in substantial changes in topography or addition of structural features within floodplains that would affect the potential for flooding, thus, there would be a negligible effect on floodplains.

Cumulative Effects

Regional transportation projects, Forest Service timber salvage operations, other roadwork and commercial service developments in the Park may affect water resources near site-specific projects. Actions such as timber salvage operations on the Moose Fire within Flathead National Forest may result in increased temporary erosion and sedimentation in the North Fork of the Flathead River. Cumulative adverse impacts to water quality from Road rehabilitation would have negligible effect on water quality in the Flathead River because of the limited surface disturbance associated with roadwork downstream from Lake McDonald. The incremental effect of proposed Road rehabilitation for all of the alternatives, and additional visitor use improvements for Alternatives 3 and 4 when added to other reasonably foreseeable actions, would have only a minor cumulative effect on water resources.

Future plans for relocation of Park employee housing, administrative, and maintenance facilities near Divide Creek to prevent damage from flooding, along with proposed roadwork near Divide Creek, would have a moderate to major long-term beneficial effect by protecting Park resources from periodic flooding for all alternatives. For other Road rehabilitation work for all alternatives, and for visitor use improvements for Alternatives 3 and 4, there would be a negligible cumulative effect to floodplains because of the limited disturbance within floodplains.

Conclusion

Road rehabilitation for Alternatives 1 and 2 would result in moderate long-term effects to hydrology and water quality due to the extended construction period and delay in implementing drainage repairs. Alternatives 3 and 4 would have a minor short-term effect on hydrology and water quality at localized sites during construction. Proposed improvements in drainage would address existing areas of inadequate drainage and erosion adjacent to the Road and would provide a minor to moderate beneficial effect to local water quality over the long term. Benefits would be greatest for Alternatives 3 and 4, which implement drainage improvements over a shorter time. Similar minor short-term effects to hydrology and water quality would occur with implementation of visitor use improvements for Alternatives 3 and 4. Planned revegetation of disturbed areas for all alternatives would minimize adverse effects to hydrology and water quality.

Road improvements for all alternatives would have negligible short-term effects on floodplains and flooding because there would be no substantial change in roadway alignment or elevation. Planned installation of low water crossings near Divide Creek would better dissipate flood flows. This improvement would have a moderate to major, beneficial, long-term effect by protecting the Road from flood damage and improving flood flows. Roadwork is exempt from compliance with Executive Order 11988, Floodplain Management.

There would be no major adverse impact to water resources, including hydrology, water quality or floodplains whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Vegetation

Methodology for Vegetation Effects

The determination of potential effects to vegetation was quantitatively estimated based on anticipated loss of vegetation from construction of new facilities. A qualitative assessment also was used to estimate temporary impacts to vegetation based on anticipated concentration of work within existing areas of disturbance and planned mitigation measures to revegetate following construction work. Previous successful revegetation efforts and noxious weed control efforts in the Park provide an indication of the high potential for success in reclaiming disturbed areas.

Effects Common to All Alternatives. Rehabilitation of the Road is confined primarily to the existing roadway prism, which includes the paved Road surface and adjacent cut and fill slopes that were created during original Road construction. Disturbance to roadside vegetation as well as additional disturbance outside of the Road prism would occur during rehabilitation. All of the vegetation communities, from grassland to alpine, bordering the Road could be disturbed during construction work. Minimal removal of trees would occur at visitor use areas and along the Road for vistas, safety, and other identified project objectives including comfort stations, parking, utilities, fiber optics, and trails.

The extent of the disturbance to vegetation depends on the particular rehabilitation activity. Lower elevation sections of the Road that only require paving would have negligible to minor short-term effects on roadside vegetation. Locations needing extensive retaining wall or guardwall repairs would require minor to moderate short-term localized impacts to vegetation to allow equipment and worker access. Vegetation may be directly affected by clearing or trampling. Construction activities that result in ground disturbance in the spring when soils are moist may damage plant roots. Plant disturbance in the fall may not allow plants time to recover prior to winter.

Logan Pit is the only staging area within the Park with scattered vegetation. Additional trampling or disturbance of vegetation within this active maintenance yard would be minor and long term. Potential impacts to vegetation are possible if the contractor chooses to establish staging areas outside of the Park, but the location of these sites would not be identified until construction is scheduled.

Proposed paving of informal pullouts would have a negligible effect on vegetation because these areas are currently unvegetated gravel. Reclamation of some informal pullouts would be a minor long-term beneficial improvement to vegetation because these areas would be planted with native vegetation.

Planned vista and roadside clearing of vegetation would require selective removal of trees and shrubs at scenic view points such as The Loop, Jackson Glacier Overlook, and along the Road for vistas, safety, and other project objectives. Removal of roadside vegetation would be an on-going maintenance operation to maintain scenic overlooks and views into the forest and would follow guidelines developed in a landscape/vista management plan. Overall, vegetation clearing would have a minor long-term effect on native vegetation communities because it would be limited to select locations adjacent to the Road.

The introduction of exotic non-native plant species is a concern for all alternatives. Soil disturbance associated with rehabilitation work increases the potential for the establishment and spread of noxious weeds. Prompt revegetation of disturbed sites with native vegetation and implementation of a weed management program would help prevent the infestation of noxious weeds. Sites with existing weeds are more likely to continue to support weeds.

For all alternatives, extensive reclamation and revegetation efforts would be used to stabilize existing eroding roadside slopes as well as those areas temporarily disturbed during rehabilitation. This includes measures such as topsoil salvage, seed collection, selective use of soil amendments, and monitoring of revegetation success.

Effects of Alternative 1 (Repair as Needed). Implementation of Road rehabilitation over 50 years would allow existing unstable slopes to continue deteriorating. This would result in a moderate long-term adverse impact to vegetation. Delay of revegetation and slope stabilization work may require extensive remediation work in the future to repair damaged areas.

Effects of Alternative 2 (Priority Rehabilitation). Moderate long-term adverse impacts to vegetation similar to Alternative 1 are possible if revegetation of existing unstable slopes is implemented over 20 years.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Proposed improvement to visitor use facilities included in Alternatives 3 and 4 would result in both beneficial and adverse effects to vegetation. The addition of three slow-moving vehicle turnouts on the west side of the Continental Divide and two to three along the St. Mary segment of the Road would result in a minor long-term loss of about 0.2 acres (0.08 hectares) of roadside vegetation.

Reconfiguration of the Wild Goose Island pullout along with a slight shift in the Road alignment would result in the disturbance of about 0.75 acres (0.3 hectares) of shrub and forest vegetation, although existing parking areas on the north side of the Road would be revegetated with native plants. Proposed improvements at other pullouts, parking areas, and trails (1.5 acres; 0.6 hectares) would have minor long-term effects on vegetation. Establishment of an oversized vehicle turnaround at Sun Point would occur within an existing area of disturbance, and no vegetation disturbance is anticipated.

Developing short new trail segments at pullouts and rehabilitating and formalizing social trials would result in a direct disturbance to vegetation for trail construction, but would be a beneficial impact by helping define visitor access routes and eliminating trampling and vegetation disturbance that presently occurs along multiple social trails. Trails would be sited to avoid adverse impacts to important plant communities and minimal removal of trees is anticipated.

Construction of a 5-acre (2-hectare) transit parking area for Alternatives 3 and 4 would result in a minor long-term loss of vegetation near Apgar. Disturbance would occur to primarily lodgepole pine forest within the western red cedar/western hemlock habitat type.

Other proposed improvements including new and upgraded toilets, and visitor exhibits, interpretive sites, and orientation stations would have negligible to minor long-term effects to vegetation at small localized sites adjacent to the Road.

Cumulative Effects

The limited impacts to vegetation from proposed Road improvements for all of the alternatives would be negligible when added to the effects of other regional transportation projects. Similar minor cumulative effects would occur with other planned GNP roadwork because work would be confined to existing Park roads rather than construction of new roads. The incremental effect on vegetation from proposed Road rehabilitation in addition to Forest Service salvage and reclamation work of the Moose fire would have a minor cumulative effect. Additional vegetation disturbance in the Park is possible if the CSP is implemented. The incremental impact on vegetation from rehabilitation of the Going-to-the-Sun Road in addition to CSP impacts would result in minor long-term cumulative effects.

Visitor use improvements included in Alternatives 3 and 4 would add only minor cumulative effects to vegetation at the regional and Park-wide scale when combined with reasonably foreseeable actions.

Conclusion

Rehabilitation of the Road would result primarily in minor short-term disturbances to roadside vegetation during construction for all alternatives. Vegetation management would remove roadside vegetation at select locations throughout the Road corridor, but would have a minor short-term effect on native plant communities. All alternatives except Alternative 1 would result in the loss of about 0.2 acres (0.08 hectares) of roadside herbaceous vegetation to construct slow-moving vehicle turnouts.

Alternatives 3 and 4 would result in minor long-term loss (7.2 acres; 2.9 hectares) in vegetation from improvements to pullouts and parking areas, construction of transit staging areas and new trails. Visitor use improvements at existing pullouts along with toilet improvements, and installation of visitor orientation facilities would have a negligible short-term impact on vegetation.

For all alternatives the introduction of exotic plant species is possible with soil disturbances. Monitoring and measures from the *Exotic Vegetation Management Plan* would be implemented to minimize the introduction and spread of these species. All alternatives would implement revegetation measures to rapidly plant areas disturbed during construction.

There would be no major adverse impact to vegetation resources whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Wetlands

Methodology for Wetland Effects

Wetland impacts were evaluated based on previous Park surveys for wetlands near the Road and the anticipated types of rehabilitation work that would be conducted near wetlands. A quantitative determination of wetland impacts was not made because it is anticipated that a direct loss of wetlands can be avoided. Temporary impacts to wetlands would be evaluated prior to implementation of each phase of rehabilitation.

Effects Common to All Alternatives. Proposed rehabilitation work on the Going-to-the-Sun Road for all alternatives is expected to have a negligible to minor short-term effect on wetlands. Wetlands near the Road would be avoided to the maximum extent possible. All wetlands near work zones would be identified and marked to prevent inadvertent disturbance during construction. Silt fences or other barriers would be used to capture sediments and prevent indirect impacts to wetlands located downslope from construction areas. Indirect impacts on wetlands from changes in supporting hydrology would be avoided by maintaining the existing ground water or surface flow with culverts or subsurface drainage. Minor short-term impacts to wetlands may occur for repairs such as culvert replacement. Affected wetlands would be promptly restored with no loss in function or values.

Impacts to wetlands and waters of the U.S. are subject to compliance with applicable regulatory requirements including the Clean Water Act and Executive Order 11990 as described in Chapter 5. Because no adverse impacts to wetlands are anticipated for any of the alternatives, a Statement of Wetland Findings (SOF) was not prepared. NPS Directors Order 77-1 allows for exceptions from a SOF for maintenance, repair, and renovation of structures, such as the minor temporary disturbances to wetlands that are expected to occur during the repair or replacement of existing facilities, such as culverts (up to 0.1 acres of wetland impact). The NPS intends to avoid wetlands to the maximum extent practicable, but should minor unavoidable impacts occur, the NPS would comply with Executive Order 11990, secure the necessary permitting from the U.S. Army Corps of Engineers, and complete a SOF to address impacts and mitigation. Additional wetland surveys would be conducted during each design phase to assist with avoidance measures and identify any permitting requirements.

Effects of Alternative 1 (Repair as Needed). Implementation of Road drainage improvements over 50 years would allow continued erosion that could indirectly affect nearby wetlands.

Effects of Alternative 2 (Priority Rehabilitation). Potential indirect effects to wetlands would be similar to Alternative 1 if drainage repairs are implemented over a 20-year period.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Road rehabilitation would have short-term negligible to minor effects on wetlands similar to those described as common to all alternatives. Damage to wetlands from existing and on-going erosion due to poor roadway drainage would be corrected sooner than Alternatives 1 and 2. Implementation of visitor use improvements for Alternatives 3 and 4 would have a negligible short-term effect on wetlands. Wetlands near parking areas, pullouts, and toilets would be avoided. New trails would be located away from wetlands. Construction of a pedestrian bridge over Avalanche Creek may result in a minor short-term disturbance to wetlands, but there would be no wetland loss and the site would be restored following construction. None of the other visitor use improvements including visitor orientation, information or interpretive exhibits would affect wetlands.

Cumulative Effects

There would be negligible cumulative effects to wetlands for all of the alternatives. Wetlands would be avoided for Road rehabilitation work and visitor use improvements.

Conclusion

Road rehabilitation would avoid wetlands to the greatest extent possible. Negligible to minor short-term disturbances to wetlands could occur from culvert replacement or work near drainages. Prompt restoration of disturbed wetlands following construction would not affect wetland functions or values and would not require wetland mitigation. Similar negligible to minor effects to wetlands would occur from implementation of visitor use improvements for Alternatives 3 and 4.

There would be no major adverse impact to wetlands whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Wildlife

Methodology for Wildlife Effects

Determination of effects to wildlife from alternative actions is difficult to quantify. Impacts to wildlife are not readily measured or observable. Potential impacts to wildlife were determined from the estimated loss of habitat, inference from other studies and scientific literature, and the knowledge of Park wildlife biologists familiar with wildlife activity.

Effects Common to All Alternatives. Proposed Road rehabilitation for all alternatives would result primarily in short-term impacts to wildlife during construction. The intensity of impact to wildlife depends on several factors including the type of construction activity, location, time of day, season, and the particular species. Projects that use heavy equipment for excavation, such as removal of the roadbase, would create more noise and disturbance than masonry work. The season of construction would also influence wildlife response to construction disturbance. All of the alternatives would initiate construction activities in the spring and extend work into the fall as weather conditions permit. Construction activities in the spring and fall would have a greater adverse effect on wildlife because wildlife are generally accustomed to less visitor activity than during the summer visitor use season. Many species of wildlife are more vulnerable to the effects of human-induced stress in the spring and fall when energy expenditures are greatest and food resources are less abundant. Road construction in the early morning and evening could potentially affect wildlife active at this time. All alternatives, except possibly Alternative 1, include potential work at night to facilitate rapid completion of work. The noise, disturbance, and artificial light may adversely affect some species.

The direct loss of wildlife habitat would be minor for all alternatives. The majority of roadwork would be conducted within the prism of the existing Road with only a minor long-term loss of habitat adjacent to the Road. Short-term losses of habitat would occur adjacent to the Road from temporary disturbances during construction. These disturbances would be reclaimed and planted with native vegetation following construction. In the short term, habitat quality of revegetated areas would be lower than existing habitat. Over the long term, habitat quality of revegetated areas would be similar to existing habitat.

Proposed rehabilitation may create additional habitat fragmentation or reduce connectivity for wildlife movement. Work on the Going-to-the-Sun Road would occur within the existing corridor but could introduce additional temporary barriers to wildlife movement. The magnitude of the effect would depend on the extent and timing of construction and is likely be a minor to moderate short-term impact. Culverts would be appropriately sized to accommodate small and medium sized wildlife movement. Rehabilitation work would have no effect on design speed or posted speed limits, so the potential for wildlife/vehicle collisions would not change.

The zone of influence (the area in which wildlife potentially could be affected by disturbances such as noise, light, and human activity) extends beyond the edge of the existing Road and varies with topography, vegetation, and type of human disturbance. Disturbance to wildlife from construction-related noise, disturbance, and artificial lighting would be minor to moderate. Wildlife displacement and avoidance of the Road during construction is likely for some species. Species such as black bears, which are active primarily in the early mornings, evenings, and at night, may be adversely affected by night construction. Other mammals such as elk, deer, mountain lion, mountain goats, and bighorn sheep also may be temporarily displaced by noise and disturbance during construction. Various bird species along the Road could be temporarily displaced to other suitable habitat during construction. Most raptors and other large birds are unlikely to nest adjacent to the Road because of the existing traffic and human activity, but construction noise and disturbance could further shift bird nesting away from the Road. Biannual raptor migration through the Park is unlikely to be affected by planned rehabilitation. Temporarily displaced wildlife would return following completion of construction. There would be no impact on wildlife in the winter.

Vista clearing would remove roadside vegetation at select locations. The loss of vegetation would have a negligible effect on wildlife because of their infrequent use of this habitat and the small area of clearing. Removal of trees could reduce perching and foraging sites for some birds, but the impact is unlikely to be perceptible. Surveys for nest sites would be conducted prior to clearing.

As discussed in Chapter 2, a number of mitigation measures would be implemented during construction to minimize impacts to wildlife and their habitat, including seasonal construction restrictions at sensitive locations, provisions for wildlife crossings through culverts under the Road, and minimizing the area of construction disturbance.

Effects of Alternative 1 (Repair as Needed). Impacts to wildlife would be similar to those common to all alternatives. Rehabilitation work would be spread over 50 years, so annual construction activity would be limited to smaller work zones than for other alternatives. Wildlife are less likely to be affected by rehabilitation work confined to smaller areas; however, continuous construction activity over 50 years could result in displacement of wildlife activity near the Road or habituation to human activity and construction disturbance. Should a catastrophic Road failure occur, it may require emergency repairs of a magnitude that could limit wildlife mitigation options.

Effects of Alternative 2 (Priority Rehabilitation). Impacts to wildlife would be similar to Alternative 1, although additional work zones would be used to complete work within 20 years.

Effects of Alternative 3 — Preferred (Shared Use). Alternative 3 would implement Road repairs over 7 to 8 years, which would require multiple construction zones each year. Disturbance to wildlife would be spread over a larger portion of the Road than Alternatives 1 and 2. Indirect impacts to wildlife from construction disturbance would have a minor to moderate short-term effect on wildlife and is likely to result in displacement and changes in movement for some species.

The implementation of visitor use improvements with Alternative 3 would result in a direct loss of wildlife habitat and additional disturbance during construction. Minor habitat loss (0.2 acres; 0.08 hectares) would occur from construction of slow-moving vehicle turnouts. The majority of this disturbance would be to roadside vegetation, which is infrequently used by wildlife. The addition of slow-moving turnouts would slightly increase the crossing distance for wildlife in these locations, but the turnouts would be less than 120 feet (40 meters) long and are expected to have a minor long-term effect on wildlife movement.

Additional minor long-term losses of habitat (0.75 acres; 0.3 hectares) would occur with proposed improvements to the Wild Goose Island Overlook. Wildlife use at the Wild Goose Island Overlook is limited because of existing human activity and traffic. Use of the Logan Pit area for construction staging would result in short-term moderate impact to wildlife from human activity and noise, but the site is currently used by Park maintenance staff for storage and construction staging. Incidental disturbance to wildlife habitat would occur at other pullouts because work would take place within areas of existing disturbance.

Construction of a 5-acre (2-hectare) transit parking lot near Apgar would result in a minor long-term loss of forest habitat. Traffic and human activity likely would displace wildlife activity near the parking lot during the summer months. The planned location of the parking area near the Road and existing visitor development would minimize wildlife impacts. There would be no loss of habitat at the St. Mary Visitor Center from reconfiguring the existing parking lot to accommodate transit service parking. The expansion of transit service for this alternative would have a negligible beneficial short-term effect on wildlife by slightly reducing traffic.

Proposed construction of short new trail segments from existing pullouts and formalizing existing social trails would result in a minor long-term loss of habitat of about 1.5 acres (0.6 hectares). Trails would be constructed within existing visitor activity areas adjacent to the Road and other visitor developments where wildlife activity is limited.

Additional human activity along these trails may also result in a minor long-term disturbance or displacement to wildlife, but would not affect species populations.

Other planned visitor use improvements including new toilets, installation of visitor orientation and information stations and new exhibits would have a negligible effect on wildlife habitat or activity because of the limited new disturbance and confinement of improvements to the existing visitor service zone.

Effects of Alternative 4 (Accelerated Completion). Impacts to wildlife for Alternative 4 would be similar to Alternative 3, except work would be completed in as few as 6 years and disturbance to wildlife would occur over a shorter period of time. An accelerated work scheduled likely would have a similar number of work sites as Alternative 3, but because traffic would be suspended during the week, rehabilitation could be completed more efficiently and quickly.

Construction of a transit parking lot near Apgar would result in a minor long-term loss of forest habitat and a displacement of wildlife activity during the summer, similar to Alternative 3. Additional expansion of transit parking spaces at the St. Mary Visitor Center would be located within the existing parking lot and would not affect wildlife. Expansion of transit service to 14 vehicles would reduce the number of vehicles on the Road, which would have a negligible, but beneficial effect on wildlife.

Impacts to wildlife from other visitor improvements would be similar to Alternative 3. Overall, there would be a minor to moderate short-term effect on wildlife during rehabilitation and implementation of visitor use improvements, with a minor long-term impact to wildlife habitat from transit parking, trails, and pullout improvements.

Cumulative Effects

Anticipated impacts to wildlife from implementation of Road improvements for all alternatives and visitor use improvements for Alternatives 3 and 4 would have a minor cumulative effect on wildlife populations when added to other regional transportation projects. A minor short-term regional disturbance and displacement of wildlife could occur from the combined effect of Road rehabilitation work and timber salvage and reclamation work at the Moose fire location in Flathead National Forest. Other reasonably foreseeable developments and construction projects within the Park would have a minor to moderate cumulative effect on wildlife when these activities are overlapping in time or location. Impacts to wildlife would be limited because all planned projects would occur within or adjacent to existing facilities and visitor service zones that currently have concentrated areas of human activity. Increased visitor activity from the Lewis & Clark Bicentennial Commemoration and GNP Centennial, in addition to Road rehabilitation and visitor use improvements, could have a minor short-term effect on wildlife from additional traffic, backcountry hiking, and visitor activity throughout the Park.

Conclusion

Rehabilitation of the Road would result in minor to moderate direct short-term impacts to wildlife habitat during construction for all alternatives. Some wildlife is likely to be displaced because of the noise, human activity, and disturbance associated with roadwork. Night construction and artificial lighting primarily for Alternatives 2, 3, and 4 would result in moderate short-term effects to wildlife foraging, movement, and behavior. The loss of wildlife habitat would be minor and long term for all alternatives from Road rehabilitation because work would be confined primarily to the existing Road prism. Additional minor short-term disturbances to wildlife would occur from implementation of visitor use improvements for Alternatives 3 and 4, but these would generally occur at the same time as other Road rehabilitation work. A minor long-term loss of wildlife habitat would occur for Alternatives 3 and 4 from construction of transit staging parking near Apgar, construction of short trails, and improvements at pullouts, and the addition of slow-moving vehicle turnouts. Mitigation measures would be implemented for all alternatives that would minimize adverse effects to wildlife.

There would be no major adverse impact to wildlife whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Aquatic Resources

Methodology for Aquatic Resource Effects

Determination of effects to aquatic resources from alternative actions is difficult to quantify. Impacts are not readily measured or observable. Potential impacts to aquatic resources were based on the potential for direct disturbance to habitat or the introduction of sediments or other contaminants into streams and lakes. Beneficial effects of proposed drainage improvements were estimated based on the potential to reduce erosion and stream sedimentation. The extent of the impact was based on the knowledge of Park aquatic biologists.

Effects Common to All Alternatives. All of the alternatives would result in construction-related disturbances adjacent or in proximity to streams and lakes along the Going-to-the-Sun Road. Streams and lakes near the Road most likely to be affected include McDonald Creek, Lake McDonald, Reynolds Creek, and St. Mary Lake because these drainages parallel the Road. Potential impacts are also possible where the Road crosses streams. Direct effects may occur from ground and vegetation disturbances that increase sediment transport to water bodies. Indirect impacts may include changes in pollutant levels in run-off water, changes in downstream water quality, and disruption of natural erosion processes.

Sedimentation associated with Road rehabilitation is expected to result in adverse, minor, short-term effects to aquatic life at localized sites. Increased sedimentation rates can negatively affect habitat for fish spawning and juvenile development and reduce the diversity and quantity of habitats for aquatic insects. Sedimentation can further stress fish species currently impacted by predation and competition with exotic species, and/or impacted by genetic dilution through crossbreeding with exotics.

Measures to minimize impact to aquatic life would be implemented at each construction zone to reduce the potential for direct or indirect impacts to aquatic species and habitat. Sedimentation would be minimized by containment of disturbed soil material within the construction zone, routing drainage around construction sites where appropriate, and other sediment and erosion control measures.

Water withdrawals from lakes, streams, and the Park water system for dust abatement and construction uses would be taken from NPS-approved locations. Withdrawal sites would be located to minimize changes in streamflow, effects to spawning habitat, and impacts to other resources. Pumps would be required to have screens to prevent the inadvertent entrainment of fish. Impacts to aquatic life from water withdrawals are expected to be minor and short term.

Proposed drainage improvements to the Road would have a minor to moderate beneficial long-term effect on aquatic resources by correcting existing drainage deficiencies, reducing erosion, and improving the quality of the water transported from the roadway. Stabilization and vegetation of eroding slopes and repairs of slumps also would have an indirect beneficial effect on aquatic resources by improving water quality. Sizing and location of culverts, where applicable, would facilitate the passage of fish, amphibians, and other wildlife using the stream corridor.

Proposed use of low water crossings near Divide Creek would have a moderate long-term beneficial impact on aquatic habitat by improving the natural flow of flood waters.

Effects of Alternative 1 (Repair as Needed). Potential impacts to aquatic resources for Alternative 1 would be the same as those common to all alternatives, except adverse and beneficial effects would be spread over 50 years. Thus, indirect adverse effects to aquatic resources from erosion and drainage deficiencies would continue and possibly become worse if rehabilitation is delayed.

Effects of Alternative 2 (Priority Rehabilitation). Potential impacts to aquatic resources for Alternative 2 would be the same as those common to all alternatives, except adverse and beneficial effects would be spread over 20 years. Thus, indirect adverse effects to aquatic resources from erosion and drainage deficiencies would continue and possibly become worse if rehabilitation is delayed.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). In addition to the impacts common to all alternatives, Alternatives 3 and 4 would result in other potential disturbances to aquatic resources from implementation of visitor use improvements. Proposed improvements to pullouts and parking areas at several locations adjacent to the Road would result in ground disturbances that would increase the potential for sediment entering nearby streams or lakes. Construction of additional slow-moving vehicle turnouts would have a negligible short-term effect on aquatic life during construction because they are not located adjacent to water sources. Disturbances associated with other pullout improvements may temporarily increase sediment discharges to streams or lakes, but adverse impacts are expected to be minor and short term.

Construction of a transit parking area near Apgar for Alternatives 3 and Alternative 4 would have no effect on aquatic resources because there are no nearby streams or water features. Surface runoff from parking areas would be routed to allow infiltration into adjacent soils to protect water quality. Reconfiguration of the St. Mary Visitor Center parking area to accommodate vehicles would have a negligible short-term effect because disturbance would occur within the existing parking lot.

New trail construction near water features would have the potential for indirect temporary effects on aquatic life from erosion and sedimentation. Establishment of short formal trails at Red Rock Point, Lunch Creek, Wild Goose Island Overlook, and other pullouts to replace multiple existing social trails would be a minor to moderate long-term beneficial effect on aquatic resources, by reducing soil erosion and sedimentation. Construction of a pedestrian bridge over Avalanche Creek would have a minor short-term effect on aquatic resources from incidental streambank disturbance.

Impacts to aquatic resources from construction of new toilets and rehabilitation of others would have negligible effect on aquatic life or habitat because these sites would be designed to prevent leakage to the environment. Other visitor use improvements including installation of orientation and information stations, and interpretive exhibits would have negligible short-term effects on aquatic resources.

Cumulative Effects

Cumulative effects to aquatic resources from the incremental minor effects of Road rehabilitation for all alternatives and visitor use improvements for Alternatives 3 and 4 in combination with regional transportation projects would be minor. Road rehabilitation would add a negligible short-term cumulative effect to aquatic life in addition to potential impacts associated with timber salvage or the Moose fire in Flathead National Forest along the North Fork of the Flathead River. The cumulative effect to aquatic resources from other planned roadwork and developments in the Park may result in minor short-term cumulative effects at localized sites.

Conclusion

Road rehabilitation for all alternatives would result in minor surface disturbances that could impact nearby aquatic resources. Roadwork adjacent to streams and lakes would have a minor short-term effect on localized aquatic life from the potential introduction of sediment during construction.

Improvements to visitor use facilities under Alternatives 3 and 4 would result in additional negligible to minor short-term impacts to aquatic life near construction sites. Long-term minor to moderate beneficial effects would occur from formalizing social trails near waterbodies and reducing sedimentation.

There would be no major adverse impact to aquatic life whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, the proposed action would not impair Park resources or values.

Threatened and Endangered Species and Species of Concern

Proposed rehabilitation of the Going-to-the-Sun Road, under all alternatives, would result in noise, disturbance, and habitat impacts that could affect federally listed threatened and endangered species protected under the Endangered Species Act and other state species of concern. The NPS submitted a Biological Assessment (BA) and Programmatic Agreement to the FWS to document potential effects to federally listed species. The results of the BA are summarized in the following discussion and represent the best information and scientific data available. The Programmatic Agreement provides a process for the NPS to consult annually with the FWS on any additional impacts to listed species identified during final design or should a new species be listed over the course of rehabilitation. As preliminary design and schedules are completed, GNP staff will review and analyze the work in regards to the information presented in the BA and any new information available. The Park will make an effect determination for each specific work site. If that determination is the same as identified in the original BA, then a letter will be issued to the FWS with that information. However, if the effect determination is different than concluded in the BA, a "BA Amendment" will be prepared and submitted to the FWS for a 45-day review and concurrence.

Methodology for Threatened and Endangered Species and Species of Concern Effects

Potential effects to federally listed threatened and endangered species and other species of concern were based on available data for these species in the Park, the anticipated loss or disturbance of habitat, and the indirect effect to species activity and behavior. Impacts to wildlife are not readily measured or observable, thus impact determinations are based on the professional judgment of Park biologists, informal consultation with the FWS, and inference from other studies. Potential impacts to plant species of concern were based on previous surveys conducted in the Road corridor and the knowledge of Park botanists on species distribution. Future plant surveys would be conducted prior to each phase of construction to determine potential effects and incorporate mitigation measures. The Park also would collect data on bull trout and westslope cutthroat trout from streams potentially affected by rehabilitation.

Bald Eagle—Threatened

Effects Common to All Alternatives. Rehabilitation of the Road would have a minor short-term effect on bald eagle nesting territories located on Lake McDonald and St. Mary Lake. There would be no loss of nesting or foraging habitat, but noise and disturbance from construction activity near these territories could alter foraging activity and roosting. Rehabilitation work near bald eagle territories is less extensive and would take less time to implement than repair work at higher elevation portions of the Road. Construction activities near bald eagle nest and foraging sites would be restricted during the critical use dates from March 1 to May 15 near the bald eagle territory at Lake McDonald, and up to June 15 for the territory near St. Mary Lake. Because most roadwork would not occur during the winter, impacts to bald eagle winter locations at Lake McDonald or St. Mary Lake would be minimal. Road rehabilitation work would have negligible, short-term effect on annual bald eagle migration through McDonald Valley.

For all of the alternatives, including the preferred, rehabilitation of the Road may affect, but is not likely to adversely affect bald eagle nesting, foraging or roosting. This determination is based on: 1) the limited area affected by the activity and availability of displacement areas; 2) mortality risk would not increase; 3) the distance of the project area from the McDonald and St. Mary bald eagle nest sites; and 4) there would be no loss or alteration of habitat. Chapter 2 includes a summary of the conservation measures that would be used to avoid and minimize impacts to bald eagles.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). Effects to bald eagles would be the same as those common to all alternatives. Road rehabilitation would have a minor short-term effect on bald eagle foraging activities near Lake McDonald and St. Mary Lake.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Implementation of visitor use improvements would add slightly to the levels of disturbance and human activity along the Road. No direct loss or impact to nesting or foraging habitat would occur, but construction-related disturbance and human activity could affect bald eagle foraging and movement. The construction of additional visitor use facilities, including improvements at parking sites, pullouts, trails, toilets, picnic sites, and other visitor orientation, information, and interpretive features would be within the existing Road corridor and in most instances would be constructed at the same time as Road rehabilitation work. Construction of visitor use improvements would have a minor short-term effect on bald eagles.

Grizzly Bear —Threatened

Effects Common to All Alternatives. Habitat for grizzly bears is located throughout the Going-to-the-Sun Road corridor. Rehabilitation of the Road would result in a minimal direct loss of grizzly bear foraging habitat and no loss of denning habitat because the majority of work would be conducted within the existing Road prism. No impact to the existing connectivity of grizzly bear habitat would occur because there would be no change in Road width except for short segments of turnouts for slow-moving vehicles. The extension of construction activities into the fall may affect grizzly bear selection or use of denning sites near the Road. No roadwork would be conducted in the winter during bear hibernation. Grizzly bears typically leave their den sites in the spring prior to when construction would begin, but some bears may not emerge from dens until after plowing and construction have begun and some bears may linger near dens after emergence.

Construction activity could temporarily displace individual bears from construction zones near the Road, particularly in areas where night work is conducted. Potential displacement of bears would be temporary and alternate suitable habitat is present nearby, although those habitats could be occupied by other bears, thus creating a conflict. Sustained levels of construction activity, especially from noise and artificial lighting at night and during periods of low visitor use in the spring and fall, may contribute to increased levels of displacement or habituation of individual bears at construction sites. Mortality from vehicle collisions is not expected to change measurably from current conditions because Road rehabilitation would not increase roadway width, straighten curves, or increase vehicle speeds or vehicle capacity.

Typically, grizzly bears avoid areas of human activity; however, they are attracted to food, the scent of some petroleum products, and human waste. As a result, increased habituation of bears is possible from successive years of construction work and human presence along the Road. This can lead to increased incidences of human/bear contact and conflicts that can ultimately result in the removal or death of bears. Management measures would be implemented to minimize the potential for bear/human conflicts during construction, including strict policies for construction crews on the storage and disposal of food, construction materials, petroleum products, human waste, and other possible attractants.

Overall, rehabilitation of the Road is expected to have moderate, short-term adverse effects on grizzly bears for all alternatives. Direct impacts to habitat would be negligible to minor, but indirect effects on grizzly bear behavior, foraging patterns, and movement could be moderately adverse during construction. As a result, the proposed Road rehabilitation for all alternatives may affect and is likely to adversely affect, grizzly bear and its habitat. This determination is based on: 1) the large-scale nature of the activity at multiple locations in non-denning habitat; 2) the timing of construction during the important foraging periods in the spring, fall, and occasionally at night; 3) the potential for increased use of attractants; and 4) the slight increase in mortality risk to grizzly bear from construction. Conservation measures would be implemented during rehabilitation to minimize effects to grizzly bear. These measures, as further described in Chapter 2, include: enforcement of speed limits; measures to reduce potential for bear/human conflicts; enforcement of wildlife feeding regulations; and additional staff monitoring of grizzly activity during construction.

Effects of Alternative 1 (Repair as Needed). Completion of Road rehabilitation work over 50 years would introduce continuous annual construction activity. Work zones would be smaller than for alternatives that complete the work sooner, but the continued presence of construction activity over a long period could increase the potential for grizzly bear habituation of human activity. This would have a minor to moderate, long-term adverse effect on grizzly bears within the Park.

Effects of Alternative 2 (Priority Rehabilitation). Impacts to grizzly bears for Alternative 2 would be similar to those for Alternative 1. Minor to moderate, long-term adverse effects to grizzly bears are possible from implementing Road rehabilitation work over 20 years.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). These alternatives would introduce additional construction-related disturbance to the environment from implementation of visitor use improvements. A minor long-term loss of grizzly bear habitat would occur from parking and pullout improvements, transit staging area parking, trail construction, toilets, and other small disturbances.

Improvements would typically be implemented during the same time that Road rehabilitation work is being done for a particular location, so a substantial increase in noise or human activity above that common to all alternatives is not expected. The expansion of transit service for Alternatives 3 and 4 would have a negligible beneficial effect on grizzly bear activity near the Road by reducing traffic. The Shared Use and Accelerated Completion alternatives would have a moderate, short-term adverse effect on grizzly bears during construction.

Gray Wolf — Endangered

Effects Common to All Alternatives. No gray wolf occupancy is known in the Going-to-the-Sun Road corridor, although a denning site was located within 2-miles of the Road in 2001 and pack activity has been observed in the lower Middle Fork of the Flathead River drainage, the lower McDonald Valley, and St. Mary Valley. Rehabilitation of the Road for all alternatives would have no direct effect on existing pack territories. Should new packs become established or existing packs expand their range near the Road, rehabilitation work could have a minor short-term effect on wolf activity. Given the year-round presence of deer and elk in the McDonald Valley, this area contains suitable habitat for wolves, although the high level of existing human use and associated development may limit their activity in this area. Wolves tend to avoid humans and areas near high use roads, especially when people are present (Mech 1989).

None of the alternatives would alter habitats or human use patterns in or near areas that could potentially serve as den or rendezvous sites in the future. Disturbance associated with proposed construction activities is not expected to influence ungulate population trends or distribution. Use of the area by ungulates during the construction season is expected to continue at current levels. Transient wolves traveling or hunting in the project area have the potential to be displaced by construction activities. Because the proposed construction activities would result in no long-term disturbance or loss of suitable habitat, adverse effects on wolves are expected to be minor.

Each of the alternatives may affect, but are not likely to adversely affect gray wolves. This effect would likely be manifested by temporary avoidance of the project area by wolves during diurnal periods of active construction and routine maintenance. This determination is based on several factors including: 1) no anticipated change in wolf mortality risk; 2) ungulate populations would not be affected; 3) the distance of the project area from the nearest den or rendezvous site; and 4) no alterations of habitat would occur.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). Implementation of Road rehabilitation over 50 years for Alternative 1 or 20 years for Alternative 2 would result in less annual construction work, but extension of the work over a longer time. Potential effects on wolf activity from small annual disturbances over a long period compared to more extensive disturbance over a shorter period is difficult to predict. Each phase of construction is expected to have an indirect minor short-term effect on wolf activity near the Road.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Proposed visitor use improvements for these alternatives would add construction disturbance and human activity at pullouts, toilets, and other facilities. Minor long-term direct loss of wolf or prey habitat would occur with construction of transit parking, new slow-moving vehicle turnouts, and trails.

Similar to Road rehabilitation effects, visitor use improvements would have an indirect minor short-term effect on wolf activity near the Road during construction and from continued human activity at these sites. Construction of new short trails adjacent to the Road would add additional human activity into the natural environment, but trails would be limited to existing visitor use zones to minimize potential effects.

Lynx —Threatened

Effects Common to All Alternatives. Lynx distribution and presence in the Park is not well known, but survey data suggests lynx use of the project area and habitat suitability is low. No den sites or evidence of denning activity has been observed along the Road corridor. No studies have examined the effects of construction activities on lynx behavior, although several authors have suggested that lynx are "generally tolerant of humans" and probably not displaced by human presence, including moderate levels of snowmobile traffic (Ruediger et al. 2000). Snow plowing to open the Road for construction in the late winter and spring, or to keep it open later in the fall, may facilitate access by competing predators (coyotes, mountain lions) to higher elevation habitats not usually available to them. This would increase competition with lynx for scarce forage resources (hares) and could influence survival and production of young.

Proposed rehabilitation would not alter habitats or human use patterns in or near areas that could potentially serve as den sites in the future. Construction during the denning period (May to August) has the potential to disturb lynx denning, but effects are expected to be negligible to minor given their preference for den sites in forested areas away from roads and existing developed areas. Forest cover likely provides lynx with visual and auditory insulation from human activities including construction.

Neither minor alternations of vegetation within the project area, nor changes in human activity patterns associated with construction is expected to influence prey species population trends or distribution, human access levels, or the range of lynx competitors and/or predators, except as previously discussed with possible early and late season snowplowing. The Road width would remain in the same location and hence, no additional barriers to lynx movement or disruption in the connectivity of habitat would occur. Most construction activities would occur during daylight hours when lynx are less active, with most night construction done at lower elevations. There would be no affect to lynx in the winter.

Rehabilitation of the Road may affect, but is not likely to adversely affect lynx that hunt or travel in the project area. This effect would likely be manifested by temporary avoidance of the project area by lynx during diurnal periods of active construction and routine maintenance would result in a negligible direct loss of suitable lynx foraging habitat. This determination is based on the following factors: 1) the limited area affected and the availability of displacement areas; 2) no anticipated change in lynx mortality risk; 3) snowshoe hare populations would not be significantly affected; 4) no expansion of the range of competitors and or predators would occur; and 5) no alterations of critical lynx habitat.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). Implementation of Road rehabilitation under Alternatives 1 and 2 would extend work over a longer period of time. The effect of small annual construction disturbances on lynx activity is not known, but may result in minor to moderate short-term displacement of lynx activity near the Road.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Implementation of visitor use improvements for these alternatives would result in a negligible long-term loss of lynx foraging habitat. Habitat loss would be located near the existing Road and visitor use facilities that are unlikely to provide essential components to lynx habitat requirements. The connectivity of lynx habitat would be maintained. There would be no loss of denning habitat. Human activity associated with visitor use improvements may have a negligible to minor long-term effect on lynx movement or activity near these sites because improvements are located near existing areas of human activity.

Construction of less than 1 mile (1.6 kilometers) of new trails could affect lynx or prey activity near the trails, but trails would be located within existing visitor use zones near the Road to minimize effects. Expansion of transit service for Alternatives 3 and 4 would slightly reduce the number of private vehicles and the potential for lynx/vehicle collisions. Construction of a transit staging area near Apgar would result in a minor long-term loss of forest habitat, but because of its proximity to the Road, this facility is unlikely to affect lynx foraging or movement.

Bull Trout —Threatened

Effects Common to All Alternatives. Rehabilitation of the Going-to-the-Sun Road for all alternatives would result in soil disturbances, erosion, and possible sedimentation of streams and lakes. Minor short-term impacts to bull trout and their habitat would occur at localized construction sites both east and west of the Continental Divide. Potential direct effects would primarily occur where the Road parallels or crosses Lake McDonald, McDonald Creek, St. Mary Creek, St. Mary Lake, and Divide Creek, and where the Road crosses tributaries. Erosion and sediment control measures would be used to capture sediment on site and minimize introduction into water bodies. Indirect adverse effects to bull trout from long-term construction-related improvements would be minor following revegetation of disturbed areas. A minor long-term beneficial improvement to bull trout would occur throughout the Road corridor from improvements in Road drainage that reduce erosion and sedimentation. The NPS would conduct additional surveys for the presence of bull trout in each agreed-upon creek, where additional information is needed in consultation with the FWS

Rehabilitation of the Road for all alternatives may affect, but is not likely to adversely affect bull trout. The effects would be related primarily to the short-term introduction of sediments into water bodies at localized construction sites. Planned implementation of erosion and sediment control measures, avoidance of aquatic habitat and spawning areas, and improvements to drainage facilities would minimize impacts. Chapter 2 includes conservation measures that are an integral component of the proposed action to avoid and minimize impacts to bull trout and other native fish.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). Potential impacts to bull trout for Alternative 1 and Alternative 2 would be the same as those common to all alternatives, except adverse and beneficial effects would be spread over 50 and 20 years, respectively. Thus, indirect adverse effects to aquatic resources from erosion and drainage deficiencies would continue and possibly become worse if rehabilitation is delayed.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Proposed improvements to pullouts and parking areas at several locations adjacent to the Road would result in ground disturbances that would increase the potential for sediment entering nearby streams or lakes. Improvements at existing pullouts would not substantially change parking capacity and are not expected to increase angling or impact bull trout or other aquatic resources.

Construction of additional slow-moving vehicle turnouts along Lake McDonald and St. Mary Lake has the potential to result in localized minor short-term effects on bull trout during construction. No adverse long-term effects to aquatic life are likely from roadside pullouts.

Construction of short new connector trails near the Road and visitor developments have the potential for indirect effects to bull trout from erosion and sedimentation. Adverse effects would be short term and negligible. Establishment of short formal trails at Red Rock Point, Logan Creek, and other pullouts to replace multiple existing social trails would be a minor long-term beneficial effect to bull trout by reducing soil erosion and stream sedimentation. Construction of a pedestrian bridge over Avalanche Creek would have a minor short-term effect to bull trout habitat from incidental streambank disturbance.

New and rehabilitated toilets would be designed to contain all waste and prevent the introduction of pollutants into the aquatic environment. As a result, there would be no effect on bull trout. Other visitor use improvements including installation of orientation and information stations, interpretive exhibits, and construction of the transit system parking would have negligible short-term effects on bull trout and aquatic resources for both Alternatives 3 and 4.

Plants

There are no known federally listed threatened or endangered plant species and only one known candidate plant species in GNP. Implementation of any of the alternatives would have no effect on water howellia, Spalding's campion, or slender moonwort. Water howellia is a wetland-dependent plant that maybe present in the Park, but there are no recorded observations in the project area. Likewise habitat for Spalding's campion is present in east side grasslands, but surveys have not detected this threatened plant in the Park. Slender moonwort, a candidate species for listing, has been located at two sites in the Park and outside the Park near St. Mary, but not within the Going-to-the-Sun Road corridor. Surveys for slender moonwort would be conducted in suitable habitat prior to each phase of construction. If located, conservation measures would be implemented to avoid or minimize impact to this species.

Wildlife and Plants —Species of Concern

There are 63 wildlife and aquatic species of concern and 64 plant species of concern within the Going-to-the-Sun Road corridor (Appendix C). Suitable habitat for several of these species is known to occur in close proximity to the Road and potential species or habitat effects are possible from rehabilitation work for all alternatives. In general, wildlife species of concern could be temporarily displaced or disturbed during construction. Potential direct effects to wildlife of special concern or their habitat would be minor because most work would occur within the existing Road prism. Direct effects to plant species of concern are possible, and future surveys would be conducted to evaluate site-specific effects.

Effects Common to All Alternatives.

<u>Rocky Mountain Bighorn Sheep and Mountain Goats</u>. Proposed Road rehabilitation would have a minor to moderate short-term effect on bighorn sheep and mountain goats present along the cliffs between The Loop and Logan Pass. Construction activity throughout the spring, summer, and fall may displace sheep and goat activity near the Road; however, many of these animals have become acclimated to traffic and human activity. The timing of construction activities, including night work, would be modified at some locations to minimize potential effects.

<u>Golden Eagle</u>. The noise and disturbance associated with Road rehabilitation would have a moderate short-term effect on golden eagle nest sites between Avalanche and Logan Pass. There would be no direct loss of habitat, but eagles could be displaced by construction-related noise. However, golden eagles are tolerant of existing traffic and noise during the summer. A negligible to minor short-term effect on annual migratory golden eagle movement through the Park would occur from Road rehabilitation.

<u>Harlequin Duck</u>. Suitable harlequin duck habitat throughout the McDonald and St. Mary valleys is in proximity to the Road. Rehabilitation work on the Road is not expected to directly degrade riparian and river habitat used by harlequin ducks. Because harlequins typically seek breeding habitat away from human disturbance, additional human activity and noise could displace ducks from some construction locations and reduce available nesting and brood-rearing sites. This may affect the number of young produced, especially on McDonald Creek. Harlequin duck use of McDonald Creek near the Logan Pit staging areas also could be affected by additional construction activity at this site. At least one nesting pair has a territory in the vicinity of Logan Pit and additional brood rearing by more than one female occurs in this area. Potential impacts during construction could cause abandonment of a nest site and displacement from foraging and brood rearing habitat. A vegetation buffer would be maintained between the creek and the staging area to minimize impacts. Overall, a moderate long-term effect to harlequin duck would occur from staging activities and continued use of Logan Pit as a maintenance yard following rehabilitation.

Wolverine. Wolverines are currently petitioned for listing as a threatened or endangered species, but no determination has been made. Wolverines are a wide ranging species that may visit a wide variety of forest and subalpine habitats near the Road, including ungulate winter range sites in search of carrion in the winter. In GNP, wolverines appear to use areas of lower elevation during late winter and early spring, and higher elevations areas in late spring (Yates 1994). Although wolverines typically avoid areas of human activity, some level of habituation to human activity is likely based on the reported number of sightings. Rehabilitation of the Road would not eliminate wolverine habitat, nor is it expected to affect availability of food sources. Proposed construction work, particularly at night, may displace wolverine activity near the Road. Road rehabilitation may affect, but is not likely to adversely affect wolverines. Impacts are expected to be minor and short term during construction.

Westslope Cutthroat Trout. The westslope cutthroat trout has been petitioned for listing as a threatened or endangered species, but no determination has been made. Westslope cutthroat trout in GNP are residents in both streams and lakes and include migrants that travel from locations outside the Park to spawn in tributary streams within the Park. Spawning occurs in the spring from May to June. Proposed Road rehabilitation may result in the temporary increase in sediment delivery to water bodies near the construction sites. Increased sediment loads have the potential to affect water quality and minor short-term impacts to trout habitat, but planned use of erosion and sediment control measures should minimize impacts. Work on drainage crossings would be confined to the late summer and fall months when water levels are low, which would reduce the potential for impacts to cutthroat spawning. A long-term minor beneficial improvement in aquatic habitat for westslope cutthroat trout is anticipated with proposed drainage improvements, including provisions for fish passage.

Fisher, Northern Goshawk, Pileated Woodpecker, Hammond's Flycatcher, Winter Wren, Brown Creeper, Great Gray Owl, Vaux's Swift, Olive-Sided Flycatcher, Three-toed Woodpecker, Northern Hawk Owl, Silver-haired Bat, Boreal Owl, Clark's Nutcracker, and Ruffed Grouse. There would be negligible impacts to forest habitat used by these species. Construction-related disturbances may result in a minor short-term displacement near the Road.

Northern Bog Lemming, Willow Flycatcher, Black Tern, Black-crowned Night Heron, and LeConte's Sparrow. Disturbance to wet meadows, bogs, riparian, and marsh borders would be avoided. As a result, Road rehabilitation would have negligible to minor short-term effects on these species.

White-tailed Ptarmigan. No loss of alpine habitat is expected and impacts to ptarmigan would be negligible to minor and short term.

Ferruginous Hawk, Lark Bunting, McCown's Longspur, Marbled Godwit, Chestnut Collard Longspur, and Swift Fox. Disturbance to grasslands and shrublands used by these species would be slight. Potential impacts from Road rehabilitation would be negligible and short term.

Common Loon, Barrow's Goldeneye, and Hooded Merganser. These species require streams, riparian forests, and lake habitats. Disturbance from construction activity would have a minor short-term effect on breeding or productivity because of the minimal disturbance of primary habitat.

Hoary Bat, Townsend's Big-eared Bat, Black-Backed Woodpecker, Cordilleran Flycatcher, and Williams Sapsucker. Minimal disturbance would occur to the mixed montane and riparian forests that these species prefer. Road rehabilitation would result in minor short-term effects to these species.

Trumpeter Swan, Long-billed Curlew, Common Tern, Forster's Tern, Franklin's Gull, Caspian Tern, Horned Grebe, and American White Pelican. Lakes, ponds, rivers, and streams provide staging during migration for these species. A minor short-term negative effect to these species is possible if construction related disturbance deters migration stopovers.

Veery and Red-Eyed Vireo. Potential impacts to these species would be negligible to minor and short term because of the limited disturbance to riparian deciduous forest.

Loggerhead Shrike. Minor short-term effects to this species are likely because of the minimal disturbance to sagebrush and upland woodlands.

Lewis's Woodpecker. Construction-related disturbance would have minor short-term effects to Lewis woodpecker and there would be no loss of low elevation, early seral, burned forests preferred by this species.

Lazuli Bunting and Calliope Hummingbird. Impacts to these species would be minor and short term with minimal disturbance to suitable breeding habitat in early seral montane and lower montane, shrub-dominated communities.

Brewer's (Timberline) Sparrow. Disturbance to subalpine shrubs and krummholz habitat preferred by this species would be minimal. Potential impacts from rehabilitation would be minor and short term.

Peregrine Falcon and Black Swift. No cliff habitat suitable for these species would be affected. Construction activity would have a minor short-term effect.

Boreal Toad and Tailed Frog. Disturbance to the aquatic habitats used by these species would be avoided during Road rehabilitation. Adverse effects are expected to be negligible to minor and short term.

Shorthead Sculpin, Spoonhead Sculpin, and Trout-perch. Potential direct effects would occur where the Road parallels or crosses Lake McDonald, McDonald Creek, St. Mary Creek, St. Mary Lake, and Divide Creek. Potential temporary introductions of sediment would have a minor short-term effect.

Rocky Mountain Capshell. No disturbance to lake or pond habitat is anticipated from Road rehabilitation that would affect this species. Negligible short-term effects are possible during construction.

Plant Species of Concern. Detailed surveys for plant species of concern have not been conducted for the entire Going-to-the-Sun Road project area. Previous surveys of the Lake McDonald Lodge and the Rising Sun Development areas near the Road did not locate any plant species of concern. Surveys near Apgar have located the state rare velvet-leaf blueberry (*Vaccinum myrtilloides*). Prior to initiating rehabilitation work, field surveys would be conducted to identify plant species of concern that could be affected by roadwork. Should species of concern be located, barriers or other measures would be used to protect plant populations from inadvertent disturbance. If plant species of concern cannot be avoided, direct long-term effects are possible to individual plants. The intensity of the impact to the population of a particular species would be identified prior to construction, but efforts would be made to limit population impacts to a minor level.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). No impacts other than those common to all alternatives were identified.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). The disturbances associated with implementation of additional visitor use improvements would have impacts to wildlife and plant species of concern similar to that described for all alternatives. Because the majority of improvements would occur adjacent to the Road and would be implemented during Road rehabilitation, substantial additional impacts are not anticipated. Adverse effects to wildlife are expected to be negligible to minor and short term; however, moderate short-term effects to Rocky Mountain bighorn sheep, mountain goat, golden eagle, harlequin duck, and wolverine are possible. A population of a plant species of concern—velvet-leaf blueberry (*Vaccinium myrtilloides*)—is located near the proposed transit staging area at Apgar. The parking facility would be located to avoid this species; however, if avoidance is not possible, there would be a direct loss of individual plant species, and a minor to moderate short-term effect to the overall velvet-leaf blueberry population.

Construction of short new trails and rehabilitation of social trails would have a minor long-term effect on wildlife species of concern, although trails would be located within existing visitor service zones to minimize impacts. Surveys for plant species of concern would be conducted prior to final trail placement to avoid impacts.

Cumulative Effects

Cumulative effects to threatened and endangered species, and species of concern are possible for all alternatives. Regional development and roads have contributed to habitat fragmentation. Reasonably foreseeable roadwork planned for areas outside of the Park could coincide with rehabilitation work on the Road. The cumulative effect of multiple road projects is expected to have a minor effect on habitat because transportation work would occur within existing road corridors; however, a minor short-term disturbance or displacement of species is possible. Forest Service salvage operations at the Moose fire also may result in a temporary displacement of threatened and endangered species or species of concern, but the incremental effect of proposed Road rehabilitation would add only a minor short-term impact to these species.

Other planned roadwork in the Park and potential future improvements to Park facilities would introduce additional disturbance. The cumulative effect of these activities plus proposed Road rehabilitation would result in a minor short-term cumulative effect on threatened and endangered species and species of concern from displacement. Special events including the Lewis & Clark Bicentennial Commemoration and GNP Centennial are likely to increase visitation, possible backcountry travel and indirectly affect threatened and endangered species and species of concern for all alternatives. Similar effects are possible from general population growth, although Park visitation is projected to remain level.

Conclusion

For all alternatives, there would be a negligible to minor direct short-term impact on wildlife habitat used by threatened and endangered species or species of concern from incidental construction disturbance. There would be no effect to threatened or endangered plant species because there are no known populations in the Park. Alternatives 3 and 4 would attempt to avoid disturbance to velvet-leaf blueberry, a plant species of concern located near the proposed transit staging area at Apgar.

The noise, disturbance, and human activity associated with Road rehabilitation and implementation of visitor use improvements for

Alternatives 3 and 4 may affect several threatened and endangered species and species of concern. Minor short-term effects to bald eagle foraging are possible near Lake McDonald and St. Mary nest sites. Grizzly bear activity near the Road could be displaced or an increase in human/bear conflicts is possible from rehabilitation work in the fall and at night. This could result in a moderate short-term effect to grizzly bears. Visitor use improvements for Alternatives 3 and 4 would result in a minor long-term loss in grizzly bear habitat. Although gray wolf territories are not presently in the project area, additional noise and disturbance during construction could deter expansion of their range. A minor short-term effect to lynx foraging near the Road is possible from additional human activity. Minor short-term effects to bull trout and/or their habitat is possible from the introduction of sediment during proposed work, but long-term beneficial effects would occur with roadway drainage improvements.

In summary, the Preferred Alternative, and other alternatives would have no effect on Spalding's campion or water howellia, and may affect, but is not likely to adversely affect bald eagles, gray wolf, lynx, and bull trout. Proposed actions are likely to adversely affect grizzly bear.

Moderate short-term effects to several wildlife species of concern would occur from rehabilitation related disturbances. Rocky mountain bighorn sheep and mountain goats between The Loop and Logan Pass would be disturbed by construction activity. Potential disturbance to golden eagle nesting is possible in the Avalanche to Logan Pass area. Wolverine activity near the Road may be affected by rehabilitation work particularly where night work is conducted. Harlequin duck breeding sites adjacent to the Logan Pit staging area and other streamside areas may be displaced by construction staging activities. Minor short-term adverse effects to westslope cutthroat trout are possible from the introduction of sediments to water bodies, but a long-term beneficial effect is anticipated with improvements in drainage.

There would be no major adverse impact to threatened and endangered species or species of concern whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Air Quality

Methodology for Air Quality Effects

Impacts to air quality were qualitatively estimated based on the anticipated emissions associated with Road rehabilitation and visitor use improvements. No quantitative modeling of air quality effects was deemed necessary because all impacts are expected to be minor and short-term.

Effects Common to All Alternatives. All of the alternatives would have similar types of effects on air quality. In the short term, truck and equipment traffic and activity would increase dispersed dust and mobile exhaust emissions. Dust emissions are expected to be minor because of the limited excavation and soil exposure that would be needed for most work. Increased dust and emissions would occasionally be visible from the Road depending on the type of rehabilitation work being conducted. Additional dust would be generated if concrete batch plants are located at the Logan Pit or Sun Point staging areas. Dust from construction sites or staging areas may be visible from the Road and other nearby locations. The increased dust and emissions would occur during the construction period and would cease after construction is completed. Dust abatement measures would be implemented to minimize airborne particulates. Road rehabilitation is not expected to result in increased traffic or vehicle emissions after the construction period. A temporary local increase in pollutants would not result in exceedances of applicable air quality standards.

Effects of Alternative 1 (Repair as Needed). Air quality emissions from rehabilitation work would occur annually over 50 years. Emissions are expected to have a negligible to minor short-term effect on air quality or visibility. Because work conducted each year would be in relatively short segments of the Road, substantial dust and vehicle emissions are unlikely.

Effects of Alternative 2 (Priority Rehabilitation). Air quality emissions would be similar to Alternative 1, with minor short-term emission and visibility impacts near construction sites over 20 years. Operation of three additional transit vehicles would have a negligible beneficial effect on air quality by reducing the number of private vehicles traveling through the Park and overall vehicle emissions.

Effects of Alternative 3 — Preferred (Shared Use). Implementation of rehabilitation work over 7 to 8 years would require multiple construction sites and increase the potential for generating dust and emissions over a longer portion of the Road. Potential impacts to air quality and visibility are expected to be minor and short term at localized sites.

Proposed visitor use improvements such as the addition of slow-moving vehicle turnouts and scenic pullouts, and upgrades to parking and pullouts would require the use of heavy equipment and some soil disturbance that would generate increased vehicle emissions and particulate dust. Impacts to air quality from these activities would have a minor short-term effect on air quality and would not exceed air quality standards. The expansion of a transit bus transit system would have a minor beneficial effect on air quality by reducing private vehicle travel and associated emissions. Other proposed visitor use improvements would have a negligible effect on air quality.

Effects of Alternative 4 (Accelerated Completion). Impacts to air quality would be similar to Alternative 3, except that dust and emissions would occur over a slightly shorter period (6 to 8 years). Potential impacts to air quality and visibility are expected to be minor at localized sites. Expansion of a transit system would have a minor beneficial effect on air quality by reducing private vehicle emissions.

Cumulative Effects

The dust, emissions and potential impacts to visibility from rehabilitation work on the Road for all alternatives would have a negligible to minor short-term effect on regional air quality when added to the similar types of emission from other transportation projects outside of the Park. Minor short-term effects to air quality in the Park would occur from rehabilitation and visitor use improvement-related emissions in addition to other planned roadwork and facility improvements in the Park. A minor short-term impact on air quality is possible with increased visitation and traffic during the Lewis & Clark Bicentennial Commemoration and Park Centennial Celebrations.

Conclusion

Minor short-term impacts to air quality and visibility would occur for all alternatives from construction vehicle emissions and dust generation by rehabilitation work on the Road. Similar levels of impact would occur from implementation of visitor use improvements for Alternatives 3 and 4. Expansion of transit service for Alternatives 2, 3, and 4 would provide minor, long-term, beneficial effects to air quality by slightly reducing the number of vehicles and associated emissions.

There would be no major adverse impact to air quality whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, the proposed action would not impair Park resources or values.

Visual Quality

Methodology for Visual Quality Effects

The analysis of Going-to-the-Sun Road visual issues was based primarily on a comprehensive *Cultural Landscape Report* for the Road completed in 2002 (RTI 2002). This study examined the overall landscape qualities of the Road, identifying important and characteristic vistas and visual qualities. Information on the visual landscape of the Road was evaluated in conjunction with Road rehabilitation and design data contained in the *Engineering Study* completed for the Road in 2001 (WIS 2001a). Recently completed Road rehabilitation projects were also examined, to gauge the impact of such projects on the visual qualities of the Road.

Effects Common to all Alternatives

As discussed in Chapter 3, the visual landscape of the Going-to-the-Sun Road includes varied views both of the Road and from the Road; visual opportunities may also be characterized as either short-range or long-range views. Future Road rehabilitation projects are likely to impact these various visual qualities in differing ways. Visual impacts to the roadway corridor would be broadly similar for all alternatives. Precise visual impacts would vary somewhat depending on the specific project design chosen, and on construction methods employed.

Regardless of the alternative chosen, both short-term and long-term impacts would be expected. Short-term impacts would generally be adverse, falling into one of two broad categories:

- Impacts caused by Road rehabilitation projects; and
- Impacts resulting from the delay of needed Road rehabilitation.

Short-term visual impacts caused by Road rehabilitation projects would occur primarily within the roadway corridor itself, affecting short-range views both of and from the Road. Most would be negligible or minor in scope. Specific short-term visual impacts would include:

- Construction equipment and crews at specific work sites, and traveling along the Road;
- The temporary removal or covering of historic stonework or other features during rehabilitation; and
- The temporary use of equipment staging areas and/or material stockpile sites.

Visible damage to the historic structural and engineering features of the Road currently impacts the visual landscape of sections of the Road corridor.

Particularly on the Alpine portions of the Road, short-range views are diminished by extensive areas of damage that have impacted stone guardwalls, retaining walls, and other features. Due to a lack of resources, the NPS has been unable to fully repair much of the damage that has occurred. Instead, concrete "jersey barriers" and other temporary protective measures have been installed in some locations; almost always, these stopgap measures are incompatible with the historic visual character of the Road corridor. Other damaged areas have been only partially repaired, or have been repaired using modern materials. In many locations, these repairs and temporary protective measures are prominent visual intrusions. The visual impact of these intrusions is generally minor to moderate in scope, and will continue until Road rehabilitation is completed. Meanwhile, the effects of continuing deterioration and damage of historic resources will become increasingly apparent along non-rehabilitated segments of roadway.

Nearly all visual impacts would be limited to the immediate Road corridor, impacting short-range views. Staging and material storage areas beyond the Road corridor would also be required; however; depending on their locations, these areas may be visible either from the Road or from other vantage points. Adequate planning for the reclamation of these sites would limit their visual impact to a short duration.

Long-term impacts have the potential to be both adverse and beneficial. Adverse long-term impacts would largely be avoided with appropriate project designs. Moderate to major beneficial long-term impacts would result from the rehabilitation of deteriorated roadway engineering features, as well as from the removal of non-historic and visually intrusive features.

Effects of Alternative 1 (Repair As Needed). Visual impacts for Alternative 1 would include both the effects of construction projects and the visual degradation caused by the delay of needed repairs. Impacts caused by Road rehabilitation work would include those described as common to all alternatives. Because repair work would be piecemeal, and programmed in response to incidents of Road damage, visual intrusions would likely be apparent along the upper reaches of the Road annually, for an extended period of years. The precise impacts would be dependent on the nature of specific projects undertaken, and would vary from project to project and year to year. Impacts would be minor to moderate, although an unforeseen, catastrophic Road failure could result in a major impact.

Under Alternative 1, additional short-term adverse visual changes to the immediate Road corridor also would result as the roadway continues to deteriorate, causing further damage and the need for subsequent repairs. This alternative would extend the period in which visually intrusive temporary protective measures are present.

Overall, Alternative 1 would result in the greatest visual impact to the roadway corridor, since the duration of the rehabilitation work would be extended over 50 years and the cultural and visual resources in the roadway corridor would continue to degrade during that time.

Effects of Alternative 2 (Priority Rehabilitation). Alternative 2 would produce visual impacts similar to those described under Alternative 1, but because the rehabilitation period would be reduced to 20 years, the duration and severity of the impacts would diminish slightly. Coordinated planning of the overall rehabilitation process would allow for implementation of repairs to specific segments of roadway during individual construction seasons, although some disturbances (such as construction traffic) would be apparent throughout much of the roadway length. The specific nature of rehabilitation projects – and their visual impacts – would vary from year to year. Construction-related visual impacts would be short-term, and most would be minor in scope.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Visual impacts under Alternatives 3 and 4 would be similar in type to those found under Alternative 2, but the duration and scope of the effects would differ. The accelerated construction schedules of Alternatives 3 and 4 would reduce the duration of visual intrusions caused by prior Road damage, while simultaneously reducing the likelihood of current or future damage. Construction-related visual impacts would be of a shorter overall duration, but would likely be more pronounced while in place. As with Alternative 2, careful project planning would help minimize these impacts. All impacts would be short-term in duration, and minor to moderate in scope.

In addition to roadway rehabilitation, Alternatives 3 and 4 call for the development of improved visitor facilities – including toilets, improved pullouts and parking, and other features – at several key locations along the Road. The construction of these improvements would create minor, short-term impacts similar to those caused by roadway rehabilitation work. The addition of these visitor use improvements would also result in some long-term impacts. The development of additional, non-historic structures and facilities on the Road would create a minor, adverse visual effect. This would be partially offset by visual improvements resulting from improved traffic flow and lessened visual clutter. Long-term beneficial effects to visual quality would occur from rehabilitation of social trails, upgrades to existing pullouts, and improvements in visitor orientation and information facilities.

Cumulative Effects

Other Road improvements, developments, and planned activities in the Park may also affect visual resources in and near the Road corridor. If the Park's CSP is implemented, this may result in short-range visual impacts near the Road at the developed areas of Apgar, Lake McDonald, and Rising Sun. Some of the additional visitor use improvements outlined in Alternatives 3 and 4 would occur within these developed areas.

Because nearly all of the adverse visual impacts of the proposed Road rehabilitation would be short term, rehabilitation would have a negligible cumulative effect on visual resources. The additional visitor use improvements specified in Alternatives 3 and 4, when added to other actions, would have only a minor cumulative effect on visual resources.

Conclusion

Road rehabilitation for all alternatives would result in minor to moderate, short-term adverse effects to visual resources during the period of construction. The coincident repair of deteriorated roadway structural features, however, would result in a moderate to major beneficial effect to visual resources over the long term. The proposed visitor use improvements in Alternatives 3 and 4 would create a minor, long-term visual impact. Negative, short-term visual impacts are greatest for Alternative 1, and would be lowest for Alternatives 3 and 4. Long-term visual benefits would be seen from all alternatives, but would be realized most quickly in Alternatives 3 and 4.

There would be no major adverse impact to visual resources whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, the proposed action would not impair Park resources or values.

Natural Soundscape and Lightscape

Methodology for Soundscape and Lightscape Effects

Potential impacts to the natural soundscape and lightscape within the Park associated with proposed rehabilitation work were evaluated based on the anticipated noise and light typical for similar types of construction work previously conducted in the Park and other regional roads.

Effects Common to All Alternatives. Rehabilitation of the Going-to-the-Sun Road would introduce noise and artificial light into the Park during construction. Noise would be generated by construction equipment, machinery, work vehicles, and additional human activity in work zones and could occur from spring to fall both day and night. Noise would be loudest near the point of generation and would decrease with distance from the source. Noise from truck traffic would extend outside of the Park from delivery of construction material and work crews. Night construction activities would introduce artificial lights at work sites, which would brighten the night sky.

Noise from construction activity would have a minor to moderate short-term effect to the natural quiet typically present in the Park. However, roadwork would be conducted along the existing Road where noise from traffic is common. Elevated noise levels may affect the quality of the visitor experience as well as wildlife activity near the Road. Various measures would be used to minimize construction-related sounds including conducting heavy equipment operations during daylight hours, equipping construction equipment with adequate mufflers, and scheduling work activities to avoid early morning or night work near lodges, campgrounds, and sensitive wildlife habitats.

Artificial night lighting to conduct rehabilitation activities would result in a minor to moderate short-term impact on the night sky in the Park. Illumination of work zones may alter wildlife behavior and deter their normal night activity. In addition, the quality of the visitor experience may be diminished by artificial light in a normally dark sky. Night work would not be conducted near lodges and campgrounds and work zones would be limited to small-localized areas to minimize impacts to visitors and wildlife.

Effects of Alternative 1 (Repair as Needed). Night work may be necessary for the Repair as Needed alternative, but is less likely than for other alternatives. Should a catastrophic Road failure occur night work may be needed to repair the roadway as quickly as possible.

Effects of Alternative 2 (Priority Rehabilitation). As with Alternative 1, night work may be necessary to complete rehabilitation work, but because less work would be done per given year, the need for night work is less likely.

Effects of Alternative 3 (Shared Use) and Alternative 4 (Accelerated Completion). Night work would be used during Road rehabilitation for certain tasks primarily at lower elevation sites subject to safety requirements. The visitor use improvements included in Alternatives 3 and 4 would result in additional noise and disturbance during construction and implementation. It is anticipated that none of the visitor use improvements associated with Alternatives 3 and 4, such as pullouts and parking, would be constructed at night, so there would be no effect on the night sky within the Park. The noise and disturbance during implementation of improvements to pullouts, parking areas, toilets, trails and other locations would deter wildlife activity and visitor use near these sites. This would be a minor to moderate short-term effect during construction and mitigation measures similar to those described as common to all alternatives would be implemented. The expansion of transit shuttle service would have a beneficial, minor, short-term effect by reducing the number of vehicles on the Road and the associated traffic noise. An additional noise source at the proposed Apgar and St. Mary Visitor Center transit parking areas would increase ambient noise levels during the summer from traffic and visitor activity.

Cumulative Effects

Cumulative effects from noise and artificial night lighting are only relevant for reasonably foreseeable projects located within or near the Park and would be common to all alternatives. Other planned transportation work and future improvements to Park facilities may result in minor to moderate, short-term impacts to visitors and wildlife from the additive impact of multiple simultaneous noise sources. Project scheduling can probably be used to minimize construction activities at the same locations. Cumulative effects on the night sky would be limited to rehabilitation work, since no other planned projects within the Park would contribute additional artificial light at night.

Conclusion

A minor to moderate short-term increase in noise would occur for all alternatives during Road rehabilitation. This may disturb visitors as well as wildlife, but scheduling and other restrictions would be used to minimize impacts. Proposed additional visitor use improvements included in Alternatives 3 and 4 also would generate noise, but most improvements would be implemented at the same time and locations as other Road rehabilitation work.

Night lighting would be used primarily for Alternatives 3 and 4. The introduction of an artificial light source would have a minor to moderate short-term effect on the night sky and may affect the quality of the visitor experience and wildlife activities near the Road.

There would be no major adverse impact to natural soundscape and night sky whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

Wilderness and Wild and Scenic Rivers

Methodology used for Wilderness and Wild and Scenic Rivers

The first level of analysis for potential impacts to proposed wilderness and wild and scenic rivers near the proposed project was to determine if any direct impacts to these land classifications were anticipated. The second level of analysis was to consider if lands intended for wilderness or wild and scenic river uses would be indirectly affected during or following rehabilitation.

Effects Common to All Alternatives. None of the alternatives would result in direct disturbance or impacts to proposed wilderness or wild and scenic rivers in the Park. Noise from construction activities may carry into proposed wilderness areas that parallel the Road and would have a negligible to minor short-term effect on wilderness values.

Only a short segment of the Road at West Glacier intersects the Wild and Scenic-designated Middle Fork of the Flathead River. No direct impacts outside of the existing Road would occur within the designated wild and scenic river corridor. Indirect effects to the Middle Fork of the Flathead River are possible from increases in sediment discharge during rehabilitation work on the west side of the Continental Divide. Because Lake McDonald is located above the Middle Fork, it is very unlikely that water quality in the Wild and Scenic River would be affected. There would be no impact to the values for which the Middle Fork of the Flathead River was designated Wild and Scenic.

Effects of Alternative 1 (Repair as Needed) and Alternative 2 (Priority Rehabilitation). No additional effects to proposed wilderness or wild and scenic rivers were identified other than those common to all alternatives.

Effects of Alternative 3 — Preferred (Shared Use) and Alternative 4 (Accelerated Completion). Impacts to proposed wilderness and wild and scenic rivers from implementation of visitor use improvements would be similar to those common to all alternatives. No additional direct or indirect effects were identified for Alternatives 3 and 4.

Cumulative Effects

No cumulative effects to proposed wilderness or wild and scenic river values were identified.

Conclusion

There would be no direct disturbance to wilderness or wild and scenic rivers as a result of Road rehabilitation for all alternatives, including visitor use improvements in Alternatives 3 and 4. Minor short-term indirect effects are possible from noise intrusion into the wilderness. There would be no effect on the Middle Fork Wild and Scenic River designation.

There would be no major adverse impact to wilderness or wild and scenic rivers whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation of GNP; 2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or 3) identified as a goal in the GMP or other relevant NPS planning documents. Therefore, none of the alternatives would impair Park resources or values.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

The Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Effects of Alternative 1 (Repair as Needed)

Alternative 1 would not meet the present needs in such areas as infrastructure improvements and visitor management, and would not allow the Park to fulfill its mission of providing for the needs of future generations. Because of the duration of rehabilitation activity (50 years), further deterioration or loss of the historic features associated with the roadway could foreclose options for future preservation and use due to higher costs of rehabilitation. Additional environmental damage is highly possible. The costs and efficiency of repairing failed sections of roadway on a piecemeal or emergency basis would be substantially higher compared with larger scale planned rehabilitation work, which could reduce the amount of funding available for future generations.

Effects of Alternative 2 (Priority Rehabilitation)

While Alternative 2 is an improvement over Alternative 1, it would not meet the present needs in such areas as infrastructure improvements and visitor management, and could also compromise the ability of future generations to meet their needs. Some planning and design would occur ahead of time, rather than in response to Road failure or emergency repairs. Advanced planning ensures that historic cultural resources, environmental and socioeconomic concerns, and operations and maintenance issues are addressed, but implementation of Road repairs over 20 years would allow continued deterioration or loss of these resources. Potential environmental damage, jeopardy of safety, and deterioration of historic features would be similar to Alternative 1.

Effects of Alternative 3 — Preferred (Shared Use)

Rehabilitation under Alternative 3 would take place in a shorter period (7 to 8 years) than Alternatives 1 and 2, minimizing further damage to the environment and historic and cultural resources. Immediate benefits to the resources listed above may cause short-term effects to visitor experience, due to traffic delays from a more aggressive rehabilitation schedule. The long-term productivity of the Park and use of Park resources would not be compromised, and is expected to increase because of improvements that upgrade facilities and address safety concerns. Advanced planning allows for a more efficient and cost effective rehabilitation process, which would benefit future generations.

Effects of Alternative 4 (Accelerated Completion)

Under Alternative 4, rehabilitation would be completed in 6 to 8 years, helping to prevent further damage to the environment and historic and cultural resources. The aggressive rehabilitation schedule would result in traffic suspensions during the week in construction zones and maintenance of visitor access on the weekends. The long-term productivity of the Park and use of Park resources would not be compromised, and is expected to increase because of improvements that upgrade facilities and address safety concerns. In Alternative 4, the advanced planning and traffic suspension allows for the most efficient and cost effective rehabilitation process, which would benefit future generations. However, this alternative would have an adverse economic effect during rehabilitation, but would provide for long-term sustainability of the Road and economy dependent on tourism.

Irreversible and Irretrievable Commitments of Resources

Under all alternatives, the use of land, construction materials, energy, and financial resources to implement the alternative would be an irretrievable commitment of resources.

Effects of Alternative 1 (Repair as Needed)

Deterioration or loss of resources, especially cultural and historic resources, as a result of delay of rehabilitation could be irreversible commitments of resources. No irreversible or irretrievable impacts to wetlands, aquatic resources, water quality, air quality, natural soundscape or lightscape, wilderness, or wild and scenic rivers would occur because impacts would be short term. There would be minor irreversible or irretrievable impacts to geology and topography, vegetation, wildlife habitat, soils, or threatened and endangered species or species of concern because construction would take place primarily within the existing prism. A long-term irretrievable disturbance to resources would occur adjacent to existing facilities at site-specific locations where structural components, such as additional pavement or stonework, are added. While there would be socioeconomic impacts due to project implementation, they would not be long term in nature and therefore would not constitute irreversible or irretrievable commitments of resources.

Effects of Alternative 2 (Priority Rehabilitation)

The commitment of resources for Alternative 2 would be similar to those described in Alternative 1.

Effects of Alternative 3 — Preferred (Shared Use)

Under Alternative 3, there would be no irretrievable or irreversible impacts to aquatics and water quality, socioeconomic resources, wetland resources, air quality, natural soundscape and night sky, or wilderness and wild and scenic rivers. Because any impacts to these resources would be short-term, they would not constitute irretrievable or irreversible impacts. Construction of new facilities under Alternative 3 would result in irretrievable impacts to geology and topography, vegetation, wildlife habitat, soils, and threatened and endangered species and species of concern. These could be restored upon removal of those facilities, and are therefore classified as irretrievable impacts.

Effects of Alternative 4 (Accelerated Completion)

The commitment of resources for Alternative 4 would be similar to those described for Alternative 3.

Adverse Impacts That Cannot Be Avoided

Effects of Alternative 1 (Repair as Needed)

Adverse effects as a result of continued deterioration of cultural and historic resources are unavoidable under Alternative 1. Construction activities would delay and displace visitors to the Park who travel on the Road. Impacts to soils, vegetation, and water quality as a result of continued erosion during the 50-year rehabilitation period would be unavoidable adverse impacts. Adverse economic effects are possible from reduced visitation to the Park and region due to Road rehabilitation particularly if emergency repairs are needed.

Effects of Alternative 2 (Priority Rehabilitation)

Unavoidable adverse impacts for Alternative 2 would be similar to those described for Alternative 1.

Effects of Alternative 3 — Preferred (Shared Use)

Unavoidable adverse impacts to geology and topography, vegetation, wildlife habitat, soils, and threatened and endangered species habitat would occur under Alternative 3 as a result of new facilities. These impacts would be minimized and avoided to the extent possible in final design using BMPs. Inconveniences to Park visitors who travel the Road during construction would be unavoidable adverse impacts. Adverse economic effects to the local and regional economy would occur during rehabilitation work. These impacts are largely unavoidable, but visitor development strategies and other mitigation measures would be used to minimize impacts.

Effects of Alternative 4 (Accelerated Completion)

Unavoidable adverse impacts for Alternative 4 would be similar to those described for Alternative 3. Intensive rehabilitation efforts and traffic management under this alternative would result in unavoidable adverse economic effects to businesses from a reduction in Park visitation.

Chapter 5 Compliance with Federal and State Regulations

Historical photo of the Belton Bridge, constructed in 1920 over the Middle Fork of the Flathead River

Photo by R.E. Marble, CNPA #8151

The NPS will comply with all applicable federal, state, and local regulations when implementing improvements to the Going-to-the-Sun Road. Regulatory requirements for this project are expected to include the following permits and approvals:

National Environmental Policy Act (NEPA) and Regulations of the Council on Environmental Quality — The National Environmental Policy Act applies to major federal actions that may significantly affect the quality of the human environment. This generally includes major construction activities that involve the use of federal lands or facilities, federal funding, or federal authorizations.

This Environmental Impact Statement meets the requirements of the NEPA and regulations of the Council on Environmental Quality in evaluating potential effects associated with activities on federal lands. The DEIS was released for a 60-day public comment period. This Final EIS contains minor changes in response to comments including a formal response in Appendix D to substantial comments received on the DEIS. The NPS will prepare a Record of Decision (ROD) to document the decision on the proposed project and any modifications in the selected alternative 30 days after release of the FEIS.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) — Section 7 of the Endangered Species Act is designed to ensure that any action authorized, funded, or carried out by a federal agency likely would not jeopardize the continued existence of any endangered or threatened plant or animal species. If a federal action may affect threatened or endangered species, then consultation with the FWS is required. The NPS has initiated consultation with the FWS to determine the potential impacts on federally listed species from the preferred action. The results of the NPS evaluation on threatened and endangered species were documented in a Biological Assessment (BA) and Programmatic Agreement submitted to the FWS on February 14, 2003. The FWS will issue a Biological Opinion documenting its determination of effects to listed species prior to issuance of the Record of Decision.

The findings of the BA are based on the best data and scientific information currently available. If new information in the future reveals effects that may impact threatened, endangered, or proposed species or their habitats in a manner or to an extent not considered in this EIS or BA, or the proposed action is subsequently modified in a manner that causes a new effect, or if new species are listed or habitat is identified that may be affected by the action, a revised BA would be prepared.

The Programmatic Agreement allows annual consultations with the FWS and the preparation of brief BAs to address site-specific project impact assessments as details of final project design and implementation are refined for each phase of construction. If the Park concludes there are no changes from the original determination of effects to listed species in the BA, concurrence from the FWS would be requested on those species with a "may effect" determination. Should a determination of "not likely to adversely affect" change to "likely" based on the potential for new adverse effects, the Park would enter into formal consultation with the FWS.

Clean Water Act (CWA); Montana Stream Protection Act; and Executive Order 11990, Protection of Wetlands — The U.S. Army Corps of Engineers (COE) is responsible for authorizing the discharge of dredge or fill materials into waters of the U.S. including wetlands under Section 404 of the Clean Water Act. No loss of wetlands has been identified from project implementation. During each phase of final design and construction, the NPS would further evaluate potential impacts to wetlands and identify measures to avoid and mitigate if necessary. Should unavoidable impacts to wetlands occur, a Statement of Findings for Wetlands would be prepared and the Park would consult with the U.S. Army Corps of Engineers and FWS for any regulatory authorizations. Any modifications to the streambed also would require compliance with the Montana Stream Protection Act and submittal of a Form 24 application to the Montana Department of Fish, Wildlife and Parks.

Executive Order 11988, Floodplain Management —The proposed action is exempt from compliance with E.O. 11988. The use of low water crossings near Divide Creek would result in changes within the floodplain; however, proposed changes would be beneficial, and allow more natural flow and dispersion of floodwaters.

Montana Floodplain and Floodway Management Act — The Montana Department of Natural Resources or local floodplain administrator regulates construction activities in the 100-year floodplain. The Park would apply for a Floodplain Development Permit prior to any changes in the Road elevation within the Divide Creek floodplain.

Wild and Scenic River Act — In 1976, Congress designated the Middle Fork of the Flathead River as a part of the national Wild and Scenic River system. The Middle Fork is designated as "recreational" for the entire length bordering Glacier National Park. The Middle Fork of the Flathead River is jointly administered by the Forest Service and the NPS under the Wild and Scenic Rivers Act. In accordance with Section 7(b) of the Wild and Scenic Rivers Act (16 U.S.C.), the administering agency of the river is responsible to determine if a "water resources project" has "direct and adverse" effects on the values for which a river is recommended for designation. The NPS has a Memorandum of Agreement with the Forest Service (September 2001), which provides for U.S. Forest Service (Flathead National Forest) concurrence on NPS projects within Wild and Scenic River designated rivers. Consultation with the Forest Service is not required so long as projects within the Park do not affect the values of the Wild and Scenic River designations. The proposed Road rehabilitation would not affect the outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, and cultural values for which the river was designated. The proposed action would preserve the Flathead River in a free-flowing condition.

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et. seq.) —The Secretary of the Interior designated Going-to-the-Sun Road as a National Historic Landmark in 1997. Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800, require all federal agencies to identify and evaluate historic properties eligible for listing in the National Register of Historic Places and to assess the effects of undertakings on eligible properties. The regulations include special requirements for minimizing harm to National Historic Landmarks.

The regulations permit federal agencies to coordinate Section 106 compliance with the National Environmental Policy Act. The development of this Plan/EIS meets some of the consultation requirements of Section 106, but it does not meet the documentation standards required to support a finding of effect. This documentation will not be available until specific road rehabilitation construction documents are prepared. Glacier National Park has a long history of consulting with the Montana State Historic Preservation Office (SHPO) during road rehabilitation projects. Additionally, Glacier staff met with SHPO staff twice during the early planning phases for this document and provided SHPO staff an on-site tour outlining the general intent of the proposed road rehabilitation. Based upon past road rehabilitation projects and consultation with the SHPO, Glacier does not anticipate an adverse effect on the National Historic Landmark qualities of the road.

Glacier National Park would consult with the Montana State Historic Preservation Officer and, as appropriate, the Advisory Council on Historic Preservation during the development of construction drawings for specific road sections. Section 106 compliance procedures would be completed prior to each phase of construction.

This page intentionally left blank.

Chapter 6
Consultation and Coordination

This section includes a list of prepares and contributors to the EIS and a list of recipients of the Draft EIS. Information on public involvement, the scoping process, and key issues is included in Chapter 1.

LIST OF PREPARERS AND CONTRIBUTORS

Name/Title	Responsibilities	Education	Experience
NATIONAL PARK SERVICE — GLACIER NATIONAL PARK			
Michael Holm Superintendent	EIS Document Review	B.S. Health and Recreation	27 years
Jerry O'Neal Assistant Superintendent	EIS Document Review	B.S. Entomology/Ecology M.S. Advanced Biochemistry M.S. Toxicology/Systems Ecology	37 years
Peter Hart Former Acting Superintendent	EIS Document Review	M.A. Physical Geography and Conservation A.B. Geography and Biology	34 years
Suzanne Lewis Former Superintendent	EIS Document Review	B.A. American History	22 years
Denis Davis Former Assistant Superintendent	EIS Document Review	B.S. Wildlife Biology M.S. Outdoor Recreation	24 years
Fred Babb Chief, Project Management	Project Manager	B.L.A. Landscape Architecture and Planning	35 years
John Kilpatrick Chief, Facility Management	EIS Document Review	B.S. Engineering	17 years
Mary Riddle Cornell Environmental Protection and Compliance Specialist	Document Review, NEPA Compliance, Public Participation	B.S. Environmental Studies	19 years
Jack Gordon Landscape Architect	EIS Document Review	B.L.A. Landscape Architecture	17 years
Jack Potter Assistant Chief, Resources Management	EIS Document Review	B.A. Political Science B.S. Forestry	28 years

Name/Title	Responsibilities	Education	Experience
Jan Knox Chief, Concessions Management	EIS Document Review	B.S. Business Administration	21 years
Tara Carolin Ecologist	EIS Document Review and Compilation	M.S. Wildlife and Range Resources	9 years
Jennifer Asebrook Biological Sciences Technician	EIS Vegetation, Wetlands	M.S. Plant Ecology	11 years
Gordon Dicus Biological Sciences Technician	EIS Vegetation, Wetlands, Aquatics	M.S. Wildlife Biology in Progress B.S. Biology	3 years
Kimberly D. Frymire Biological Sciences Technician	EIS Vegetation	B.S. Biology B.A.E. Secondary Education	4 years
Steve Gniadek Wildlife Biologist	EIS Wildlife	M.S. Wildlife Biology	29 years
Meg Hahr Biological Sciences Technician	EIS Wildlife, Aquatics	M.S. Environmental Studies	5 years
Joyce Lapp Supervisory Horticulturist	EIS Vegetation	B.S. Soils Science B.S. Horticulture	15 years
Leo F. Marnell Senior Scientist	EIS Aquatics	Ph.D. Aquatic Ecology	28 years
Lon Johnson Cultural Resource Specialist	Cultural Resources	B. Architecture	21 years
William Michels Biologist	EIS Aquatics	B.A. Park Administration	30 years
Rick Yates Biological Science Technician	EIS Wildlife	M.S. Wildlife Biology	22 years
Amy Vanderbilt Public Affairs Officer	Public Participation	B.S. Park Administration B.S. Biology	24 years
Richard Menicke GIS Manager	GIS Mapping Support	M.S. Environmental Sciences	10 years
Dick Gatten Federal Highway Administration	Design Operations Engineering	B.S. Civil Engineering	35 years
Peter Field Federal Highway Administration	Transportation Planner	MS. Civil Engineering/Transportation Planning B.S. Construction Engineering/Management	12 years
Anne Dunning Ford Transportation Scholar	Transportation Planner	M.S. Civil Engineering/Transportation	10 years

Name/Title	Responsibilities	Education	Experience
ERO RESOURCES CORPORATION			
Mark DeHaven Senior Natural Resource Specialist	Project Manager	M.S. Natural Resources B.A. Business	24 years
Aleta Powers Natural Resource Specialist	Cumulative Effects	B.A. Geography/Sociology	8 years
Andy Cole Natural Resource Specialist	Natural Resources	M.F.S. Forest Science	10 years
Janelle Luppen GIS Specialist	Maps and Graphics	B.A. Land Use (GIS emphasis)	5 years
Mark Bina Graphics Designers	Graphics	B.S. Art	20 years
Martha Clark Technical Editor	Technical Editor; Document Production	B.A. English	16 years
Tonya Bartels Editor	Technical Editor	B.S. Chemistry M.S. Analytical Chemistry	11 years
BBC RESEARCH & CONSULTING, INC.			
Doug Jeavons Managing Director	Project Manager	M.S. Economics B.A. International Relations	16 years
James Carpenter Associate	Fiscal Analysis and Community Resources	M.P.P. Public Policy B.A. History	5 years
Marc Carey Associate	Socioeconomic Impact Assessment	Ph.D. Natural Resource Economics B.A. Government	12 years
Lloyd Levy Associate	Socioeconomic Affected Environment	M.B.A Business Administration B.A. History	15 years
Cary Laffer Research Associate	Visitation Analysis	B.A. Economics	3 years
RENEWABLE TECHNOLOGIES INC.			
Mark Hufstetler	Cultural and Visual Resources	M.A. History	18 years
WASHINGTON INFRASTRUCTURE SERVICES			
Mark Bancale	Project Manager, Engineering and Transportation/Visitor Use	B.S. Civil Engineering	13 years
Joe Kracum	Project Manager, Engineering Study, EIS Document Review	B.S. Mining Engineering	27 years
COLEY-FORREST			
Jean Townsend	Survey Research; Review Socioeconomic Analysis	M.A. Economics B.A. Economics	25 years

AGENCIES, ORGANIZATIONS AND INDIVIDUALS TO WHOM THIS EIS WAS SENT

Public officials, agencies, and organizations that received the Going-to-the-Sun Road Rehabilitation Plan/Environmental Impact Statement are listed below.

Elected Officials

Max Baucus, United States Senate
Blackfeet Tribal Business Council
Confederated Salish and Kootenai Tribal Council
Conrad Burns, United States Senate
Flathead County Commissioners
Glacier County Commissioners
Lake County Commissioners
Judy Martz, Governor of Montana
Dennis Rehberg, United States House of Representatives

Federal Agencies

Advisory Council on Historic Preservation
Bureau of Indian Affairs
Department of Interior, Intermountain Region
Department of Interior, Office of the Solicitor
Environmental Protection Agency
U.S. Forest Service, Flathead National Forest
U.S. Forest Service, Kootenai National Forest
U.S. Forest Service, Lewis and Clark National Forest
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

Canadian Government Agencies

Department of Forestry, British Columbia and Alberta
Parks Canada, Regional Office
Waterton Lakes National Park

State and Provincial Agencies

Montana State Historic Preservation Office
Montana State Clearinghouse
Montana Department of Environmental Quality
Montana Department of Fish, Wildlife and Parks
Montana Department of Transportation

Organizations/Businesses

Alberta Community Development
Backcountry Horseman
Belton Chalets, Inc.
Browning Public County Library
Chinook Tourist Association, Alberta
Coalition for Canyon Preservation
Columbia Falls Branch Library
Columbia Falls Chamber of Commerce
Crowsnest Pass Chamber of Commerce, Town of Cardston, Alberta, Canada
Cut Bank Library
Daily Inter Lake
Environmental Media Sources
Flathead Valley Convention and Visitor Bureau
Flathead County Library
Flathead Economic Development Corporation
Flathead Regional Development Office
Friends of the Bitteroot
Friends of the Wild Swan
Glacier Park Boat Company
Glacier Country Regional Tourism Commission

Glacier Natural History Association
Glacier Park Associates
Glacier Park Foundation
Glacier Park, Inc.
Glacier Pilot
Glacier-Waterton Visitor Association
Glacier Wilderness Guides, Incorporated
Going-to-the-Sun Road Advisory Committee
Great Falls Public Library
Great Falls Tribune
Hungry Horse News
Kalispell Chamber of Commerce
Lethbridge Herald, Alberta, Canada
Missoula Public Library
Missoulian
Montana Wilderness Association
Montanan's for Multiple Use
Mule Shoe Outfitters, LLC.
National Parks Conservation Association
Sun Tours
Waterton Natural History Association
Waterton Park Chamber of Commerce and Visitors Association
Waterton Visitor Services Corporation
Waterton Inter-Nation Shoreline Cruise Company, LTD.
Whitefish Branch Public Library
Whitefish Chamber of Commerce
Wilbur Force - Bozeman
Wild Wilderness
Wilderness Society, Northern Rockies Regional Office
Wilderness Watch

A complete listing of agencies, organizations, public officials, and individuals whom a copy of the Draft Going-to-the-Sun Road Plan/Environmental Impact Statement is on file at Glacier National Park.

This page intentionally left blank.

Chapter 7
References

Alberta Municipal Affairs. 2002. County budgets, municipal profiles and Bank of Canada currency conversion. 2002.

Babb, F. 2002. Project Manager, National Park Service—Glacier National Park. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

Barrett, S.W. 1997. Fire history of Glacier National Park: Middle Fork of the Flathead River Drainage. Prepared by Systems for Environmental Management under contract for the National Park Service. On file at Glacier National Park.

Barron, B. 2002. Personal communication with Doug Jeavons, BBC Research & Consulting. March 19.

BBC (BBC Research & Consulting). 2003. Data analysis for Going-to-the-Sun Road Final Environmental Impact Statement.

Boyd-Herger, D. 1997. Dispersal, genetic relationships, and landscape use by colonizing wolves in the Central Rocky Mountains. PhD. Diss., University on Montana, Missoula, MT.

Brazda, L. 2002. District Engineer, Montana Department of Transportation, Kalispell, MT. Personal communication with Aleta Powers, ERO Resources Corp., January 14 and April 9, 2002.

Brittel, J.D., R.J. Poelker, and S.J. Sweeney. 1989. Native cats of Washington. Washington Department of Wildlife, Olympia, WA.

Brown, D.E. 1985. The grizzly in the southwest. Norman, OK: University of Oklahoma Press.

Bureau of Economic Analysis. 2001. Regional Economic Information System. Available from the Census and Economic Information Center, Montana Department of Commerce. Rates calculated by BBC Research & Consulting. <http://ceis.commerce.state.mt.us>.

Carlin, R. 2002. NEPA expert, Flathead National Forest, Kalispell, MT. Personal communication with Aleta Powers, ERO Resources Corp., January 16.

Census (U.S. Bureau of the Census). 1990. Decennial Censuses. Available from Census and Economic Information Center, Montana Department of Commerce <http://ceis.commerce.state.mt.us>.

Census (U.S. Bureau of the Census). 2000a. Decennial Censuses. Available from Census and Economic Information Center, Montana Department of Commerce <http://ceis.commerce.state.mt.us>.

Census (U.S. Census Bureau). 2000b. Poverty and household income estimates from U.S. Census Bureau, Housing and Household Economic Statistics Division, Small Area Estimates Branch. Rates calculated by BBC Research & Consulting.

Census (U.S. Census Bureau). 2002. Data available from Census and Economic Information Center, Montana Department of Commerce. Rates calculated by BBC Research & Consulting.

Coley-Forrest. 2002. Glacier National Park 2002 Survey of Visitors. Prepared for Glacier National Park, West Glacier, MT.

Daily Inter Lake. 2002. Newspaper article, February 7.

DeArment, J. 2001. Wetland delineation in Glacier National Park Developed Zone, CESU Technical

Assistance Project 2000/2001. University of Montana.

DeBolt, A. and B. McCune. 1993. Lichens of Glacier National Park, Montana. The Bryologist 96:192-204.

Dupont, J. 2002. Flathead County Sheriff. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

Dutton, B., J. Hadlock, M. Arthur, D. Marrett, A. Goldin, and A. Zhu. 2001. Soils of Glacier National Park. Prepared for Glacier National Park by Land & Water Consulting, Inc. Missoula, MT.

Edgar, C. 2002. Director, Flathead Valley Convention and Visitor Bureau. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

Edmonds, A. 2002. Gray wolf monitoring observations in Glacier National Park. Division of Natural Resources, Glacier National Park, West Glacier, MT.

Elliott, J.C. 1987. Preliminary report on the ecology and distribution of mosses in Glacier National Park, Montana. Unpublished report on file at Glacier National Park.

Ellis, B.K., J.A. Stanford, J.A. Craft, D.W. Chess, G.R. Gregory, and L.F. Marnell. 1992. Monitoring water quality of selected lakes in Glacier National Park, Montana: Analysis of data collected, 1984-1990. Open File Report 129-92 in Conformance with Cooperative Agreement CA 1268-0-9001, Work Order 6, National Park Service, Glacier National Park, Montana. Flathead Biological Station, The University of Montana, Polson.

Elze, L. 2002. Threatened, endangered, and species of concern wildlife sightings within the Going-to-the-Sun Road corridor. Division of Resource Management. Glacier National Park, West Glacier, MT.

Estimation and Awareness Study Issues and Answers. 2001. University of Montana.

FHWA (Federal Highway Administration). 1984. Glacier National Park Road Rehabilitation Planning Study. Vancouver, WA.

FHWA (Federal Highway Administration). 1996 and updates. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects. U.S. Department of Transportation. FP-96.

FHWA (Federal Highway Administration). 1998a. The Road Inventory of Glacier National Park Road Inventory Program. Eastern Federal Lands Highway Division.

FHWA (Federal Highway Administration). 1998b. Federal Highway Administration 1998 Retaining Wall Update. Vancouver, WA.

FHWA (Federal Highway Administration). 2002 The Road Inventory of Glacier National Park Road Inventory Program. Eastern Federal Lands Highway Division.

Fredenberg, W. 2000. Glacier National Park bull trout: Flathead lake drainage survey and fish passage evaluation. U.S. Fish and Wildlife Service, Creston fish and Wildlife Center, Kalispell, MT.

FWS (U.S. Fish and Wildlife Service). 1987. Northern Rocky Mountain Gray Wolf Recovery Plan. U.S. Fish and Wildlife Service, Denver, CO.

FWS (U.S. Fish and Wildlife Service). 1993. Grizzly Bear Recovery Plan. U.S. Fish and Wildlife Service, Denver CO.

FWS (U.S. Fish and Wildlife Service). 1998. Bull Trout Interim Conservation Guidance. U.S. Fish and Wildlife Service, Lacey, WA.

FWS (U.S. Fish and Wildlife Service). 2001. Letter from Mark Wilson, Montana Field Supervisor, FWS, Helena, MT to Superintendent, Glacier National Park. December 17, 2001.

Gipe, H. 2002. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

GNP (Glacier National Park). 1991. Visitor Services Project Report 35. USDI National Park Service.

GNP (Glacier National Park). 2001. Exotic plant database. USDI National Park Service.

GNP (Glacier National Park). 2002. 2001-2002 FY Budget.

Goodman Reporting. 2000/2001. Transcripts from Going-to-the-Sun Road Citizens Advisory Committee Meetings dated February 29-March 2, 2000; September 25-26, 2000; September 19-21, 2001, and November 15, 2001. Whitefish, MT.

Harris, K. 2002. Project Manager, Skillings-Conley Engineers. Personal communication with Aleta Powers, ERO Resources Corp., January 16.

Haverfield, S. 2002. Flathead County Clerk and Recorder, Flathead County Courthouse. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

Haybeck, J.R. 1963. Lichen distribution in the Lake McDonald forest communities in Glacier National Park. Montana Academy of Science 23:34-37.

Hermann, F.J. 1969. The bryophytes of Glacier National Park, Montana. The Bryologist 72:358-376.

IAQAB (International Air Quality Advisory Board). 1998. Special Report on Transboundary Air Quality Issues. January 18, 2002. <http://www.ijc.org/boards/aqab/spectrans/exec.html>.

IMPLAN. 2002. Minnesota IMPLAN Group, IMPLAN Input-Output Model.

Johnson, M. 2002. District Engineer, Montana Department of Transportation, Great Falls, MT. Personal communication with Aleta Powers, ERO Resources Corp., January 17 and April 10.

Jope, K. 1985. Implications of grizzly bear habituation to hikers. Wildl. Soc. Bull. 13(1):32-37

Joslin, G. and H. Youmans. 1999. Effects of recreation on Rocky Mountain wildlife: A review for Montana. Committee on effects of recreation on wildlife, Montana chapter of the Wildlife Society.

Kendall, K. 2002. Biologist, USGS Biological Resources Division, West Glacier Field Station. Personal communication with Gordon Dicus, NPS.

Koehler, G.M. 1990. Population and habitat characteristics of lynx and snowshoe hares in North Central Washington. Canadian Journal of Zoology 68: 845-851.

Land and Water Consulting, Inc. 2001. Floodplain literature review for Glacier National Park. Glacier National Park, MT.

LAUS (Local Area Unemployment Statistics). 2001. Available from Research & Analysis Bureau, Montana Department of Labor and Industry <http://rad.dli.state.mt.us>.

Lesica, P. 2002. The flora of Glacier National Park. Oregon State University Press. Corvallis, OR.

Littlejohn, M. 1991. Visitor service project, Glacier National Park. Report 35, University of Idaho Cooperative Park Studies Unit.

Mace, R.D., and J.S. Waller. 1997. Grizzly bear ecology in the Swan Mountains. Montana Fish, Wildlife and Parks, Helena, MT.

Marnell, L.F. 1988. Status of the westslope cutthroat trout in Glacier National Park, MT. American Fisheries Society Symposium 4: 61-70.

Martinka, C. 1972. Habitat relationships of grizzly bears in Glacier National Park. Progress Report. On file at Glacier National Park.

McClelland, B.R., L.S. Young, P.T. McClelland, J.G. Crenshaw, H.L. Allen, and D.S. Shea. 1994 Migration ecology of bald eagles from autumn concentrations in Glacier National Park, Montana. Journal of Raptor Research 30(2): 79-89.

McDonald, T. 2002. Manager, Division of Fish, Wildlife and Recreation, Salish and Kootenai Tribes. Personal communication with Doug Jeavons, BBC Research & Consulting. March 19.

Mech, L.D. 1989. Wolf population survival in an area of high road density. American Midland Naturalist 121:387-389.

Mech, L.D., T.J. Meier, and J.W. Burch. 1991. Denali Park wolf studies: Implications for Yellowstone. *In* Transactions of the North American Wildlife and Natural Resources Conference 56: 86-90.

Miller, S. 2002. Blackfeet Planning and Development Department, Blackfeet Tribe. Personal communication with Doug Jeavons, BBC Research & Consulting. March 21.

Mondeville, M. 2002. Alberta Transportation Department, Cardston, Alberta, Canada. Personal communication with Aleta Powers, ERO Resources Corp., January 14 and April 9.

Montana Bald Eagle Working Group. 1994. Montana Bald Eagle Management Plan. U.S. Bureau of Reclamation, Billings, MT.

Montana County Budgets. 2001. Individual budget documents for Flathead County, Glacier County, and Lake County.

NPA (National Park Service). Undated. Design Guidelines — Vista Clearing. Glacier National Park.

NPS (National Park Service). 1990. Transportation Plan. Glacier National Park, MT.

NPS (National Park Service). 1991. Exotic Vegetation Management Plan. Glacier National Park, MT.

NPS (National Park Service). 1993a. Resource Management Plan. Glacier National Park, West Glacier, MT.

NPS (National Park Service). 1993b. Roadside Maintenance Guidelines. Glacier National Park, West Glacier, MT.

NPS (National Park Service). 1999a. Going-to-the-Sun Road Environmental Assessment. Glacier National Park, West Glacier, MT.

NPS (National Park Service). 1999b. Final General Management Plan, Environmental Impact Statement. Volume 1. Glacier National Park, West Glacier, MT.

NPS (National Park Service). 2000. West Entrance Station Environmental Assessment. Glacier National Park, West Glacier MT.

NPS (National Park Service). 2001a. Going-to-the-Sun Road Citizens Advisory Committee Final Report. Glacier National Park, West Glacier, MT.

NPS (National Park Service). 2001b. Management Policies 2001. U.S. Department of Interior.

NPS (National Park Service). 2002. Preliminary draft Commercial Services Plan Environmental Impact Statement, Glacier National Park.

Omang, R.J., C. Parrett, and J.A. Hull. 1983. Flood estimates for ungaged streams in Glacier and Yellowstone National Parks, Montana. U.S. Geological Survey Water-Resources Investigations Report 83-4147.

Overn, G. 2002. Glacier County Road Supervisor. Personal communication with Doug Jeavons, BBC Research & Consulting. March 21.

NPA Data Services, Inc. 2000. Population projections for the State of Montana.

Racine, G. 2002. Personal communication with Doug Jeavons, BBC Research & Consulting. March 21.

Raup, O., R. Earhart, J. Whipple, and P. Carrara. 1983. Geology along the Going-to-the-Sun Road, Glacier National Park, Montana. U.S. Geological Survey in Cooperation with the National Park Service. Glacier Natural History Association.

RTI (Renewable Technologies, Inc.). 2001. Glacier National Park Going-to-the-Sun Road Draft Cultural Landscape Inventory. March 2001. Butte, MT.

RTI (Renewable Technologies, Inc.). 2002. Glacier National Park Going-to-the-Sun Road Draft Cultural Landscape Report. December 2002. Butte, MT.

RTI (Renewable Technologies, Inc.). 2003. Glacier National Park Going-to-the-Sun Road Cultural Landscape Report. Volume II.

Ream, R.R., M.W. Fairchild, D.K. Boyd, and A. Blakesley. 1989. First wolf den in western U.S. in recent history. Northwest. Nat. 70:39-40.

Robert Peccia and Associates. 1994. Traffic Safety Study, Glacier National Park, MT. Prepared for U.S. Dept. of Interior National Park Service, Denver Service Center, CO.

Robert Peccia and Associates. 1997. Vehicle Movement and Traffic Study. Prepared for U.S. Dept. of Interior National Park Service, Denver Service Center, CO.

Rockwell, D. 1995. A Natural History Guide, Glacier National Park. Houghton Mufflin Company, New York, NY.

Rowley, A. and J. DeHerrera. 2001. Flathead National Forest News Release, Travel Delays in the Moose Fire, October 18.

Ruediger, B.J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Forest Service Publication #R1-00-53, Missoula, MT.

Baucus. M. 2001. Senator Max Baucus website, <http://baucus.senate.gov>.

Smillie, G.M. and D. Ellerbroek. 1991. Flood Hazard Evaluation for Divide and Wild Creeks, Glacier National Park. Technical Report NPS/NRWRD/NRTR-91/02. U.S. Department of Interior, National Park Service, Water Resource Division.

Smith, G. and Johnson, C. 2002. Lake County Roads and Flathead County roads, respectively. Personal communication with Doug Jeavons, BBC Research & Consulting. March 19, March 20.

Spencer, C.N. 1991. Evaluation of historic sediment deposition related to land use through analysis of lake sediments. Flathead Basin Commission, Kalispell, MT.

Statistics Canada. 2001. Profile of Census Divisions and Subdivisions in Alberta (95-190-XPB. Rates calculated by BBC Research & Consulting.

COE (U.S. Army Corps of Engineers). 1983. Technical write-up of the Flood Hazard Analysis for Divide Creek and Rose Creek. Glacier National Park, MT.

Census (U.S. Census Bureau). 2002. County Business Patterns. http://tier2.census.gov/cgi-win/cbp_naics/Sector.exe

U.S. Bureau of Indian Affairs. 1999. 1999 labor market information on the Indian labor force: a national report. Available from the Bureau.

U.S. Geological Survey. 2001. Snowpack analysis of chemical loading in Glacier National Park. http://nrmsc.usgs.gov/research/snowpack-analysis. Downloaded 11/20/01.

USDI (U.S. Department of the Interior). 1998. The Secretary of the Interior's Standards for the Treatment of Historic Properties Pursuant to the National Historic Preservation Act. Federal Register, April 24.

USDI (U.S. Department of the Interior). 2001. National Park Service Management Policies.

USDOT (U.S. Department of Transportation, Federal Transit Administration). 1995. Transit Noise and Vibration Impact Assessment. DOT-T-95-16. Burlington, MA.

White, D. 2002. Transportation Engineer, Blackfeet Reservation, MT. Personal communication with Aleta Powers, ERO Resources Corp., January 15.

White, D. Jr., K.C. Kendall, and H.C. Picton. 1998. Grizzly bear feeding activity at alpine army cutworm moth aggregation sites in northwest Montana. Canadian Journal of Zoology 76(2): 221-227.

WIS. 2001a. Going-to-the-Sun Road Engineering Study. August 2001. Glenwood Springs, CO.

WIS (Washington Infrastructure Services). 2001b. Going-to-the-Sun Road Socioeconomic Study. August 2001. Glenwood Springs, CO.

WIS (Washington Infrastructure Services). 2001c. Going-to-the-Sun Road Transportation and Visitor Use Study. August 2001. Glenwood Springs, CO.

WIS (Washington Infrastructure Services). 2001d. Going-to-the-Sun Road Business Development Survey. August 2001. Glenwood Springs, CO.

Yates, R.E. 1989. Bald eagle nesting ecology and habitat use: Lake McDonald, Glacier National Park, Montana. M.S. thesis, University of Montana, Missoula, MT.

Yates, R.E. 1994. A pilot forest carnivore tracking survey and monitoring recommendations. Division of Resource Management. Glacier National Park, West Glacier, MT.

Yates, R.E., B.R. McClelland, P.T. McClelland, C.H. Key, and R.E. Bennetts. 2001. The influence of weather on golden eagle migration in northwestern Montana. Journal of Raptor Research 35(2):81-90.

GLOSSARY

Adfluvial. Found in lakes.

Statistical Model. A type of model where (in this case) visitation levels in the current year are explained by visitation levels in previous years.

Biodiversity. The range of organisms present in a given ecological community or system. It can be measured by the numbers and types of different species, or the genetic variations within and between species.

Cut slope. The excavated portion of a roadway located upslope from the road surface.

Drop inlet. Drainage structure that directs runoff from the road surface down into a culvert or drain.

Exotic vegetation or wildlife. Plant or animal species not native to a particular location.

Fill slope. The fill portion of the roadbed located down slope from the road surface.

Fluvial. Found in rivers or streams.

Guardwall. Typically referred to as low rock wall adjacent to the outside edge of a road. They may be located on top of a retaining wall or on their own foundation. Also include timber rails, avalanche resistant removable timber rails, and concrete barriers.

Indirect economic impact. The change in sales, income or employment within the local region in industries that supply goods and services to directly affected businesses.

Induced impact. The change in sales within the local impact region that result from changes in local household spending of income (on housing, utilities, groceries, etc.) earned in the tourism, construction and other supporting industries.

Input-Output Analysis. An analysis of the flows of economic activity between sectors, that captures what each sector must purchase from every other sector in order to produce a dollar's worth of goods or services.

Jersey barrier. Movable concrete wall used as a temporary guardwall.

Krummholz. The stunted trees that grow just below the treeline or in extremely windy locations.

Lacustrine wetlands. Wetlands associated with deep water such as lakes and ponds.

Mitigation measures. Measures taken by the NPS in an effort to offset the adverse impacts resulting from an action or activity.

Multipliers. Captures the size of secondary effects in the impact region. Multipliers are generally expressed as a ratio of the total change in economic activity in a region relative to the direct change. (Or the total impact relative to the direct impact).

Palustrine wetlands. Wetlands dominated by trees, shrubs, and herbaceous vegetation. May include wet meadows, swamps, bogs and fens.

Party day. A party day is equal to one party (or vehicle load) spending one day at GNP.

Party. A group of visitors to GNP. Generally, this refers to the people arriving within a single vehicle, since this is how visitation counts are completed by the Park.

Peak visitation season. The 1st of July until the 15th of September.

Recreational visit. A measurement used by the NPS to count visitors. One recreational visit is equal to one person participating in any recreational activity during a visit to GNP. This includes activities such as sightseeing, touring, and driving, and is not directly related to any specific time period.

Retaining wall. A rock wall constructed on the outside of a road to support the roadway. It is often used in steep terrain and eliminates the need for a fill slope.

Riverine wetlands. Wetlands associated with river, streams and creeks.

Road prism. The road pavement plus additional cut and fill slopes required to construct the road.

Rock scaling. The removal of rock from steep cliff faces, typically where falling rocks are expected to occur in the near future.

Secondary economic impact. The change in economic activity that results from subsequent rounds of re-spending tourism dollars or direct road construction expenditures. Secondary impacts may be further divided into indirect or induced impacts.

Sedimentation. The transport of sediment into a water body.

Shoulder visitation seasons. The month of June and the 16th of September until park closure (approximately October 15th).

Slump. A shifting in the ground, often caused by water intrusion on a steep slope.

Ungulate. Hoofed mammal such as elk, deer, bighorn sheep, mountain goat, and moose.

Visitor spending profile. A breakdown of average, daily visitor (or party) expenditures within relevant tourism sectors (e.g., lodging, restaurants, groceries, souvenirs, etc.).

INDEX

Appendices

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Lake McDonald	***Landslide***	6.4	Lake Erosion at toe of slope / Place large rip rap at lake level, place 3 rows erosion log, clean silt fence (800 LF Excelsior Log / 200 CY rip pap with 60 hrs crane)
		9.1	Identified slide in progress has been monitored / Continue monitoring - possible tie back fix when limits identified
	Lake McDonald Lodge	10.86	Snyder Creek Bridge / See FHWA report
	Lake McDonald Falls	12.7	Stone retaining wall / See FHWA report
	Sacred Dancing Cascades	13.16	Stone retaining wall / See FHWA report
	McDonald Creek Overlook	14.6	Stone retaining wall / See FHWA report
West Tunnel	***Avalanche Campground***	16.4	Avalanche Creek Bridge / See FHWA report
	Red Rock Point	17.45	Dry stack wall, erosion problems at base, river scour / Need to place rip rap in void areas and grout (80 hrs crane / 80 hr grout crew)
		17.61	Damaged ends of walls, minor degradation of grout / Point and patch
		17.67	Minor grout deterioration / Point and patch
		17.8	200' of riverside slump - Riverbank erosion likely cause / Some rip rap and reveg has been done, more needed (200 CY 3-5' rip rap)
		18.34	CMP with stone headwall - erosion at headwall / rebuild headwall (75 SF / double CMP)
	Roadway at Creek Bridge	19.8	Roadway approach to bridge settling due to saturation / Over exc 5' place geotextile place 3' washed rock, more geotextile, then R59 (150 LF excavation)
	Logan Creek Bridge	20.9	Logan Creek Bridge scour along footer / Install scour protection while dredging - rip rap 2' -3' (220 CY)
		20.9	Logan Creek Bridge high bed loading / Use cofferdam to move water to one cell - clean out and use good material (2500 CY)
	Haystack Creek Bridge	21.5	Haystack Creek Bridge - high bed Loading, washout frequently, undersized / Rem 1 cottonwood create another channel at 20 deg skew 8x6 CBC+C48 (75 LF armor plate)
	Alder Creek Culverts	22.6	Alder Creek Box grout loss and separation of headwall - bottom scoured / Repair head and wingwalls, Attach abrasion plate to bottom, rip rap outlet (60 SF of wall repair)
		22.6	Drainage against walls / Concrete pan to drop inlet, 60lf pipe down hill (150 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
West Tunnel	***West Tunnel Approach***	23.08	Concrete retaining wall non crash tested, non-historical / Cut concrete at road level, build core wall and face with stone both sides (135 LF)
		23.11	Stone retaining wall impact damage, grout damage, settlement inside wall / Point & patch, template rehab, 4' sub ex (90 LF)
		23.2	Tipping guardwall / Remove and replace on 4' slab with drop inlet (70 LF)
		23.25	Concrete culvert pipe and inlet in disrepair / Replace inlet with Type C corten close mesh (1 EA)
		23.29	Road settlement and creeping / 8' Slab with anchors - keyed with toe wall (200 LF)
		23.3	Uphill soil cut erosion due to steepness / Wire mesh biomat (500 SY)
Alpine	***West Tunnel***	23.5	Uphill soil cut erosion due to steepness / Wire mesh biomat (400 SY)
		23.62	Concrete box trench drain erosion at outlet / Rip rap rundown (20 CY)
		23.64	West Tunnel with some large slabs above view area / Spot bolts both locations (300 LF)
		23.65	West Tunnel uphill portal is missing curb at waterfall / Install curb (20 LF)
		23.65	West Tunnel broken stones, grout cracking / Replace 120 SY concrete pavement, stones to be 7.5x12 (120 SY)
		23.66	West Tunnel uphill portal missing rock masonry / Replace, patch and point (120 SY)
		23.68	20' guardwall missing to allow drainage / Remove existing, install new trench drain, build new guardwall on 4' slab (20 LF wall / 35 LF trench drain)
		23.74	Stone retaining wall with broken stones, grout cracking / Point and patch (800 SF)
		23.75	Stone retaining wall moving, grout failing / FHWA has design slated for construction 2001
		23.77	Stone retaining wall with some cracked grout and stones, road subsidence inside wall / Point and patch, template rehab (300 LF)
		23.85	Stone retaining wall tilting - moving / FHWA has design slated for construction 2004
		23.88	Rock face above road with loose rock / Scaling, crane and hand (50 hr scaling)
		23.9	Drainage against walls / Concrete valley pan, 3 outlets with flat stone rundowns (300 LF)
		23.9	Stone retaining wall with erosion at toe / Rip rap toe of retaining wall (30 CY) See FHWA Report
		23.95	Stone retaining wall failing / Rebuild wall on footer (300 SF wall - See FHWA Report)
		23.97	Stone retaining wall settlement and erosion at footing / FHWA has design slated for construction 2004 (see FHWA Report)
		23.98	Rock face above road with loose rock / Scaling, crane and hand (30 hr scaling)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	***The Loop***	24.07	Asphalt curb in disrepair, shoulder raveling, but 13' lane here from centerline / Remove curb, cut 2' of asphalt from edge and shoulder with Class 7 (250 LF)
		24.1	Blasted rock is possible source of guard and retaining wall rock / Use slusher to recover 200-300 CY Ashlar stone and rubble (300 CY)
		24.2	Loop Parking Lot has impact damage to wall / Install parking stops to prevent vehicles from hitting wall (20 EA)
		24.2	Loop Parking Lot has guardwall undermined for 200 LF / Grout repair needed under wall (200 LF)
		24.5	Low Guard Wall / Lower roadway 6 in. (500 SY)
		24.5	Concrete pipe with stone headwall broken at outlet / Replace 30" RCP (16 LF)
Alpine	***Crystal Point Arch***	24.6	Road shows subsidence cracking, wall doesn't / Roadway template rehab - 4 ft sub exc. (100 LF)
		24.66	Ashlar guardwall is low and tipping / Remove and replace on 8' slab, 2 scuppers also needed (300 LF)
		24.7	Stone retaining wall is low and tipping / Remove guardwall portion and place on 8' slab (125 LF)
		24.8	Roadway damage due to drainage against walls / Install drop inlet and weepholes (1 EA)
		24.8	Crystal Point Arch Failed / FHWA has design
		24.8	Pullout guardwall at Crystal Point shows low wall / Safety concerns -lower roadway template 8" for 150 LF (500 SY)
		24.9	Roadway damage due to no drainage across road / Install trench drain with pipe through wall (1 EA)
		24.9	Stone and concrete retaining wall has veneer peeling from concrete, removable barrier not crash tested / Remove and replace veneer with compatible stone, replace removable barrier - replace with removable ARG (45 LF)
		25	Damaged concrete pavement and drainage pan, cracking & spalling / Replace 630SF concrete after subexc, stone size 9 x 7, replace 100 LF of pan - 30" hillside pan, seal joints (630 SF)+D79
		25	Stone retaining wall - guardwall portion failing, impact damage / Repair guardwall for full length 80' - See FHWA Report (240 SF)
		25	Guardwall subsidence due to raveling below wall / Install a 30’w x 4'H drystack wall below this guardwall in raveled area (120 SF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	***Crystal Point Arch***	25	CMP headwall damaged causing erosion into lane / Repair headwall to regain lane width, also install bollard (1 EA)
		25	Random rubble guardwall foundation problems and low wall / Repair foundation for 30', lower template 4-8" (100 LF)
		25.1	Several locations this area will require milling before overlay to prevent low guardwall
		25.1	CMP with stone headwall plugged, no grate on inlet / Clean pipe, install bollard (1 EA)
		25.1	Rock face above road has loose rock / Scaling, crane and hand (10 hr)
		25.1	Stone and concrete retaining wall - concrete portion stable, rock portions have foundation problems / In rock area rebuild top 4' of wall on 8' slab w/anchors (30 LF)
		25.2	CMP with stone headwall -hillside Inlet is blocked, small diameter pipe / Rebuild headwall on skew to ditch, install 30” new RCP on skew - headwall repair + 60' pipe w rip rap (60 LF - 10 CY rip rap)
		25.2	Ashlar guardwall tipping, road shows movement / Roadway rehab and guardwall on 8' slab (70 LF)
		25.2	CMP with stone headwall failing, pipe damaged / Repair headwall, remove existing inlets and install drop inlet Type C - new inlet drop into single pipe (60 SF)
		25.2	CMP with stone headwall failing, pipe damaged / Repair headwall, replace 2-24' CMP with 24" RCP, install bollard (80 LF pipe, 60 SF)
		25.3	Stone retaining wall - top 2' damaged for 20', some tipping / Repair top 2 ft (20 LF)
		25.3	Rock face above road has loose rock / Scaling, crane and hand (20 hr)
		25.3	Roadway drainage problem with water running against guard wall / Install concrete pan (100 LF)
Alpine	***Alder Creek***	25.4	Trash rack catching all material -plugging / Install new rack on 45 deg angle with bars on 8" centers - excv clean out hole above trash rack - blasting required (1 EA)
		25.5	Uphill soil cut erosion due to steepness / Wire mesh biomat (5600 SF)
		25.5	Localized roadway subsidence caused by drainage problems / Install 30" RCP on a 45 degree skew across the roadway - remove and replace fill in subsidence area (75 LF- 100 CY)
		25.5	Slope creep enhanced by water / Roadway template rehab - include pullout at 913+50 (400 LF)
		25.5	Saturation of uphill ditch / Install 30" RCP on a 45 deg. skew across the D95roadway (75 LF rip rap)
		25.5	Vertical roadway movement / Install 8" anchored slab (170 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	***Alder Creek***	25.5	Road and guard all moving downhill / Remove and replace wall on 8' slab with piles & anchors (60 LF)
		25.5	Drainage against guardwalls / 2 inlet collection with 1 outlet (2 EA)
		25.5	Stone retaining wall footer undermining, guardwall needs repair / Footing repair, point and patch - See FHWA Report (80 hr)
		25.6	Roadway fines washed out under asphalt, pavement failing / When trenching for collection system (below) fill with flowfill (25 CY)
		25.6	Drainage against walls / Install 4 inlet collection system with one outlet onto rock formation (4 EA, 180 LF 24" RCP)
		25.6	CMP with stone headwall plugged with sediment / Clean, enlarge basin uphill side, install trash rack with 12" gaps
		25.6	Stone retaining wall - guardwall in bad repair / Rebuild guardwall on top of retaining wall (113 LF)
		25.7	Rock face above road with loose rock / Scaling, crane and hand - need staining on rock and wall (30 HR)
		25.7	Missing guardwall / Rebuild on 4' footer - rock source downhill (100 LF)
		25.7	Tipping guardwall / Remove and replace on 4'Footer (70 LF)
		25.7	Guardwall tipping, road shows movement / Remove and replace on 8'slab w/anchors without piles - 20' spacing (100 LF)
		25.8	Open mesh inlet not functioning / Remove and replace with Type C corten close mesh grate, 80'- 24"RCP (1 EA)
		25.8	Material to back top of guardwall / Remove, some salvageable rock (30 CY)
		25.8	Tipping guardwall / Remove and replace on 4' footer (75 LF)
		26	Drainage to wall no outlet/Add a two inlet collection system with 1 outfall, 100 lf 18", rip rap (20 CY)
		26	Stone retaining wall grout cracking and spalling top 8-10' - guardwall damage / Point and patch (2000 SF) repair guardwall (50 LF)
		26.1	Tipping guardwall / Remove and replace on 4' footer (125 LF)
		26.1	No grate on inlet / Install bollard (1 EA)
		26.1	Rock face above road with loose rock / Scaling, crane and hand (40 hr)
		26.1	Low guardwall with super and road problems / Lower template 1' add inlet (100 LF)
		26.1	Missing section of guardwall / Install new section of ARG guardwall (100 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	***Alder Creek***	26.2	Low guardwall / Lower roadway template 4-6" (120 SY)
Alpine	***Haystack Creek***	26.9	Road Settlement / Roadway template rehab (300 LF)
		27	Stone retaining wall impact damage and cracking of guardwall portion / Repair existing wall See FHWA Report (225 LF)
		27	Rock face above road with loose rock / Scale, crane and hand (50 hr)
		27	CMP rotted out / Line or replace (75 LF)
		27	Subsidence behind stone retaining wall / Road rehab without disturbing wall See FHWA Report (110 LF)
		27	Super to wall with no outlet / Install scupper (1 EA)
		27	Rock face above road with loose rock / Scaling, crane and hand (150 hr)
		27	Impact damage and cracking, 70' missing random rubble guardwall / Replace top 4' with ARG (100 LF)
		27.1	Avalanche damage to retaining wall, seeping water / Rehab template with french drain - Replace top 4' with ARG (73 LF)
		27.1	Avalanche damage to retaining wall, seeping water / Rehab template with french drain - Replace top 4' with ARG (169 LF)
		27.1	CBC X drain taper section undermined / Remove and replace w/ rip rap (20 CY)
		27.1	Rock face above road with loose rock / Scaling, crane and hand (150 hr)
		27.2	Missing guardwall / Rebuild on 15' on 4' slab (15 LF)
		27.2	Damaged top 4" of retaining wall / Remove and replace with ARG (100 LF), patch and repoint (2200 SF)
		27.3	Impact Damage and Cracking to guardwall / Replace top 4' with ARG (40 LF)
		27.3	Non crash tested removable rail / Replace with FHWA crash tested removable on 8' Slab (125 LF)
		27.3	Concrete walls at Haystack does not match historic / Either demo and rebuild with suitable or face with stone (150 LF)
		27.4	Non crash tested removable rail / Replace with FHWA crash tested removable on 8' Slab (100 LF)
		27.4	Stone retaining wall subsidence and leaning / Remove top 4' of wall, roadway rehab, 12' slab w/piles & anchor, rebuild wall (150 LF)
		27.4	Tipping guardwall / Remove and replace on 4' footer - Salvageable rock here (140 LF guard+D147wall)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	*Haystack Creek*	27.4	Water hitting CMP headwall at angle / Remove and replace headwall at 20 deg. angle, replace pipe (30 SY - 80' 24" RCP)
		27.5	Tipping guardwall /
		27.6	Rock face above road with loose rock / Scaling, crane and hand (40 hr)
		27.6	Low guardwall / Lower roadway template 10" (1300 SY)
		27.6	No grate on inlet / Install bollard (1 EA)
		27.7	Concrete End Taper Undermined / Demo concrete add rip rap end treatment (20 CY grouted rip rap)
		27.7	Low guardwall / Add rock to raise (25 LF)
		27.7	Non crash tested removable rail / Replace with guardwall on 4' slab (100 LF)
		27.7	No drainage across road / Drop inlet with 75' of pipe (1 EA)
		27.7	Non crash tested removable rail / Replace with ARG (100 LF)
		27.9	Non crash tested removable rail / Replace with stone guardwall on 4' slab (200 LF)
		27.9	Low guardwall / Replace with guardwall on 4' slab (100 LF)
		27.9	No grate on inlet / Install bollard (4 EA)
Alpine	*Weeping Wall*	28	Non crash tested removable rail / Replace with stone guardwall on 4' footer (150 LF)
		28.25	Stone masonry wall / See FHWA report
		28.8	No grate on concrete box trench drain inlet / Install bollard (1 EA)
	Big Bend	28.9	Leaning guardwall / Remove wall and footer, roadway rehab, replace 4' footer and rebuild guardwall (100 LF)
		28.9	Water damage to guardwall / Remove and replace on new concrete pavement, Rebuild half at a time (100 LF)
		28.9	Water washing out under slab - cracking and moving slab / Remove all concrete, rehab roadway, and replace with concrete slab after installing 6 inlets with corten 10 grates (1200 SY)
		29	Grout cracking and spalling throughout stone retaining wall / Point and patch See FHWA Report (1800 SF)
		29	Impact damage and cracking to guardwall / Rebuild guardwall on 4' footer (330 LF)
		29.1	Exposed concrete on backside of guardwall / Bush hammer and stain (75 LF)
		29.1	Missing Castellations on guardwall / Place castellations (50 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	Big Bend	29.3	Large amount of rock for recovery / Use slusher for retrieval (220 CY)
		29.3	No grate on inlet / Install bollard (1 EA)
		29.4	Guardwall subsidence and tipping / Remove wall and footer, roadway rehab, replace 4' footer and rebuild guardwall (200 LF)
		29.5	No grate on inlet / Install bollard (1 EA)
		29.5	Guardwall subsidence and tipping / Remove wall and footer, roadway rehab, replace 4' footer and rebuild guardwall (125 LF)
		29.6	No grate on inlet / Install bollard (1 EA)
		29.6	Guardwall rock color does not match / Apply stain (8 hr)
		29.6	Rock face above road with loose rock / Scale, crane and hand (20 hr)
		29.7	Super elev. Forces water to wall with no outlet / Install 3 inlet system with one outlet, rock arch over pipe at penetration and rip rap end treatment (3 EA)
		29.7	Stone masonry wall is leaning, road is moving / Remove top 4', roadway rehab, 12' slab w/ piles and anchors, rebuild wall (107 LF) drainage needs end treatment and rip rap D182 (20 CY rip rap)
		29.7	Tipping guardwall / Combo roadway template rehab and remove and replace (125 LF)
		29.7	Rock face above road with loose rock / Scaling, crane and hand (100 hr)
		29.7	Shallow guardwall footing showing - outside edge / Bury it (75 LF)
		29.82	CMP with stone headwall - no grate on Inlet / Install Bollard (1 EA)
		29.88	Tipping guardwall / Remove and replace on 8' moment slab (60 LF)
		29.9	Modern concrete guardwall D186inner and top surfaces incompatible rock -outside has none / Replace stone with compatible or roughen and stain faces (125 LF)
		29.9	Rock face above road with loose rock / Scaling, crane and hand (75 hr)
Alpine	Triple Arches	29.9	Reinforced concrete tieback wall - wall missing stone face - concrete barrier portion too high / Remove stone and reinstall to historic spec - cut barrier off pour core wall and face with rock (660 SY)
		30	Bedrock spalling below pillar of arches / Temporary repair made / See FHWA Report
		30	Removable rail is non crash tested / Remove existing removable - install ARG - no anchor - See FHWA plans (170 LF)
		30.1	No grate on inlet / Install bollard (1 EA)
		30.1	Triple Arches - stone masonry retaining wall - Low guardwall / Full width roadway template lowering - See FHWA report (450 SY)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	*Triple Arches*	30.1	Triple Arches - stone masonry retaining wall -voids in grout, minor foundation erosion / Point an patch, grout foundation repair See FHWA report (45 LF)
		30.15	Uphill road cut slope erosion / Try Macafarri Wire Mesh - Biomat (800 SY)
		30.15	Low guardwall with some subsidence / 12' Slab with anchors and piles (150 LF)
		30.18	Guardwall tipped and low some subsidence / Roadway template rehab, plus 4'footer under rebuild (150 LF)
		30.3	Concrete pipe with stone headwall broken at outlet / Need bollard (1EA)
		30.3	Guardwall low / Remove and replace on 4' footer (400 LF)
		30.4	Super elev causes drainage to wall with no outlet / Add pipe, drop inlet, rip rap (1 EA)
		30.4	Roadway localized settling, subgrade problem / Remove and replace subgrade with suitable material (25 CY)
		30.4	Guardwall low / Lower roadway 4-6" (450 SY)
		30.5	Guardwall subsidence and tipping / Remove and replace on 8' moment slab - may need anchors (220 LF)
		30.5	Guardwall tipped and low some subsidence / Roadway template rehab, plus 4'footer under rebuild (75 LF)
		30.5	Trench drain end concrete section - Outfall undermined / Remove taper section, add rock rundown (10 CY)
			Drainage against walls / Every 100 LF where super drains to wall, add drop inlet (15 EA)
		30.6	Roadway drainage against guardwall / Install drop inlet (1 EA) and rip rap (2 CY)
			Material to back top of guardwall / Leave dirt down 6"
		30.7	Roadway settlement, movement / 12' Slab with anchors and piles (250 LF)
		30.7	Removable rail is non crash tested / Remove existing removable (160 LF)
		30.78	Roadway settlement, sag in asphalt / Remove and replace subgrade - full width - leave wall in place - excv behind wall (150 LF)
		30.8	Guardwall settling, tipping / Rebuild wall on 8' slab (130 LF)
		30.8	Stone retaining wall erosion, under drainage, loose stones, foundation undermined / Point and patch - rebuild wall under drainage - See FHWA Report (100 LF)
		30.84	Stone retaining wall erosion under footing / Grout - concrete under footing - See FHWA Report (10 CY)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	Triple Arches	30.85	Drainage pipe failing, erosion problems / Install new 30" RCP - rip rap run down - leave arch in wall above new pipe (50 LF)
		30.89	Guardwall subsidence / Remove and replace on 4' slab (150 LF)
		30.9	Guardwall grout spalling, cracking / Extensive point and patch (28 LF)
		31	Guardwall stone different color than adjacent original wall / Stain stone and bury exposed footing (150 LF)
		31.1	Drainage crossing outfall undermined / Remove outfall chute - install rip rap energy dissipater - need bollard at inlet (20 CY)
		31.18	Guard rock area - slope erosion and subsidence / Install 12' slab anchored with micropiles and tiebacks (200 LF)
		31.2	Drainage crossing plugging and erosion / Install 30 " pipe diagonally across road (90 LF) rip rap (10 CY) corten trash grate
		31.2	Trench drain plugged / Clean (5 hr)
		31.2	Guardwall rock and snow damage also low / Install removable w/anchors (500 LF) lower template (130 LF)
		31.3	Loose material on rock face above road / Hang mesh on high wall during construction - close trail (700 SY)
		31.3	Roadway drainage running along walls / Install concrete pan (200 LF) to drop inlet, pipe downhill (100 LF) rip rap (10 CY)
		31.3	Guardwall damage and tipping /Remove and replace with removable rail on 12' slab with anchors - no piles (1650 LF)
		31.4	Stone masonry retaining wall undermining causing outward deflection / See FHWA Task Order 6
Alpine	Oberlin Bend	31.8	Rock face above road with loose rock / Scaling, crane and hand (50 hr) good rock
		31.9	Random rubble guardwall isolated damage / Install 4' slab repair (100 LF)
		32.4	Guardwall low / Add guardwall (100 LF)
		32.4	Edge of roadway eroded, losing shoulder / Removable guardrail on 12' slab - piles and anchors (210 LF)
		32.5	Low guardwall / Remove 4-6" asphalt (300 LF)
		32.7	Extensive guardwall damage / Core wall with slab (150 LF)
	East Tunnel	32.9	Roadway settlement / Roadway template rehab (300 LF)
		32.9	Guardwall tipping / Rebuild on 4' footer (100 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
Alpine	***East Tunnel***	33	Grout cracking and spalling throughout stone retaining wall / Point and patch, spot section rebuild See FHWA Report (80 SY)
		33	Stone masonry wall height low by 6-8" / Lower template 550 LF (1100 SY)
		33.2	Top portion of stone masonry wall damaged / Rebuild top portion - point and patch (200 LF)
		33.2	Heavy damage stone guardwall / Rebuild on 4' footer (250 LF)
		33.3	Guardwall tipping, undercut, some missing / Pull wall, pull in towards CL 2 (200 LF)
		33.3	Rock face above road with loose rock / Scaling, crane and hand (100 hr)
		33.4	Avalanche zone taking guardwall / Install ARG on slab with piles (200 LF)
		33.4	No drainage across road / Drop inlet with 50' of 24" RCP, rip rap outfall (1 LS)
Baring Creek	***Siyeh Bend***	34.75	Roadway super - drainage problem / Remove 4-6" asphalt (300 LF)
		34.78	Rundown erosion, invert damage, spalling, rebar exposed / Abrasion plating - rip rap (20 CY)
		34.82	High sediment flow causing headwall damage and plugging from masonry smooth rundown / Add small catch dam above masonry rundown
		35	Side slope erosion, sediment wash over roadway / Realign roadway - install catch ditch or wall
	Jackson Glacier	36.7	Sediment flow plugging culvert -erosion problem / Install rock drop - flat spot - replace 30" RCP (75 LF) rip rap (30 CY)
		37.4	High sediment and erosion debris flow / Install bollard type trash guard above road
		37.4	High sediment and erosion debris flow / Install 30" RCP (75 LF) rip rap rock rundown (20 CY)
	Baring Creek Bridge	39.45	Stone masonry wall under construction / See FHWA report (75 LF)
	Dead Horse Point	41.1	Guardwall settling / Add to wall height (200 LF)
		41.1	Rock face above road with loose rock / Scaling, crane and hand (50 hr) good rock
		41.5	Top 4' of wall in need of repair Rebuild top 4' - See FHWA report (218 LF)
		41.5	Low guardwall / Rebuild guardwall on 4’ footing (200 LF) and mill WB lane (400 SY)
		41.5	Moving subsiding guardwall / Install 8' slab with micropiles rebuild guardwall (130 LF)
	Wild Goose	43	Ped xing with short sight distance / Realign roadway slightly (1500 LF) add signing
St. Mary	***Golden Stairs***	43.35	Stone masonry retaining wall east end 75' sagging, tipping / Subex (100 CY) slab w/ core wall w/piles (75 LF)
		43.3	Low guardwall / Add rock to raise (200 LF)

Appendix A: Going-to-the-Sun Road Deficiencies and Repairs

Section	Segment	Mile Post	Identified Problem/Potential Solution (Magnitude)
St. Mary	***Golden Stairs***	43.3	Rock face above road with loose rock / Scaling, crane and hand (75 hr)
		43.3	No drainage crossing / Add inlets (3 EA) 24" RCP (200 LF) with I outlet - provide arched outfall
	St. Mary Slump	48.2	Roadway slump area / Monitor shore erosion - add rip rap protection (75 CY) to toe - tiebacks if necessary
	Divide Creek Bridge	49.3	High bed loading of Divide Creek Bridge / Add additional capacity - cells

APPENDIX B

SOCIOECONOMIC IMPACT METHODS FOR ANALYSIS AND SUPPORTING DATA

Methods for Socioeconomic Analysis

In order to assess the full economic impact to the local area from road rehabilitation, BBC Research & Consulting (BBC) projected the total socioeconomic impacts that could result from changes in visitation patterns, construction activity, and Park operations. Effects of mitigation strategies to reduce impacts on visitors and visitation levels (described in Chapter 2) were also analyzed. The socioeconomic impacts resulting from changes in visitation patterns are expected to be the largest followed by those resulting from construction activity and finally those resulting from changes in Park operations. The methodology employed for estimating these impacts is summarized below.

Visitation Effects

Visitor Experience

There is no direct means of measuring and quantifying the quality of the visitor experience at GNP. It is logical to presume that visitors prefer to be able to access all points along the GTSR from either direction and avoid traffic delays. This presumption is borne out by the results of the 2000 Survey of Visitors and the comparable survey performed in the summer of 2002, which indicated that a substantial portion of visitors would reconsider visiting the Park if access to Logan Pass was limited or lengthy delays were experienced along the GTSR. These projected responses to changes in the visitor experience are embodied in the impact analysis in this EIS in terms of projected changes in visitation levels under the various alternatives, as described in more detail elsewhere.

It is also logical to presume that at least some portion of the impact on visitor experience due to road rehabilitation can be mitigated by providing or enhancing other attractions at the Park, such as adding interpretive exhibits. Again this presumption is borne out by visitor's responses in the 2000 and 2002 visitor surveys, which indicated that a portion of the visitors who would avoid coming to the Park due to anticipated traffic disruption during rehabilitation would change their minds if more exhibits and interpretive services were provided. The effects of this mitigation strategy on the visitor experience at GNP are embodied in the projected effects of mitigation on visitation levels under Alternative 3 and Alternative 4.

Whether the presence of visible road rehabilitation activity, by itself, would significantly impact the visitor experience at GNP is unclear. While the primary purpose of most visits to GNP is undoubtedly to enjoy the relatively pristine environment of the Park, community leaders suggested during previous studies that the opportunity to observe the unique efforts to rehabilitate the historic road may be a potential tourist attraction in itself, at least for some visitors (WIS 2001).

Reductions in Direct Visitor Spending

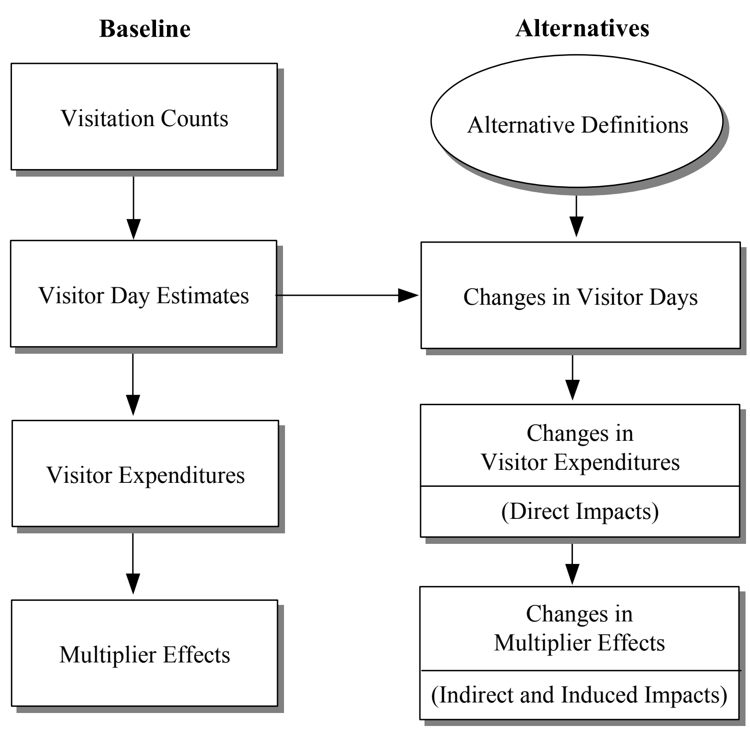
Reductions in Park visitation due to rehabilitation would directly impact the economy of the local study area, both in terms of declines in visitor spending in tourist related sectors and the resulting employment losses in those sectors. The level of direct impacts experienced by each region within the local impact area would depend on the following key factors:

- The baseline level of visitation to the Park,
- Road rehabilitation alternative characteristics and the traffic disruptions along the Road that these definitions imply,
- Visitor responses to the traffic disruptions,
- Existing visitor spending patterns within the study area,

- Visitor travel patterns and the ability of local communities to attract visitor expenditures.

To estimate the direct economic impacts from reductions in visitor spending, it is necessary to quantify each of these key factors. To achieve this, BBC used the Alternative definitions described in Chapter 2 combined with existing NPS recreation visitation estimates and analysis of data collected in the 2000 and 2002 visitor surveys. An overview of the methodology employed for estimating the direct impacts from reductions in visitor spending within the local impact area under each of the alternatives is graphically presented in Figure B-1 below.

Figure B-1. Overview of Methodology for Estimating Visitation Impacts



Source: BBC 2003

The first column in Figure B-1 depicts the relationship between baseline visitation levels and the associated economic effects that this visitation has within the local impact area. Economic effects from visitation include direct economic flows from baseline visitor expenditures and indirect economic flows that result from multiplier effects.

For Alternatives 2, 3, and 4, there is a parallel relationship, depicted in the second column of Figure B-1. Alternative specific definitions are combined with baseline visitation estimates to produce estimates of reductions in visitation. These reductions imply changes in both the direct economic flows from visitor expenditures and the indirect economic flows resulting from multiplier effects. The methodology for estimating each of these components is discussed in more detail below.

Estimation of Baseline Recreation Visits

The first step for estimating direct visitation impacts was to calculate existing baseline visitation and corresponding visitor expenditure levels. To accurately capture visitor expenditure patterns, it was necessary to segment the visitor population into visitor types. This is because visitor spending depends not only on the number of visitors, but also on the types of visitors. Day visitors have different spending patterns than visitors staying overnight in the area, and spending also varies among overnight visitors, depending on their lodging type (motel, campground, backcountry camping). Additionally, since GNP estimates visitation through vehicle (party) counts and because how much a visitor spends in the area also depends on how long the visitor stays in the area, not just how much time they spend in the park, a party day was selected as the spending unit of analysis. (Street, pers. comm. 2002.)

In order to convert NPS baseline recreation visit estimates to party days in the area, the study team employed NPSCONVERT.XLS software developed by recreation researchers at Michigan State University for the NPS. Required data inputs include estimates of recreation visits and overnight stays as well as estimates of parameters including average party size, length of stay in the park, nights spent in the park, number of Park entries made per trip. The first two inputs were NPS estimates, while all other required parameter estimates were calculated using data collected from the 2000 and 2002 visitor surveys.

The software produces estimates of party trips to the area by seven lodging segments as well as estimates of segment shares. Lodging segments included 1) day visitors living in the local impact area, 2) non local day visitors not staying overnight in the impact area, 3) visitors staying in motels or lodges inside the Park, 4) campers staying inside the Park, 5) visitors staying in motels outside the Park, 6) campers staying outside the Park, and 7) visitors staying overnight in the area in owned seasonal homes or with relatives or friends. Baseline party trips were then converted to party days by multiplying through by the average number of days spent in the area for each visitor type (assuming one for local and non-local day visitors).

During the completion of the *Socioeconomic Study*, concerns were raised by some members of the Advisory Committee concerning the number of recreational visits reported by NPS. In particular, the question was raised about potential double counting of parties that enter the Park more than once in any particular day. The NPS estimates are, however, the best data available regarding visitor use of GNP. The study team contacted Park staff and confirmed that they do ask visitors whether they have been in the Park earlier in the day in order to minimize or eliminate double counting (Street, pers. comm. 2002).

Estimations of Alternative-Specific Visitor Reductions

The second step for calculating direct visitation impacts was to estimate alternative specific reductions in party days. Reductions in party days may happen in two ways: parties that decide to completely cancel their trip to the Park as a result of road rehabilitation, and parties that decide to reduce the length of stay in the area because of the traffic disruption on the road. The actual number of party days reduced varies by alternative, depending upon the level of traffic disruption associated with the alternative.

For each road rehabilitation alternative, visitor response estimates were initially estimated using data from the 2000 visitor survey and subsequently revised based on the 2002 visitor survey. Response frequencies to specific questions were associated with different behavioral responses (trip cancellation versus trip length reduction) for road rehabilitation alternatives, using the alternative definitions provided in Chapter 2. Applying behavioral response frequencies to baseline party day estimates allowed the study team to estimate reductions in party days that would result from implementation of specific road rehabilitation alternatives.

For Alternatives 3 and 4, it may be possible for the Park to offset a portion of the negative visitor impacts associated with road rehabilitation through visitor service mitigation efforts, and thus recover some of the potential reductions in party days (and associated visitor expenditures) for the local impact area. Response frequencies to relevant questions from the 2002 visitor survey were used to estimate the mitigating impacts of visitor service improvements. In this manner, the study team calculated alternative specific estimated reductions in party days, both with and without the mitigating impacts of proposed visitor service improvements.

Estimation of Visitor Expenditure Reductions

The third step in calculating direct visitation impacts was to calculate estimated reductions in visitor expenditures. This was achieved by applying the visitor spending profiles to the estimated reductions in party days on a party type basis. This allowed the study team to estimate reductions in visitor expenditures, by party type and by expenditure sector, associated with each road rehabilitation alternative. These totals were aggregated to obtain overall estimates of visitor expenditure reductions for each alternative.

Statistical analysis determined that Canadian visitors had significantly different spending profiles than other visitors to the Park. For this reason, separate expenditure profiles were developed and applied appropriately for Canadian visitors and Non-Canadian visitors.

Aggregate expenditure totals are net of estimated expenditure totals calculated for local Montanans under each alternative scenario. While construction activity associated with road rehabilitation might induce local Montanans to also visit the Park fewer times, any money this group saves by not visiting the Park may still ultimately be spent in the study area on other items. Such changes in local spending patterns were excluded from the impact analysis.

Allocation of Expenditure Reductions Within the Local Impact Area

The final step in calculating direct visitation impacts is to estimate the geographic distribution of expenditure reductions among the counties within the local impact area. The study team developed an allocation methodology based on two factors: 1) visitor travel patterns to and from the Park and 2) the relative ability of the economy in each study area county (and southwest Alberta) to capture visitor expenditures.

The 2000 and 2002 visitor surveys asked respondents what route they took in traveling both to and from the Park. Responses to these questions were used to estimate the proportion of visitors that traveled through Flathead, Glacier, and Lake Counties in Montana and southwest Alberta. In general, seven main routes are used in driving through the local impact area to reach the Park. In many cases, travel routes to and from the Park pass through more than one county. For example, visitors traveling on US 93 must drive through both Lake and Flathead counties in order to reach the Park. Each potential route combination was linked to the appropriate counties (and southwest Alberta), and travel frequencies for each combination were calculated using responses from the 2000 and 2002 visitor surveys.

For travel routes that passed through more than one county, a capture factor was applied to calculate route frequencies reflecting the relative ability of the county (or provincial area) to attract visitor expenditures. Some counties are better able to capture visitor expenditures than others because they offer a more diverse and complete set of the goods and services (lodging, restaurants, gift shops, recreation activities) that visitors purchase. To represent the percent of a visitor's daily expenditures that local businesses were able to capture, the study team used capture rates developed for the Road *Socioeconomic Study* (August 2001) — 100 percent for Flathead County, 60 percent for Lake County and 25 percent each for Glacier County and southwest Alberta.

Combining calculated travel route frequencies with the capture factors resulted in the following estimated distribution of visitor expenditures and expenditure reduction: Flathead County – 42 percent, Glacier County – 28 percent, Lake County – 16 percent and southwest Alberta –14 percent.

During completion of the *Socioeconomic Study*, some Citizen Advisory Committee members indicated concerns that the previous estimates of annual visitor expenditures in the study area were too high based on data on bed tax revenues in the study area counties. In analyzing effects for this EIS, the study team returned to the original data from the 2000 visitor survey and developed an independent analysis of impacts on visitation and visitor spending. The estimates presented herein are lower than prior estimates in the *Socioeconomic Study*, but of similar general magnitude. Comparison of estimated baseline GNP visitor expenditures to IMPLAN model estimates of overall economic activity in key sectors such as lodging implies that about half of all annual lodging revenues in the study area would be attributable to visitors to GNP. Interviews with economic developers in the study area suggest that this figure is reasonable (Edgar pers. comm. 2002; Stewart, pers. comm. 2002).

Construction Effects

How spending and employment for Road rehabilitation construction would directly affect socioeconomic conditions in the study area depends on these key characteristics:

- The duration and total cost of each alternative
- Total costs for the three main categories of expenditure — labor, equipment, and materials
- Employment associated with labor expenditures
- Other issues affecting local participation in employment and contracting
- The following sections describe the methodology used to estimate the direct construction spending and employment effects associated with each rehabilitation alternative.

Duration and Funding

The Going-to the-Sun Road *Engineering Study* established benchmark estimates of duration and spending on the Road rehabilitation project. As modified to reflect current alternative descriptions, these cost estimates are the basis for the direct spending and employment effects used in this analysis (WIS 2001). The cost estimates were updated for inflation to year 2002 dollars, assuming an annual inflation rate of four percent.

Since the project durations for Alternative 3 (Shared Use) and Alternative 4 (Accelerated Completion) ranges of seven to eight years and six to eight years, respectively, Alternative 3's duration was simply fixed at eight years and Alternative 4's at seven years to render the analysis more straightforward. Similarly, costs for road rehabilitation were fixed at $112 million for Alternative 1, $102 million for Alternative 2, $98 million for Alternative 3, and $81 million for Alternative 4. These numbers represent the average of the lowest and highest costs in the cost range for each alternative.

The total costs for Alternatives 3 and 4 reflect an additional year of construction in this analysis compared to the schedule presented in the *Engineering Study*.

In addition, to the construction related costs for Road rehabilitation, Alternatives 2, 3, and 4 include costs for transit service and visitor use improvements. These costs range from about $6 million for Alternative 2 to about $19 million for Alternatives 3 and 4. Alternatives 3 and 4 also include expenditures of about $17.7 million for visitor development mitigation. Following Road rehabilitation, Alternatives 2, 3, and 4 anticipate annual operation and maintenance costs of about $1.5 to $1.9 million.

Labor, Equipment and Materials Costs

The analysis of direct socioeconomic costs carries forward the distribution of costs originally determined in the *Engineering Study*. Costs are distributed both across the key expenditure categories and over time.

First, road rehabilitation costs were reduced by 41 percent to separate contingency, design, and engineering costs, based on data from Appendix B of the *Engineering Study*. Then using data from the *Engineering Study*, the labor share of costs was estimated at 37 percent to 38 percent of the sum of labor, equipment, and materials costs. The remainder was apportioned between equipment and materials in proportion to shares represented in the *Engineering Study* data.

Distribution of costs over time follows annual patterns specified and described in the *Engineering Study*. Alternatives 1 and 2 assume level annual spending as a matter of policy. For Alternatives 3 and 4, spending was distributed over time in response to scheduling considerations such as efficient grouping of the work, the seasonal workability of job sites, when and where it is feasible to do night work, expectations about the weather, workforce availability, accommodating visitors, and funding expectations.

Employment

The *Engineering Study* did not estimate direct employment for road rehabilitation. The estimates of direct employment effects presented in this analysis are derived from assumptions about the labor share of costs, the duration of the construction season, and average labor cost per worker.

Based on information from the *Engineering Study*, the construction season was assumed to be 18 weeks for Alternatives 1, 2, and 4, and 21 weeks for Alternative 3. Initial estimates of the labor cost per worker were accessed from the Montana Davis-Bacon prevailing wage report for the year 2001 (Research and Analysis Bureau 2001). An interview with the lead author of the *Engineering Study* (Kracum, pers. comm. 2002) indicated that prevailing wages might be too low for a project of this type, assuming several factors would contribute to a higher overall labor cost.

First, the project would demand operators, crafts, and laborers with mountain road skills and experience that would command compensation at the high end of the range for every category. Second, some specialized occupations would be recruited from other, higher wage areas. Finally, attracting workers to work on a seasonal job may require higher pay rates.

Therefore, a premium of 10 percent over prevailing wages was applied to base assumptions, leading to a weighted average labor cost per worker of $1,349 per week as the overall labor cost assumption for this analysis. Using this value, the number of employees required is estimated by dividing total labor costs by the duration of the alternative in weeks and by the average weekly labor cost per worker.

Location Distributions

The direct socioeconomic effects of Road rehabilitation were distributed to various locations within the study area based on the following key factors: local labor employed on the project, the residential location of non-local labor, and the location of project activity resulting in expenditures on equipment and materials.

Empirical research on the local composition of construction workforces has shown that the number of local workers supplied by a community increases with the population of the community and the numbers employed by the project and decreases with the distance of the community from the project and with the number of employees supplied by other communities. A preliminary estimate of local hiring based upon a standard version of this model (Mountain West Research) predicted 60 percent of the local hiring from communities and unincorporated areas of Flathead, Glacier and Lake counties and assumed there would be no hiring of residents of Canada. Interviews with the Job Service Division of the Montana Department of Labor and Industry (Lybbert, pers. comm. 2002) indicated that several factors, including transportation, competing job opportunities, and preferences for job location, would tend to decrease local hiring in parts of the study area. Therefore, the local hiring rate was set at 50 percent for this analysis.

The residency distribution of local residents working on the project and of non-local workers who re-locate to the study area during the construction season is assumed to be as follows: 60 percent in Glacier County, 30 percent in Flathead County, and 10 percent in Lake County. All residency is assumed to be outside the Park in accommodations drawn from market housing and lodging resources. This distribution is based on a field reconnaissance of housing resources in the study area and interviews with Job Service personnel familiar with residency patterns associated with past road construction projects at GNP (Baker, pers. comm. 2002).

Work sites for the Road rehabilitation project are distributed across the 50-mile length of the highway. Montana's transportation construction industry is relatively small, and most places where construction establishments are located are more than two hour's drive from GNP. There is, however, a construction firm in Kalispell that has been involved in previous Going-to-the-Sun Road work. The *Engineering Study* identified the most feasible staging sites for the Road project, including two on the west side of Logan Pass and one on the east side. Based on a review of these sources of information, two-thirds of spending on equipment and materials is assumed to occur in Flathead County and one-third in Glacier County.

Local Participation Issues

Although none of the documents describing the project sets forth specific occupational detail for the project, the *Engineering Study* indicates that the Going-to-the-Sun Road work force would need special skills and experience in mountain corridor road construction. According to the Study, this would include craftsmen able to fulfill historic rehabilitation requirements and contractors whose capabilities include handling tiebacks, micropiles, polyurethane injection and high rock scaling. Implementation of training and prequalification programs for local workers and contractors could potentially increase local participation.

An interview with the Job Service Division of the Montana Department of Labor and Industry indicates that there are typically numerous qualified active applicants in the skilled and unskilled construction activities (Lybbert, pers. comm. 2002). The Division maintains a high profile in communities, registers a high proportion of the unemployed, and can provide comprehensive personnel services to incoming employers.

Highway construction projects in GNP are designed, awarded, and administered by the Western Federal Lands Highway Division of the Federal Highway Administration, and they are subject to affirmative action requirements to ensure equal employment opportunity (Parsons, pers. comm. 2002). Assuming the contract is configured like past GNP road projects, contractors on the Road rehabilitation project would be required to implement hiring goals for minority and female utilization in terms of percentages of the total hours of employment and training for the target groups.

Park project contracts also have typically included an enhancement for minority employment for laborers and all construction trades. Because the projects are near the Blackfeet and Flathead Indian Reservations, solicitations for construction work in GNP encourage prospective bidders to meet this intent by giving employment preference to Native Americans through contact with the Tribal Employment Rights Offices on each reservation.

Park Operations

Any large-scale changes in Park operations, particularly staffing and expenditures for locally procured goods and services, could have an impact on socioeconomic conditions in the study area. To assess potential changes in Park operations, the study team gathered and reviewed data from the Park regarding current revenues, expenditures, staffing, and staff residency. Interviews were conducted with Park staff to understand how each of these variables might change under the rehabilitation alternatives.

As described later in this section, affects of rehabilitation on Park revenues, expenditures, and staffing are expected to be somewhat offsetting. Since overall net effects on park operations are expected to be negligible from a socioeconomic standpoint, and the Park does not anticipate specific overall changes in operations under the alternatives, quantitative estimates of changes in Park operations and corresponding socioeconomic impacts were not developed.

Mitigation Effects

As noted in Chapter 2, potential strategies to mitigate socioeconomic impacts of Road rehabilitation were identified via working sessions with local economic development and tourism development specialists, a survey of local businesses in the local impact area, and work with the Citizens Advisory Committee. Essentially, the resulting socioeconomic mitigation strategies can be divided into four categories: construction management, transportation improvements, park facility/service improvements, and marketing measures.

Construction management and transportation mitigation measures consist of scheduling and planning rehabilitation activities to minimize traffic disruption, particularly during peak visitation periods, and adding transit services to further reduce disruption. Such measures are embodied, to varying degrees, in the design of each of the rehabilitation alternatives. Consequently, the socioeconomic effects of these mitigation strategies are built into the projected changes in visitation and visitor expenditures under each of the alternatives.

Park facility and service improvements can help mitigate socioeconomic effects by reducing the impacts on the number of visitors and/or the length of visitor stays at GNP during rehabilitation. The study team analyzed visitor responses to questions in the 2000 and 2002 visitor surveys regarding the impact of such improvements on their decision to come to the Park and on the activities they would undertake while visiting the Park. Based on survey responses, a proportion of visitors who would not come to the Park or would shorten their stay given anticipated traffic disruptions under some of the alternatives would change those decisions if more exhibits and interpretive services were offered. This proportion was used, in conjunction with the methodology for estimating impacts of visitation reductions described previously, to calculate the partly offsetting impact of facility and service improvement mitigation measures on visitation levels, length of visitor stays in the study area, and associated socioeconomic effects.

Effects of mitigation strategies based on marketing measures are more difficult to quantify. The study team interviewed local economic development representatives within the study area and researched proactive marketing efforts in other communities highly dependent on nearby national park visitation, as well as statewide tourism marketing efforts. Essentially, proactive public relations by the Park during rehabilitation (as described in Chapter 2) is believed to be essential in avoiding a public perception that the effect of Road rehabilitation on the visitor experience at GNP is worse than it actually would be. For example, it is essential that the message be conveyed that the Park is not closed and that a variety of attractions for visitors remains. In other words, these efforts are believed necessary to confine visitation impacts to the projected levels based on responses to the 2000 and 2002 visitor surveys.

Under Alternatives 3 and 4, the Park also plans to participate in business planning efforts to coordinate with local economic development and tourism agencies and to provide funding that such agencies can apply for and use in marketing GNP and their communities (as described in Chapter 2). Such efforts can undoubtedly have an impact on visitation levels to the Park, but there is too much uncertainty regarding what will ultimately be done and how effective it would be to specifically quantify the effects of such measures.

Indirect and Induced Impacts

Secondary economic impacts result from "ripple" or "multiplier" effects throughout the local economy in response to direct impacts. In this case, they are the changes in economic activity that result from subsequent rounds of re-spending tourism dollars or direct road construction expenditures.

Definition of Indirect and Induced Impacts

Secondary impacts are often further divided into two categories: indirect impacts and induced impacts. Indirect impacts refer to changes in sales, income or employment within the local region in industries that supply goods and services to directly affected businesses. For example, in the case where the direct impact is reductions in visitor spending, indirect impacts may include a decrease in sales for the firms that supply linen to motels or lodges in the local area.

As a result of both the direct and indirect impacts, the number of jobs and income in the affected sectors will also change. This change in household spending capability can then affect the revenues of local businesses that cater to household needs, and the receipts of local governments. These secondary effects are known as "induced" impacts. In our case, induced impacts would be the changes in sales within the local impact region that result from changes in local household spending of income (on housing, utilities, groceries, etc.) earned in the tourism, construction and other supporting industries. Both indirect and induced impacts may be expressed either in terms of changes in expenditures (i.e., sales, output or income) or in terms of changes in the numbers of jobs required to produce a given volume of sales/production within the affected industries.

Overview of Input-Output Modeling for This Analysis

Input-Output (IO) analysis is a common method used to measure secondary socioeconomic impacts. This type of analysis usually employs an IO model tailored to the specific impact region of interest, which characterizes the flows of economic activity between sectors within that impact region. The model captures what each business or sector must purchase from every other sector in order to produce a dollar's worth of goods or services. In this way, flows of economic activity may be traced throughout both the local impact region and more generally, throughout the economy as a whole.

To conduct its analysis of the secondary impacts from changes in visitor spending, construction activity and park operations associated with each alternative for the United States portion of the impact region, the study team used the IMPLAN model originally developed by the United States

Forest Service. IMPLAN (IMpact analysis for PLANing) is a micro-computer based input-output modeling system that can estimate impacts for up to 528 sectors for any region in the United States defined at either the county or state level. To assess the secondary impacts for both the Province of Alberta and for the portion of Alberta within the local impact area (Census District 3) the study team retained Dr. Atif Kubursi of Econometric Research Limited and McMaster University in Hamilton, Ontario. Dr. Kubursi has developed a Canadian input-output model and has used it extensively to analyze the economic implications of tourism activity in Alberta. Kubursi's model is a less detailed model than IMPLAN, with only 57 commodities and 37 sectors represented (IMPLAN 2002; Econometric Research Limited 2002).

Fiscal and Community Impacts

To evaluate potential direct and indirect fiscal and community service impacts, budgets and other supporting documentation for local governments and infrastructure in the study area were obtained from county and provincial staff and the 2000 Census. Revenue sources were analyzed for sensitivity to changes in retail sales and other anticipated effects of the alternatives. Telephone interviews were conducted with local government staff in other communities adjacent to national parks that had experienced reductions in visitation due to construction projects and/or wildfires, particularly communities near Yellowstone National Park and Yosemite National Park. Finally, personal visits were made to county commissioners, county staff members, regional Job Service staff and local economic development officials to discuss any potential fiscal and community service effects from the alternatives.

Cumulative Impacts

As described at the outset of this chapter, cumulative effects refer to the impacts that result when the incremental impact of the action being analyzed is added to the impacts of other past, present or reasonably foreseeable future actions. While the effects of these actions can be relatively minor on an individual basis, collectively, their effects may be significant.

The study team evaluated a number of other events that are currently planned for the local impact area that could potentially have significant cumulative socioeconomic effects. These include a variety of highway and transportation projects currently planned for the local impact area, national forest activities, planned celebrations of the Lewis and Clark Bicentennial and the Glacier Park Centennial, and increases in regional population.

In order to evaluate these impacts, the study team analyzed information on anticipated events and conducted numerous on-site interviews. Interviewees included representatives for each of the three counties in the Montana portion of the study area, representatives of local economic development organizations, and representatives of both the Salish-Kootenai Confederated tribes and the Blackfeet tribe.

Table B-1. Visitors to geographic areas in GNP outside of the Road corridor.

Area	Percent of Respondents Who Stopped	Most Frequent Response for Duration of Stop	Percent of Respondents Who Did Not Stop Due to Lack of Parking	Average Estimated Time Spent for Daily Recreation
Polebridge/ Northfork	8%	28% 1 – 4 hours	6%	30 hours, 50 minutes
Many Glacier/ Swiftcurrent	39%	59% 4 hours – 1 day	6%	4 hours, 20 minutes
Two Medicine	18%	36% 1 – 4 hours	7%	3 hours, 5 minutes
Chief Mountain	14%	66% < 1 hour	6%	1 hour, 20 minutes
Camas Road	8%	42% 1 – 4 hours	5%	2 hours, 50 minutes
Waterton, Canada	25%	63% 4 hours – 1 day	4%	4 hours, 35 minutes

Source: WIS 2001.

Table B-2. Average daily expenditures per party during GNP visit (2002 $), all visitors.

Expenditures	Day Visitors		Motel Stay		Campers		Visited Friends or Relatives
	Local	Non-Local	In Park	Outside Park	In Park	Outside Park	
Groceries	$11.22	$26.42	$15.69	$18.72	$17.27	$19.13	$29.81
Restaurant/Bar	$11.58	$14.96	$52.84	$52.42	$20.44	$23.93	$43.84
Gas/Auto	$11.03	$27.46	$18.60	$24.24	$15.49	$21.11	$28.24
Lodging/Camping	$1.03	$37.89	$122.82	$138.32	$28.33	$41.84	$17.24
Recreation	$4.57	$6.81	$19.13	$23.98	$12.21	$10.25	$16.08
Gifts	$7.95	$19.90	$27.87	$26.20	$15.71	$29.98	$27.28
Other†	$1.41	$2.24	$12.86	$11.31	$9.85	$3.21	$4.87
Total	$48.78	$135.68	$269.82	$295.18	$119.30	$149.45	$167.35

†Excluding airfare.
Source: WIS 2001 and Coley-Forrest 2002.

Table B-3. Average daily expenditures per party during GNP visit (2002 $), Canadians only.

Expenditures	Day Visitors	Motel Stay		Campers		Visited Friends or Relatives
	Non-Local	In Park	Outside Park	In Park	Outside Park	
Groceries	$10.06	$6.19	$25.27	$12.60	$14.69	$9.29
Restaurant/Bar	$11.35	$47.18	$39.18	$7.58	$21.31	$5.90
Gas/Auto	$14.83	$2.33	$18.79	$10.71	$20.55	$6.67
Lodging/Camping	$9.33	$79.71	$103.00	$14.67	$28.08	$0.00
Recreation	$1.24	$40.96	$41.69	$12.24	$12.99	$0.00
Gifts	$15.82	$27.58	$19.99	$4.37	$30.66	$4.24
Other†	$4.00	$0.00	$20.71	$0.00	$3.27	$20.00
Total	$66.63	$203.95	$268.63	$62.17	$131.55	$46.09

†Excluding airfare.

Source: WIS 2001 and Coley-Forrest 2002.

Table B-4. Share of employment by key industry sector in the Montana study area.

Employment in 1999 by Key Sector	Montana	Flathead	Glacier	Lake
Farm and Agricultural Services	7.4%	3.9%	9.5%	10.8%
Annual change since 1990	1.1%	2.2%	0.2%	-0.3%
Construction	6.3%	8.2%	4.8%	6.6%
Change from 1990	6.6%	7.7%	4.2%	6.2%
Manufacturing	5.3%	10.2%	1.2%	11.4%
Annual change since 1990	1.2%	1.6%	-6.6%	7.4%
Trade and Services	53.2%	54.8%	52.3%	52.1%
Annual change since 1990	1.2%	1.6%	0.1%	1.1%
Other Private	12.8%	13.2%	10.0%	8.5%
Annual change since 1990	0.3%	0.8%	-0.6%	1.3%
Government	15.1%	9.7%	22.3%	10.6%
Annual change since 1990	0.4%	1.1%	0.3%	0.9%

Source: Bureau of Economic Analysis 2001.

Table B-5. Percentage of full and part time employees by industry— three county region.

Industry	1980	1990	1999	1980 to 1999 Change (in percentage points)
Farm Employment	7.1%	5.9%	4.2%	(2.9)
Agricultural Services, Forestry and Fishing	1.2%	1.5%	1.6%	0.4
Mining	1.9%	0.7%	0.6%	(1.3)
Construction	6.2%	5.5%	7.6%	1.4
Manufacturing	13.1%	10.6%	9.7%	(3.4)
Transportation, Communications and Utilities	6.4%	4.7%	4.1%	(2.2)
Wholesale Trade	3.0%	2.6%	2.2%	(0.9)
Retail Trade	17.5%	18.7%	19.5%	2.0
Finance, Insurance and Real Estate	6.3%	6.5%	7.2%	1.0
Services	22.0%	29.3%	32.3%	10.3
Government	15.4%	14.1%	11.0%	(4.3)

Source: Bureau of Economic Analysis 2001.

Table B-6. Distribution of transportation construction employment and business establishments in Montana, 1999.

	Employees	Establishments		
		All	With <50 Employees	With 50+ Employees
State of Montana	1,529	113	105	8
Billings MSA	454	12	9	3
Missoula MSA	370	20	18	2
Great Falls MSA	206	8	7	1
Gallatin Co. (Bozeman)	92	11	10	1
Silver Bow Co. (Butte)	60	3	3	0
Lewis & Clark Co. (Helena)	21	5	5	0
Balance of State	326	54	53	1

Note: Data are for the highway, street, bridge and tunnel construction sector, NAICS 2341.
MSA Metropolitan Statistical Area.

Source: U.S. Census Bureau 2000.

Table B-7. Selected demographic indicators in the Montana study area.

	Montana	Flathead	Glacier	Lake	Three-County Region
Persons under 18 years old in 2000	25.5%	25.9%	34.9%	28.1%	27.4%
Persons 65 years old and over in 2000	13.4%	13.0%	9.2%	14.5%	12.9%
White population in 2000	90.6%	96.3%	35.4%	71.4%	83.4%
American Indian population in 2000	6.2%	1.1%	61.8%	23.8%	13.4%
Persons in poverty in 1998	15.7%	14.6%	35.6%	21.5%	18.8%
Median household income in 1998, as percent of statewide level	100	109	70	88	NA

Note: All data available from Census and Economic Information Center, Montana Department of Commerce (ceis.commerce.state.mt.us).

Source: U.S. Census Bureau 2000.

Table B-8. Housing units by county.

	Flathead County		Glacier County		Lake County	
	Units	Percent	Units	Percent	Units	Percent
Total	34,773		5,243		13,605	
Owner Occupied	21,678	62%	2,670	51%	7,278	53%
Renter Occupied	7,910	23%	1,634	31%	2,914	21%
Vacant	5,183	15%	939	18%	3,413	25%
Total Vacant	5,183		939		3,413	
Owner	375	7%	44	5%	144	4%
Renter	595	11%	215	23%	217	6%
Rented/Sold Not Occupied	185	4%	32	3%	79	2%
Seasonal	3,570	69%	386	41%	2,690	79%
Other	458	9%	262	28%	283	8%

Source: U.S. Census Bureau 2000.

Table B-9. Alternative 1 (baseline) visitor expenditures and resulting total economic output (thousands of year 2002 dollars).

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004	$115,756	$167,872	$56,177	$79,326	$38,275	$46,975	$21,303	$28,910	$18,065	$25,171
2005	$116,130	$168,415	$56,359	$79,583	$38,399	$47,127	$21,372	$29,004	$18,123	$25,252
2006	$116,318	$168,686	$56,450	$79,711	$38,461	$47,203	$21,406	$29,050	$18,152	$25,293
2007	$116,442	$168,867	$56,510	$79,796	$38,502	$47,254	$21,429	$29,081	$18,172	$25,320
2008	$116,505	$168,958	$56,540	$79,839	$38,523	$47,279	$21,441	$29,097	$181,181	$25,333
2009	$116,567	$169,048	$56,571	$79,882	$38,543	$47,304	$21,452	$29,113	$18,191	$25,347
2010	$116,567	$169,048	$56,571	$79,882	$38,543	$47,304	$21,452	$29,113	$18,191	$25,347
2011	$116,567	$169,048	$56,571	$79,882	$38,543	$47,304	$21,452	$29,113	$18,191	$25,347
2012-2023 (Annual Impacts)	$116,567	$169,048	$56,571	$79,882	$38,543	$47,304	$21,452	$29,113	$18,191	$25,347
2024-2053 (Annual Impacts)	$116,567	$169,048	$56,571	$79,882	$38,543	$47,304	$21,452	$29,113	$18,191	$25,347
Baseline Totals	$5,826,677	$8,449,980	$2,827,717	$3,992,942	$1,926,605	$2,364,527	$1,072,305	$1,455,209	$909,293	$1,266,981

Source: BBC 2003.

Table B-10. Jobs supported by visitor expenditures for Alternative 1.

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
2004	3,351	4,241	1,626	2,011	1,054	1,204	671	801	298	478
2005	3,362	4,255	1,631	2,018	1,057	1,208	673	804	299	479
2006	3,367	4,262	1,634	2,021	1,059	1,210	674	805	299	480
2007	3,371	4,266	1,636	2,023	1,060	1,211	675	806	300	480
2008	3,373	4,268	1,637	2,024	1,061	1,212	675	806	300	481
2009	3,374	4,271	1,637	2,025	1,061	1,212	676	807	300	481
2010	3,374	4,271	1,637	2,025	1,061	1,212	676	807	300	481
2011	3,374	4,271	1,637	2,025	1,061	1,212	676	807	300	481
2012-2023 (Annual Impacts)	3,374	4,271	1,637	2,025	1,061	1,212	676	807	300	481
2024-2053 (Annual Impacts)	3,374	4,271	1,637	2,025	1,061	1,212	676	807	300	481

Source: BBC 2003.

Table B-11. Projected impacts on visitor expenditures and economic output for Alternative 2 (thousands of year 2002 dollars).

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-$4,847	-$7,027	-$2,352	-$3,321	-$1,603	-$1,967	-$892	-$1,210	-$781	-$1,912
2005	-$4,863	-$7,050	-$2,360	-$3,332	-$1,608	-$1,973	-$895	-$1,214	-$783	-$1,918
2006	-$4,871	-$7,061	-$2,363	-$3,337	-$1,611	-$1,977	-$896	-$1,216	-$785	-$1,921
2007	-$4,876	-$7,069	-$2,366	-$3,341	-$1,613	-$1,979	-$897	-$1,217	-$786	-$1,923
2008	-$4,878	-$7,072	-$2,367	-$3,342	-$1,613	-$1,980	-$898	-$1,218	-$786	-$1,924
2009	-$4,881	-$7,076	-$2,368	-$3,344	-$1,614	-$1,981	-$898	-$1,218	-$786	-$1,925
2010	-$4,881	-$7,076	-$2,368	-$3,344	-$1,614	-$1,981	-$898	-$1,218	-$786	-$1,925
2011	-$4,881	-$7,076	-$2,368	-$3,344	-$1,614	-$1,981	-$898	-$1,218	-$786	-$1,925
2012-2023 (Annual Impacts)	-$4,881	-$7,076	-$2,368	-$3,344	-$1,614	-$1,981	-$898	-$1,218	-$786	-$1,925
2024-2053 (Annual Impacts)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Alternative 2 Total	-$97,549	-$141,423	-$47,335	-$66,837	-$32,261	-$39,587	-$17,952	-$24,352	-$15,716	-$38,473

Source: BBC 2003.

Table B-12. Projected effects on jobs for Alternative 2.

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-140	-177	-68	-84	-44	-50	-28	-34	-12	-24
2005	-140	-178	-68	-84	-44	-50	-28	-34	-12	-24
2006	-141	-178	-68	-84	-44	-50	-28	-34	-12	-24
2007	-141	-178	-68	-84	-44	-50	-28	-34	-12	-25
2008	-141	-178	-68	-85	-44	-50	-28	-34	-12	-25
2009	-141	-178	-68	-85	-44	-50	-28	-34	-12	-25
2010	-141	-178	-68	-85	-44	-50	-28	-34	-12	-25
2011	-141	-178	-68	-85	-44	-50	-28	-34	-12	-25
2012-2023 (Annual Impacts)	-141	-178	-68	-85	-44	-50	-28	-34	-12	-25
2024-2053 (Annual Impacts)	0	0	0	0	0	0	0	0	0	-25

Source: BBC 2003.

Table B-13. Projected effects on visitor expenditures and economic output for Alternative 3 (thousands of year 2002 dollars).

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-$7,721	-$11,193	-$3,747	-$5,290	-$2,553	-$3.132	-$1,421	-$1,928	-$1,244	-$3,042
2005	-$7,746	-$11,229	-$3,759	-$5,307	-$2,561	-$3.142	-$1,426	-$1,934	-$1,248	-$3,052
2006	-$7,758	-$11,247	-$3,765	-$5,316	-$2,565	-$3,147	-$1,428	-$1,937	-$1,250	-$3,057
2007	-$7,767	-$11,259	-$3,769	-$5,321	-$2,568	-$3,151	-$1,429	-$1,939	-$1,251	-$3,060
2008	-$7,771	-$11,265	-$3,771	-$5,324	-$2,570	-$3,152	-$1,430	-$1,940	-$1,252	-$3,062
2009	-$7,775	-$11,271	-$3,773	-$5,327	-$2,571	-$3,154	-$1,431	-$1,942	-$1,253	-$3,063
2010	-$7,775	-$11,271	-$3,773	-$5,327	-$2,571	-$3,154	-$1,431	-$1,942	-$1,253	-$3,063
2011	-$7,775	-$11,271	-$3,773	-$5,327	-$2,571	-$3,154	-$1,431	-$1,942	-$1,253	-$3,063
2012-2023 (Annual Impacts)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2024-2053 (Annual Impacts)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Alternative 3 Total	-$62,088	-$90,009	-$30,132	-$42,540	-$20,530	-$25,186	-$11,427	-$15,504	-$10,002	-$24,463

Source: BBC 2003.

Table B-14. Projected effects on jobs for Alternative 3.

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-223	-282	-108	-134	-70	-80	-45	-53	-21	-42
2005	-224	-283	-108	-134	-70	-80	-45	-53	-21	-42
2006	-224	-283	-109	-135	-70	-80	-45	-53	-21	-42
2007	-224	-284	-109	-135	-70	-81	-45	-53	-21	-42
2008	-224	-284	-109	-135	-70	-81	-45	-53	-21	-42
2009	-225	-284	-109	-135	-70	-81	-45	-53	-21	-42
2010	-225	-284	-109	-135	-70	-81	-45	-53	-21	-42
2011	-225	-284	-109	-135	-70	-81	-45	-53	-21	-42
2012-2023 (Annual Impacts)	0	0	0	0	0	0	0	0	0	0
2024-2053 (Annual Impacts)	0	0	0	0	0	0	0	0	0	0

Source: BBC 2003.

Table B-15. Projected effects on visitor expenditures and economic output for Alternative 4 (thousands of year 2002 dollars).

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-$13,903	-$20,160	-$6,747	-$9,528	-$4,597	-$5,641	-$2,559	-$3,472	-$1,882	-$4,605
2005	-$13,978	-$20,269	-$6,784	-$9,580	-$4,622	-$5,672	-$2,573	-$3,491	-$1,892	-$4,630
2006	-$14,024	-$20,335	-$6,806	-$9,611	-$4,637	-$5,690	-$2,581	-$3,502	-$1,898	-$4,645
2007	-$14,046	-$20,368	-$6,816	-$9,626	-$4,644	-$5,699	-$2,585	-$3,508	-$1,901	-$4,652
2008	-$14,061	-$20,389	-$6,824	-$9,636	-$4,649	-$5,705	-$2,588	-$3,512	-$1,903	-$4,657
2009	-$14,069	-$20,400	-$6,827	-$9,642	-$4,652	-$5,708	-$2,590	-$3,513	-$1,904	-$4,660
2010	-$14,076	-$20,411	-$6,831	-$9,647	-$4,654	-$5,711	-$2,591	-$3,515	-$1,905	-$4,662
2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2012-2023 (Annual Impacts)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2024-2053 (Annual Impacts)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Alternative 4 Total	-$98,157	-$142,333	-$47,635	-$67,269	-$32,456	-$39,826	-$18,067	-$24,513	-$13,284	-$32,511

Source: BBC 2003.

Table B-16. Projected Local Impacts from Visitation Changes Due to Alternative 4 GTSR Rehabilitation: Jobs

	State of Montana		Flathead County		Glacier County		Lake County		SW Alberta (CD-3)	
Year	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
2004	-402	-508	-195	-241	-126	-144	-81	-96	-38	-85
2005	-403	-510	-196	-242	-126	-144	-81	-96	-38	-85
2006	-404	-510	-196	-242	-127	-145	-81	-96	-38	-85
2007	-404	-511	-196	-242	-127	-145	-81	-97	-38	-85
2008	-405	-511	-196	-243	-127	-145	-82	-97	-38	-86
2009	-405	-512	-196	-243	-127	-145	-82	-97	-38	-86
2010	-405	-512	-196	-243	-127	-145	-82	-97	-38	-86
2011	0	0	0	0	0	0	0	0	0	0
2012-2023 (Annual Impacts)	0	0	0	0	0	0	0	0	0	0
2024-2053 (Annual Impacts)	0	0	0	0	0	0	0	0	0	0

Source: BBC 2003.

References for Appendix B

Baker, G. 2002. Manager, Glacier County Job Service. Personal communication with Doug Jeavons, BBC Research & Consulting. March 21.

BBC (BBC Research & Consulting). 2003. Data analysis for Going-to-the-Sun Road Final Environmental Impact Statement.

Bureau of Economic Analysis. 2001. Regional Economic Information System. Available from the Census and Economic Information Center, Montana Department of Commerce. Rates calculated by BBC Research & Consulting. <http://ceis.commerce.state.mt.us>.

Census (U.S. Census Bureau). 2000. Poverty and household income estimates from U.S. Census Bureau, Housing and Household Economic Statistics Division, Small Area Estimates Branch. Rates calculated by BBC Research & Consulting.

Coley-Forrest. 2002. Glacier National Park 2002 Survey of Visitors. October 2002. Denver, CO.

Econometric Research Limited. 2002. Alberta Input-Output Modeling. March.

Edgar, C. 2002. Director, Flathead Valley Convention and Visitor Bureau. Personal communication with Doug Jeavons, BBC Research & Consulting. March 20.

IMPLAN. 2002. Minnesota IMPLAN Group, IMPLAN Input-Output Model.

Kracum, J. 2002. Owner, Kracum Resources. Personal communication with Lloyd Levy, BBC Research & Consulting. March.

Lybbert. 2002. Glacier County Job Service. Personal communication with Lloyd Levy, BBC Research & Consulting. March.

Parsons, W. 2002. Federal Highway Administration. Personal communication with Lloyd Levy, BBC Research & Consulting. March.

Research and Analysis Bureau. 2001. Job Service Division, Montana Department of Labor and Industry. Montana Prevailing Wage Heavy and Highway Construction.

Stewart, J. 2002. Executive Director, Glacier Action & Involvement Now, Inc. Personal communication with Doug Jeavons, BBC Research & Consulting. March 22.

Street, B. 2002. Management Analyst, National Park Service. Personal communication with C.J. Laffer, BBC Research & Consulting. January.

WIS (Washington Infrastructure Services). 2001. Going-to-the-Sun Road Socioeconomic Study. August 2001. Glenwood Springs, CO.

Appendix C:
Wildlife and Plant Species of Concern

The wildlife species of concern found in Glacier National Park are described in Table C-1. This list includes species that are listed as "species of special concern" by the Montana Natural Heritage Program, "priority species" by Partners in Flight, and "sensitive species" by the U.S. Forest Service. Aquatic species are listed as species of concern by the Montana National Heritage Program.

Wildlife Species of Concern

Table C-1. Wildlife species of concern in the Going-to-the-Sun Road corridor.

Common Name	Scientific Name	Habitat	Potential for Occurrence near the GTSR
Mammals			
Fisher	*Martes pennanti*	Coniferous forest and riparian areas	Present, McDonald and St. Mary drainages
Hoary bat	*Lasiurus cinereus*	Mature subalpine, montane and riparian forest edges	Suitable habitat, rare occurrence east and west sides of GNP
Northern bog lemming	*Synaptomys borealis*	Wet meadows, bogs, and marshes	Present McDonald Creek drainage, rare resident, breeding confirmed
Rocky mountain bighorn sheep	*Ovis canadensis*	Subalpine and alpine rocky steep terrain	Present along Continental Divide to St. Mary
Silver-haired bat	*Lasionycteris noctivagans*	Mature subalpine, montane and riparian woodland	Present, both east and west sides of GNP, including McDonald Valley
Swift fox	*Vulpes velox*	Low elevation grasslands	Present in grassland habitat near St. Mary
Townsend's big-eared bat	*Corynorhinus townsedii*	Montane to subalpine forest, shrubland and riparian	Suitable habitat, but no records from GNP
Wolverine	*Gulo luscus*	Subalpine forest and alpine meadows	Present McDonald and St. Mary drainages, rare resident, breeding documented
Birds			
American white pelican	*Pelecanus erythrorhynochos*	Near water bodies	Present, rare in summer at Lake McDonald and St. Mary Lake, no breeding evidence
Barrow's goldeneye	*Bucephala islandica*	Small lakes where cavity trees for nesting are available	Present, common spring to fall, both sides of GNP
Black swift	*Cypseloides niger*	Rock cliffs near waterfalls	Present, rare spring and summer, McDonald and St. Mary Valleys
Black tern	*Chlidonias niger*	Large wet meadows, montane	Possible, records in North Fork, observations on east side of GNP
Black-backed woodpecker	*Nattallornis borealis*	Mature subalpine and montane forest, riparian woodlands	Present in McDonald Creek drainage, nesting documented

Common Name	Scientific Name	Habitat	Potential for Occurrence near the GTSR
Black-crowned night heron	*Nycticorax nycticorax*	Shallow water bodies, wetlands, marshes	Possible, accidental visitor to west side of GNP
Boreal owl	*Aegolius funereus*	Subalpine dense mature forest	Present in McDonald drainage, nesting documented
Brewer's sparrow	*Spizella breweri*	Shrubby subalpine habitat	Present, uncommon spring to fall
Brown creeper	*Certhia americana*	Coniferous forest montane to subalpine	Present, common year-round
Calliope hummingbird	*Stellula calliope*	Montane and subalpine forest clearings, alpine meadows	Present, common spring and summer, both sides of GNP
Caspian tern	*Sterna caspia*	Lakes and streams	Possible, rare in fall east side of GNP
Chestnut-collard longspur	*Calcarius ornatus*	Grassland prairie	Possible, uncommon spring, both sides of GNP
Clark's nutcracker	*Nucifraga columbiana*	Coniferous forest	Present, common year-round
Common loon	*Gavia immer*	Large and small lakes with emergent vegetation	Present, common spring to fall in Lake McDonald, St. Mary Lake
Common tern	*Sterna hirundo*	Marshes, lakes, and rivers	Possible, rare spring and fall migrant on east side of GNP
Cordilleran flycatcher	*Empidonax difficilis*	Woodlands	Possible, uncommon North Fork area
Ferruginous hawk	*Buteo regalis*	Plains and grasslands	Present, rare in grasslands on the east side of GNP
Forster's tern	*Sterna fosteri*	Marshes near open shallow water	Possible, accidental visitor on east side of GNP
Franklin's gull	*Larus pipixcan*	Open country near lakes	Possible, uncommon both sides of GNP spring and summer
Golden eagle	*Aquila chrysaetos*	Nests in cliffs and trees in a variety of habitats	Present, several nest sites between Avalanche and Logan Pass; GNP is important migration corridor
Great gray owl	*Strix nebulosa*	Dense conifer forest with meadows	Present, rare resident with documented nesting
Hammond's flycatcher	*Empidonax hammondii*	Mature coniferous forest with open understory	Present, common spring and summer, both sides of GNP
Harlequin duck	*Histrionicus histrionicus*	Primarily fast moving streams, occasionally lakes	Present, breeding habitat along upper McDonald, Avalanche Snyder, and Reynolds Creeks, and St. Mary
Hooded merganser	*Lophodytes cucullatus*	Ponds surrounded by forest	Present, uncommon spring to fall, both sides of GNP
Horned grebe	*Podiceps auritus*	Small lakes and ponds	Present, common spring and summer, both sides of GNP
Lark bunting	*Calamospiza melanocorys*	Grassland prairie	Possible, rare summer, both sides of GNP
Lazuli bunting	*Passerina amoena*	Foothills and riparian shrubland	Present, common spring and summer, both sides of GNP

Common Name	Scientific Name	Habitat	Potential for Occurrence near the GTSR
LeConte's sparrow	*Ammodramus leconteii*	Wet meadows	Present, rare spring to fall on west side of GNP
Lewis's woodpecker	*Melanerpes lewis*	Open pine forest	Present, uncommon spring and summer, both sides of GNP
Loggerhead shrike	*Lanius ludovicianus*	Plains, low valleys, open country	Present, uncommon spring and fall, both sides of GNP
Long-billed curlew	*Numenius americanus*	Open areas near water	Present, uncommon in spring, both sides of GNP
Marbled godwit	*Limosa fedoa*	Prairie grasslands and meadows near lakes	Possible, rare spring, both sides of GNP
McCown's longspur	*Calcarius mccownii*	Grassland prairie	Possible, rare spring, both sides of GNP
Northern goshawk	*Accipiter gentiles*	Mature dense coniferous forest	Present, uncommon spring to fall, rare nesting, sightings in McDonald and St. Mary Valleys
Northern hawk owl	*Surnia uluta*	Burned forested areas, large snags	Present, rare resident and migrant, nesting in North Fork area
Olive-sided flycatcher	*Contopus borealis*	Coniferous forest, bogs, recent burned forest	Present, uncommon spring to fall in McDonald and St. Mary Valleys, documented breeding
Peregrine falcon	*Falco peregrinus*	Foothills to montane, nest generally in cliffs	Present, rare migrant, no known nesting
Pileated woodpecker	*Dryocopus pileatus*	Mature forest montane to subalpine and riparian	Present, fairly common, nesting documented
Red-eyed vireo	*Vireo olivaceus*	Riparian deciduous forest	Present, uncommon spring and summer, both sides of GNP
Ruffed grouse	*Bonasa umbellus*	Deciduous woodland, coniferous forest edges	Present, abundant year-round
Three-toed woodpecker	*Picoides tridactylus*	Coniferous forest and burned areas	Present, common year-round throughout GNP
Trumpeter swan	*Cygnus buccinator*	Lakes, ponds, and rivers	Present, spring and fall migrant, Lake McDonald
Vaux's swift	*Chaetura vauxi*	Coniferous and deciduous forest	Present, common spring and summer both sides of GNP
Veery	*Catharus fuscescens*	Deciduous woodlands and shrubland	Present, uncommon spring to fall, both sides of GNP
White-tailed ptarmigan	*Lagopus leucurus*	Tundra and riparian areas	Present, common in alpine areas
Williamson's sapsucker	*Sphyrapicus thyroideus*	Coniferous and aspen forests	Possible, uncommon spring and summer, both sides of GNP
Willow flycatcher	*Empidonax traillii*	Riparian thickets, mountain parks	Present, common spring and summer, both sides of GNP
Winter wren	*Troglodytes troglodytes*	Coniferous shrubby understory	Present, common spring and summer, both sides of GNP

Common Name	Scientific Name	Habitat	Potential for Occurrence near the GTSR
AMPHIBIANS AND FISH			
Boreal toad	*Bufo boreas*	Breeds in shallow, permanent water bodies above 8,500 feet; adults use upland habitat	Present, aquatic habitat
Rocky Mountain capshell	*Acroloxus coloradensis*	Lakes and ponds	Present in the St. Mary drainage
Shorthead sculpin	*Cottus confussus*	Streams and lakes	Present in the St. Mary drainage
Spoonhead sculpin	*Cottus ricei*	Streams and lakes	Present in the McDonald Creek drainage
Tailed frog	*Ascaphus truei*	Turbulent headwater streams with cobble substrates	Present in McDonald Valley, breeding confirmed
Trout-perch	*Percopsis omiscomaycus*	Streams and lakes	Present, rare in St. Mary Lake
Western cutthroat trout	*Oncorhynchus clarki lewisi*	Streams and lakes	Present in east and west side water bodies

PLANT SPECIES OF CONCERN

Tables C-2, C-3, and C-4 list plant, moss, and lichen species of concern for Glacier National Park according to species listed as plant "species of special concern" listed by the Montana Natural Heritage Program. The rank for these species includes the state rank by the Natural Heritage Program, unless the plant is also globally rare, in which case its global rank is also listed.

Table Code Definitions

G = global status; S = state-wide status; T = rank for subspecific taxon; Q = taxonomic questions involved; H = historically known only from records before 1925; may be rediscovered.

1 = Critically imperiled (<5 occurrences) because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction.

2 = Has demonstrable factors making it vulnerable to extinction throughout its range (6 to 20 occurrences).

3 = Either very rare or local throughout its restricted range (21 to 100 occurrences) or vulnerable to extinction because of other factors.

4 = Apparently secure, through it may be quite rare in parts of its range, especially at the periphery.

5 = Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.

Table C-2. Plant species of concern in the Going-to-the-Sun Road geographic corridor.

Common Name	Scientific Name	Habitat	Rank
Lyre-leaf rockcress	*Arabis lyrata var. kamchatica***	Open, rocky slopes in montane and subalpine zones	G5T5/S2
Mountain moonwort	*Botrychium montanum*	Deep litter of springy, mature forests; also in riparian thickets, mesic meadows, and grassy trail edges where there is little vegetated cover	G3/S3
Creeping sedge	*Carex chordorhiza*	Sphagnum bogs at low elevations	G5/S2
Maritime sedge	*Carex incurviformis var. incurviformis*	Wet rock ledges and small streams above treeline	G4G5T4T5/S1
Lens-fruited sedge	*Carex lenticularis var. dolia***	Wet meadows and boggy ground, along ponds and shallow streams	G5T3Q/S2
Pale sedge	*Carex livida****	Cold, calcareous, poorly drained lowlands and wet peaty ground at low elevations in foothill and submontane zones, shade intolerant.	G5/S3
Beaked sedge	*Carex rostrata***	Organic soils of fens and floating peat mats	G5/S1
Pink corydalis	*Corydalis sempervirens**	Rocky, dry soils of eroding or disturbed slopes, frequently after a burn	G4G5/S1
Mountain bladder fern	*Cystopteris montana***	Moist areas in the mountains at mid to high elevations	G5/SH
Alaskan clubmoss	*Diphasiastrum sitchense*	Meadows and open rocky places at mid to high elevations	G5/S3
Dense-leaf draba	*Draba densifolia*	Gravelly and stony, open soil of rocky slopes and exposed ridges from the mid-montane to alpine zones	G5/S2
Macoun's draba	*Draba macounii***	Moist to wet areas of cool, slopes, outcrops and streams above treeline	G3G4/S1

Common Name	Scientific Name	Habitat	Rank
English sundew	*Drosera anglica*	With moss in wet, organic soils of fens, swamps and bogs in the montane zone	G5/S2
Giant helleborine	*Epipactis gigantea*	Open, wet sites, and in mossy shady areas along rivers, streams, meadows, seeps, and hanging gardens from warm desert shrub to spruce communities	G4/S2
Slender cottongrass	*Eriophorum gracile*	In wet, organic soil of fens at mid to high elevations	G5/S2
Northern eyebright	*Euphrasia arctica var. disjuncta*	In alpine bogs, moist peaty soil, streambanks, and other wet places	G5/S1
Viviparous fescue	*Festuca vivipara***	Moist to wet alpine turf often on slopes between 7,000-8,000 feet	G4G5Q/S2
Glaucous gentian	*Gentiana glauca***	Wet to boggy soils of rock ledges at or above treeline	G4G5/S1
Three-flowered rush	*Juncus albescens*	Peatlands and moist, well-developed turf and gravelly soils along streams and seeps in the alpine zone	G5/S2
Pale laurel	*Kalmia polifolia*	In peat-lands, including spruce forest and outer lake margins in the montane zone	G5/S1
Simple kobresia	*Kobresia simpliciuscula*	Moist, organic soils in alpine turf on exposed slopes	G5/S2
Ground pine	*Lycopodium dendroideum*	Low elevations in moist, montane forest	G5/S1
Running pine	*Lycopodium lagopus***	Turf along moist slopes at mid to high elevations	G?/S1
Adder's tongue	*Ophioglossum pusillum*	Wet meadows, margins of fens, and gravelly moist soil at low to mid elevations	G5/S2
Alpine glacier poppy	*Papaver pygmaeum*	Rocky, open slopes at high elevations	G3/S3
Banff loose-flowered bluegrass	*Poa laxa ssp. banffiana***	Mudstone slopes and alpine turf at high elevations	G5?T1/S1
Five-leaf cinquefoil	*Potentilla quinquefolia*	Dry, gravelly soil of windswept ridges and slopes in the alpine zone	G5T4/S2
Northern buttercup	*Ranunculus pedatifidus*	Moist meadows, grasslands, alpine tundra, or open, rocky soil on windswept ridges; grows best in calcareous regions	G5/S1
Timberline buttercup	*Ranunculus verecundus*	Meadows, moraines, open slopes and ridges, often in gravelly areas at treeline	G5/S2
Barratt's willow	*Salix barrattiana*	Boggy meadows, moist open hillsides in mountains, and along lakeshores and streambanks	G5/S1
Pod grass	*Scheuchzeria palustris*	Wet, organic soil of fens and bogs at low to mid elevations	G5/S2
Tufted club-rush	*Scirpus cespitosus*	Wet meadows and bogs at low to high elevations	G5/S2
Hudson's Bay bulrush	*Scirpus hudsonianus**	Wet meadows and springs at low to mid elevations	G5/S1
Water bulrush	*Scirpus subterminalis*	Submerged in rivers, ponds, lakes, streams, and standing water up to 3 or 4 feet deep at low elevations	G4G5/S2
Northern beechfern	*Thelypteris phegopteris*	Boreal, wet temperate, cool mesothermal climates on moist, calcareous cliff crevices or moist banks in rich, damp forest floors	G5/S2

Common Name	Scientific Name	Habitat	Rank
Little false asphodel	*Tofieldia pusilla***	Moist, often shallow soils in alpine areas	G5/S2
Cushion townsendia	*Townsendia condensata*	Open, rocky, soil of exposed slopes and ridge tops at mid to high elevations	G4/S2
Flat-leaved bladderwort	*Utricularia intermedia*	Shallow, standing, or slow-moving water	G5/S1
Velvetleaf blueberry	*Vaccinium myrtilloides*	Moist to rather dry forests in the montane zone	G5/S1

* only locations in the western US

** only location(s) in Montana

*** only location for the northern Rocky Mountains

Table C-3. Mosses of concern in the Going-to-the-Sun Road corridor.

Scientific Name	Habitat	Rank
Brachythecium turgidum	Partially submerged in pond on tundra	G4/S1
Bryum lonchocaulon	Moist, peaty soils	G5?/S1
Bryum pallens	On soil or rocks	G4G5/S1
Bryum schleicheri	Wet rock surfaces	G5?/S1
Dichodontium olympicum	Wet rock surfaces and soil	GU/S1
Dicranella grevilleana	Moist shaded banks	G2G4/S1
Dicranella heteromalla	Moist peaty slight slopes	G5?/S1
Dicranum fragilifolium	Moist shaded banks and slopes and on rotting wood	G4G5/S1
Distichium inclinatum	Rock surfaces	G4G5/S1
Grimmia mollis	Rock and occasionally tundra	G3G5/S1
Kiaeria blyttii	Rock at mid to high elevations	G5/S1
Kiaeria starkei	Peaty soils, stream edges, ledges and banks	G5/S1
Meesia longiseta	In swamps and sphagnum bogs	G4?/S1
Meesia triquetra	Moist to wet soils	G5/S2
Meesia uliginosa	Peaty or calcareous soils, fens, and in wet depressions at high elevations.	G4/S1
Myurella tenerrima	Soil, cliffs, banks and overhangs; fens at mid elevations	G3G4/S1
Neckera douglasii	Lakeshore	G4/S1
Paludella squarrosa	Fens, springs, meadows and seeps in tundra at high elevations	G3G5/S1
Paraleucobryum enerve	Acidic tundra, often in depressions and at the top of rock outcrops at high elevations	G5?/S1
Paraleucobryum longifolium	Acidic tundra and on rock outcrops at high elevations	G5/S1
Plagiobryum zierii	Wet rock	G3G4/S1
Pohlia drummondii	Wet to moist soils including clay at mid to high elevations	G3G4/S1
Pohlia obtusifolia	Cold, wet soil such as the edge of snowfields	G2G4/S1
Pseudocalliergon turgescens	Wet rock in alpine zone	G3G5/S1
Schistostega pennata	Moist to wet dark places such as caves and overturned bases of trees	G4/S1
Sphagnum centrale	Fens and bogs at low to high elevations	G5/S1
Sphagnum contortum	Fens and bogs at low to high elevations	G5/S1
Sphagnum girgensohnii	Fens and bogs at low to high elevations	G5/S1
Stegonia latifolia	Dry soil	G3G5/S1
Tayloria lingulata	Fens, preferably slightly acidic, at high elevations	G3G5/S1
Tayloria serrata	Dung, decomposing wood, and soil	G4/S1
Thamnobryum neckeroides	Rock in the alpine zone	G?/SH
Tortula norvegica	Wet soils and rocks in the alpine zone	G5/S1

Table C-4. Lichens of concern in the Going-to-the-Sun Road corridor.

Scientific Name	Habitat	Rank
Bryoria subdivergens	Alpine sod at high elevations	G2/S2
Collema curtisporum	Bark of *Populus* species	G3/S2

Appendix D

Comments and Responses on the Draft Environmental Impact Statement

The Going-to-the-Sun Road Draft EIS was released to the public for a 60-day comment period in September 2002. In addition, the NPS held a series of five public hearings in October 2002 in Montana at Missoula, Kalispell, Great Falls, Browning, and at Lethbridge, Alberta, Canada to allow public input on the proposed rehabilitation plan and alternatives. Over 250 written and oral comments were received on the DEIS. This Appendix addresses the substantive comments. Comments, as defined in NPS-12 and NEPA Compliance Guidelines, are considered substantive if they:

- Question, with reasonable basis, the accuracy of the information in the document
- Question, with reasonable basis, the adequacy of the environmental analysis
- Present reasonable alternatives other than those presented in the environmental impact statement
- Cause changes or revisions in the proposal

Comments and responses are divided into two sections. The first section includes copies of the substantive comments made by government agencies, organizations, and businesses. Beside each reproduced letter is the numbered response of the National Park Service corresponding to each specific comment. The second part of the response to comments includes a summary of additional substantive comments made by the general public or other entities. Many of the comments made by the public were similar to the range of issues and concerns that are addressed in the first section. Rather than print every letter from individuals, we have summarized the additional comments received and have addressed these with specific responses. The summary of comments from individuals broadly fall into three categories: alternatives and visitor use improvements; mitigation; and transit. All letters and hearing testimony received are available for public inspection at Park headquarters in West Glacier, Montana.

Where appropriate, the text of the Final EIS has been revised to address comments.

Agency, Business, and Organization Comments

Comment #	Letter #15	Response
1	**Montana Contractors' Association Inc.** A Chapter of the Associated General Contractors of America Cary Hegreberg, Executive Director September 20, 2002 Superintendent, Glacier National Park GTSR/DEIS, Project Management Office Glacier National Park West Glacier, MT 59936 Dear Mr. Holm, On behalf of the member companies of the Montana Contractors' Association, I am writing to comment on the Draft EIS in support of the preferred alternative for reconstruction of the Going-to-the-Sun highway. We would like to offer several suggestions. We understand that continued use of the highway during construction is a high priority for the Park Service and for adjoining communities, and we acknowledge the emphasis on convenience to tourists. However, we feel compelled to urge you to ensure that safety to construction workers is not sacrificed in the process. Construction is inherently dangerous in normal conditions. This project will present enormous challenges to selected contractors due to steep, unstable slopes, engineering constraints, nighttime work, unpredictable weather, and heavy traffic. It goes without saying that motorists drive this highway to enjoy the scenery. A quick glance at a Bighorn Sheep in the middle of an active, congested construction zone could prove disastrous. Attention to safety of motorists and construction workers must be the top priority of this construction project. We also encourage the Park Service to structure construction projects so Montana's highly skilled and qualified contractors have opportunities to bid on the work. The Park Service has placed high emphasis on the economic impact of tourism to local economies and we ask that you also structure construction contracts in a manner that is conducive to local/regional contractors competitively bidding the projects. We would be happy to work with you in devising criteria for construction contracts. Finally, we would offer our assistance in conveying the importance of this project to the appropriate decision-makers to ensure adequate funding is made available. Please let us know what we can do to expedite the funding of this important project for Montana. Thank you for the opportunity to comment. Sincerely, Cary Hegreberg Executive Director SEP 23 2002 Cc: MCA Board of Directors Sen. Max Baucus Sen. Conrad Burns Congressman Denny Rehberg Telephone (406) 442-4162 Fax phone (406) 449-3199 Website: www.mtagc.org 1717 11th Avenue Post Office Box 4519 Helena, Montana 59604 15	**1.** The NPS and FHWA will encourage local contractors, including Native American communities to bid on the rehabilitation of the Road.

Comment #	Letter #23	Response
1	MONTANA HISTORICAL SOCIETY 225 North Roberts ❖ P.O. Box 201201 ❖ Helena, MT 59620-1201 ❖ (406) 444-2694 ❖ FAX (406) 444-2696 ❖ www.montanahistoricalsociety.org OCT 2002 Received Glacier National Park October 1, 2002 MICHAEL O HOLM SUPERINTENDENT GLACIER NATIONAL PARK WEST GLACIER MT 59936 RE: Going-to-the-Sun Road Rehabilitation Plan/Draft Environmental Impact Statement Dear Michael, Thank you, for the Draft EIS. We will place it in our files and await any construction plan so we can assess what affect all this planned work will have on this important resource. You may choose and we would recommend that we develop a PA to establish a means for future phased reviews of specific project plans/impacts before signing ROD. The recommended parties would be the SHPO, ACHP, National Landmark folks, and GNP. If you have any questions about any points that I have made, you may call me at (406) 444-0388. Sincerely, Josef J Warhank Review & Compliance Officer file: STATE HISTORIC PRESERVATION OFFICE ❖ 1410 8th Ave ❖ P.O. Box 201202 ❖ Helena, MT 59620-1202 ❖ (406) 444-7715 ❖ FAX (406) 444-6575 23	**1.** Since receipt of this letter, the NPS, in consultation with the State Historic Preservation Office, has agreed that Section 106 compliance would be conducted separately for each phase of design and construction. The Park will work with the State Historic Preservation Office to develop a Programmatic Agreement for reoccurring rehabilitation actions. Individual Section 106 consultations will occur for rehabilitation plans that result in unique circumstances for a particular section of Road.

Comment #	Letter #36	Response
	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8, MONTANA OFFICE FEDERAL BUILDING, 10 West15th Street, Suite 3200 HELENA, MONTANA 59626 OCT 2002 Received Glacier National Park Ref: 8MO October 24, 2002 Mr. Michael O. Holm, Superintendent Project Management Office Glacier National Park West Glacier, Montana 59936 Re: Going-to-the-Sun Road Rehabilitation Draft EIS Dear Mr. Holm: The Environmental Protection Agency (EPA) Region VIII Montana Office has reviewed the Draft Environmental Impact Statement (DEIS) for the Going-to-the-Sun Road Rehabilitation Project. The EPA reviews EISs in accordance with its responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309 of the Clean Air Act directs EPA to review and comment in writing on the environmental impacts of any major Federal agency action. The EPA's comments include a rating of both the environmental impact of the proposed action and the adequacy of the NEPA document (see explanation of EPA DEIS rating criteria enclosed). The EPA does not object to Glacier National Park's the preferred alternative, Shared Use with Extended Rehabilitation Season Alternative (Alternative 3), to rehabilitate the Going-to-the-Sun Road. We are pleased that proposed road rehabilitation alternatives would not change existing road width and alignments, since new road widening and new alignments generally have greater potential for adverse environmental impacts. We understand that proposed road rehabilitation would be carried out over a 7 to 8 year period, and that visitor use and access during road repairs would be maintained with minimal delays and disruptions. We also understand that Alternative 3 proposes improvements and upgrades to visitor use facilities adjacent to the road (e.g., improved parking at pullouts and visitor centers, vegetative clearing at scenic vistas, improved trails, interpretive information and toilet facilities). We do have concerns about potential water quality impacts during construction, since the Going-to-the-Sun Road parallels McDonald Creek, Lake McDonald, Reynolds Creek, and St. Mary Lake, and that portions of the Road lie within the floodplain of Sprague, Snyder, Avalanche, McDonald, Rose, and Divide Creeks and the St. Mary River. We recognize, however, that these impacts will be likely be short term. Encroachment of the road upon these 36 Printed on Recycled Paper	

Comment #	Letter #36 continued	Response
	waterbodies and their floodplains should be avoided. It is important that all possible efforts be made to utilize sediment and erosion control measures during construction to avoid and minimize sediment entry to streams and lakes. We particularly recommend maintenance of filter barriers, especially vegetated areas, between construction sites and surface waters to filter out sediment before construction runoff enters surface waters. Road rehabilitation planning and design should seek to avoid or minimize encroachment upon or modification of natural stream channels. Bridges and culverts should be designed to avoid sediment deposition above stream crossings or scour below stream crossings. All possible efforts should be made to avoid and minimize siltation in streams that require bridge or culvert replacement. We recommend that culverts simulate the natural stream grade and substrate as much as possible to avoid concerns with fish passage. Bridges or open bottom arch culverts that allow natural stream bed substrate and stream grade, and sufficient width and capacity to pass flood flows and bedload transport with minimal encroachment upon the river channel and riparian area are preferred. Bridges with wide spans also afford opportunities for wildlife passage, and reduced wildlife-vehicle collisions. We are pleased that sediment and erosion control BMPs would be implemented and disturbed areas revegetated, and a weed management program implemented, and that extensive reclamation and revegetation efforts would to used to stabilize eroding roadside slopes as well as disturbed areas. It is also important that appropriate storm water discharge permits and turbidity exemption authorizations be obtained from the Montana Dept. of Environmental Quality prior to implementation of any road construction work (contact John Herrin in Helena at 444-3927 and Jeff Ryan at 444-4626, respectively). We also want to indicate that Divide Creek is listed by the State of Montana as a water quality impaired stream, since it does not fully support beneficial uses (i.e., Divide Creek is identified on Montana's Clean Water Act 303(d) list of impaired waters). Causes of water quality impairment are listed as channel incisement, fish habitat degradation, and other habitat alterations. The Montana Dept. of Environmental Quality (MDEQ) will be preparing a Total Maximum Daily Load (TMDL) with an associated water quality restoration plan to address these problems in Divide Creek. It is important that encroachment of the road upon the Divide Creek channel and floodplain be minimized, and that adequate capacity be provided during bridge and roadway design to accommodate natural bedload deposition and stream channel migration. We recommend that aquatic biologists and staff with training and knowledge of fluvial geomorphology be consulted during design of the Divide Creek bridge and of any other bridges or road features that may encroach on stream channels. Proposed road rehabilitation activities should be conducted in a manner that avoids further degradation of Divide Creek, and that is consistent with long term restoration as identified in the water quality restoration plan that will be developed by the State in association with the TMDL. The TMDL will need to be reviewed and approved by EPA. We recommend that Glacier Park staff contact the MDEQ (i.e., Robert Ray, 444-5319 in Helena) to ensure MDEQ concurrence on consistency of the proposed Going-to-the-Sun Road rehabilitation with MDEQ's TMDL development for Divide Creek. 36	

Comment #	Letter #36 continued	Response
	Finally we want to indicate that Glacier National Park staff should contact the U.S. Army Corps of Engineers to assure that the proper 404 permits necessary for discharges of dredged or fill material in waters of the U.S. that may occur during road construction work are obtained prior to carrying out road rehabilitation work (Contact Mr. Allan Steinle of the Corps of Engineers Office in Helena at 406-441-1375). The EPA's more detailed questions, concerns, and/or comments regarding the analysis, documentation, or potential environmental impacts of the Going-to-the-Sun Road Rehabilitation DEIS are included in the enclosure with this letter. Based on the procedures EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action and alternatives in an EIS, the Going-to-the-Sun Road Rehabilitation DEIS has been rated as Category EC-2 (Environmental Concerns-Insufficient information). A copy of EPA's rating criteria is attached. The EPA's environmental concerns regard potential construction impacts upon water quality, and consistency of proposed Road improvements with restoration of Divide Creek, a 303(d) listed stream in need of TMDL development. We also have concerns about potential impacts to sensitive and fragile vegetation (e.g., State rare velvet-leaf blueberry plant), and disturbances to wildlife and wildlife habitat adjacent to the roadway and near visitor facility improvements. The EPA appreciates the effort that went into the preparation of this DEIS, and we thank you for the opportunity for review and comment. If we may provide further explanation of our concerns please contact Mr. Steve Potts of my staff in Helena at (406) 457-5022 or in Missoula at (406) 329-3313. Sincerely, John F. Wardell Director Montana Office Enclosure cc: Cynthia Cody/Julia Johnson, EPA, 8EPR-N, Denver Robert Ray, MDEQ, Helena 36	

Comment #	Letter #36 continued	Response
	U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements **Definitions and Follow-Up Action*** **Environmental Impact of the Action** **LO - - Lack of Objections:** The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal. **EC - - Environmental Concerns:** The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts. **EO - - Environmental Objections:** The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts. **EU - - Environmentally Unsatisfactory:** The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ). **Adequacy of the Impact Statement** **Category 1 - - Adequate:** EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information. **Category 2 - - Insufficient Information:** The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS. **Category 3 - - Inadequate:** EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ. * From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987. 36	

Comment #	Letter #36 continued	Response
	EPA Comments on the Going-to-the-Sun Road Rehabilitation Draft EIS <u>Brief Project Overview:</u> Glacier National Park prepared this draft EIS to evaluate alternatives for rehabilitation of the Going-to-the-Sun Road, a 50 mile road traversing east-west across Glacier National Park from West Glacier to St. Mary, and crossing the continental divide. Going-to-the-Sun Road is a National Historic Landmark. The purpose of the project is to protect and preserve the National Historic Landmark and premier visitor experience in Glacier National Park, and prevent further loss or damage to natural and cultural resources and protect visitors and employees. Since the road's original construction in 1932 traffic volume, avalanches, harsh weather, and inadequate maintenance have caused deterioration of the structural and historic features of the road. The entire 50 mile Going-to-the-Sun Road is in need of rehabilitation, although the most critical needs are located on the 11 mile alpine section where the terrain is steep, the road is narrow, and there is little or no shoulder. Due to climatic conditions the construction season is limited to 4 to 6 months (late spring, summer, and early fall). Maintenance of visitor access and support for local and regional businesses and communities that rely on summer tourism is a significant socioeconomic issue. Road rehabilitation alternatives are directed at addressing the road deterioration, while minimizing impacts to cultural, natural and socioeconomic resources within the confines of the short construction season. Each of the road rehabilitation alternatives would maintain the existing road width and alignment and use the same construction techniques. A Citizens Advisory Committee was established to provide public input into road rehabilitation alternatives. This Committee was made up of a diverse group of local business leaders from the east and west sides of the Park; state and local government officials; Blackfeet and Confederated Salish and Kootenai Tribal officials; Montana and Canadian tourism representatives; and local and national experts on environmental, economics, historic preservation, and highway engineering. The Committee met from February 2000 to December 2001 to advise the National Park Service how to best accomplish road rehabilitation. Alternative 1 is the Repair As Needed or No Action Alternative which represents the existing situation. Under this alternative roadwork would be limited to critical and emergency repairs as funding allows. Road rehabilitation is estimated to take 50 years at current levels of funding and would cost from $328 to $394 million. This alternative would not meet Park goals to correct safety issues, protect resources, and maintain world class visitor experiences. Alternative 2 is the Priority Rehabilitation Alternative that allows for planning and design to complete road rehabilitation more proactively than responding to roadway failure and emergencies. Under this alternative roadwork would be limited to critical and emergency repairs as funding allows. Road rehabilitation is estimated to take 20 years, but this would still allow deterioration of historic, natural and scenic resources. The estimated is $157 to $186 million. This alternative would only make a few improvements to visitor use facilities and visitor development. 36	

Comment #	Letter #36 continued	Response
	Alternative 3 is the Shared Use with Extended Rehabilitation Season Alternative, which was recommended by the Citizen's Advisory Committee and is the preferred alternative. This alternative would require 7 to 8 years to complete road rehabilitation in order to maintain visitor use and access during road repairs. Improvements and upgrades to visitor use facilities adjacent to the road such as improved parking at pullouts, and visitor centers, vegetative clearing at scenic vistas, improved trails, interpretive information and toilet facilities are also part of this alternative. Costs of this alternative range from \$140 to \$170 million. Roadwork would be conducted from late spring to early fall with the most extensive work conducted prior to July 4th and after September 15th. Between July 4th and September 15th a maximum cumulative traffic delay of 30 minutes over the length of the road during peak visitor hours would occur. This is similar to delays experienced during the past 3 years for roadwork. Longer delays would occur during early morning, evening and at night. Before July 4th and after September 15th when visitation is typically lower, traffic would be suspended within discrete work zones, while Logan Pass and the remainder of the road would remain open. Alternative 4 is the Accelerated Completion Alternative to complete rehabilitation as quickly as possible by using isolated traffic suspensions Monday through Thursday and maintain visitor access on the weekends from Friday to Sunday (May through October). This alternative would implement road repairs over 6 to 8 years at a cost of \$126 to \$144 million, and include the visitor use facility improvements and upgrades proposed with Alternative 3. <u>Comments:</u> 1) Thank you for providing a description of the deficiencies and needs of the existing roadway involving road drainage, slope stability and rockfall hazard, retaining walls, arches, guardwalls and tunnels, pavement, operation and maintenance, safety, cultural resources, and visitor use facilities (pages 8 to 23, and Appendix A). This information improves public understanding of Going-to-the-Sun Road deficiencies, project purpose and need, and provides important background information for understanding road rehabilitation alternatives. 2) The EPA does not object to the Shared Use with Extended Rehabilitation Season Alternative (Alternative 3), the preferred alternative, to the rehabilitate the Going-to-the-Sun Road over a 7 to 8 year period maintaining visitor use and access during repairs, with minimal delays and disruptions. We also understand that this alternative includes improvements and upgrades to visitor use facilities adjacent to the road (e.g., improved parking at pullouts, vegetative clearing at scenic vistas, improved trails, interpretive information and toilet facilities). We are particularly pleased that the road rehabilitation alternatives would maintain the existing road width and alignment, since new road alignments and road widening and expansion generally have greater potential for adverse environmental impacts. 3 36	

Comment #	Letter #36 continued	Response
1	3) It is not clear why the more extensive level of improvements and upgrades to visitor use facilities adjacent to the road (e.g., improved parking at pullouts, vegetative clearing at scenic vistas, improved trails, interpretive information and toilet facilities) that are proposed and included in Alternatives 3 and 4, were not also included in Alternative 2 (which includes more limited visitor use facilities improvements). Why were comparable levels of visitor use facility improvements and upgrades not included and evaluated as part of Alternative 2? 4) Thank you for including descriptions of mitigation measures proposed to reduce environmental effects (pages 64 to 70). This information is important to for public understanding of the many efforts and measures proposed to avoid and minimize adverse impacts.	**1.** Alternative 2 did not include the same level of visitor use improvements and upgrades as Alternatives 3 and 4 because the focus is to use all available funding to complete Road rehabilitation. Alternatives 3 and 4 include additional costs for transit and visitor use improvements, because these help mitigate the effects of completing the rehabilitation in less time.
2	5) It is stated that streams and lakes most likely to be affected by proposed road rehabilitation include McDonald Creek, Lake McDonald, Reynolds Creek, and St. Mary Lake because these drainages parallel the road (page 184). It is also stated that portions of the Going-to-the-Sun Road likely lie within the floodplain of Sprague, Snyder, Avalanche, McDonald, Rose, and Divide Creeks and the St. Mary River, and may impact Lake McDonald and St. Mary Lake (pages115, 184). The EPA has concerns about potential impacts to water quality during construction, particularly road construction activities needed to address drainage features and stream crossings (culvert replacements, bridge construction, road drainage features, etc.,). Road rehabilitation planning and design should seek to avoid or minimize encroachment upon or modification of natural stream channels. Bridges and culverts should be designed to avoid sediment deposition above stream crossings or scour below stream crossings. All possible efforts should be made to avoid and minimize siltation in streams that require bridge or culvert replacement. We recommend that culverts simulate the natural stream grade and substrate as much as possible to avoid concerns with fish passage. Bridges or open bottom arch culverts that allow natural stream bed substrate and stream grade, and sufficient width and capacity to pass flood flows and bedload transport with minimal encroachment upon the river channel and riparian area are preferred. Bridges with wide spans also afford opportunities for wildlife passage, and reduced wildlife-vehicle collisions. It is important that all possible efforts are made to utilize sediment and erosion control measures during construction to avoid and minimize sediment entry to streams and lakes. We particularly recommend maintenance of filter barriers, especially vegetated areas, between construction sites and surface waters to filter out sediment before construction runoff enters surface waters. We are pleased that sediment and erosion control BMPs would be implemented and disturbed areas revegetated, and a weed management program implemented (pages 66, 182, 184, 187). We are also pleased that extensive reclamation and revegetation efforts would to used to stabilize eroding roadside slopes as well as 4 36	**2.** The NPS is also concerned with minimizing impacts to water quality during rehabilitation. The NPS would avoid and minimize direct impacts to streams and water features to the maximum extent practicable using Best Management Practices and other erosion control measures. No substantial modifications or encroachment of natural stream channels are anticipated. Final engineering designs would seek to minimize disturbances near water features to the minimal area needed to accomplish repair objectives. An overall long-term beneficial effect to water quality is anticipated with drainage improvements.

Comment #	Letter #36 continued	Response
3	disturbed areas (i.e., topsoil salvage, seed collection, use of soil amendments, monitoring of revegetation success). It is important that appropriate storm water discharge permits and turbidity exemption authorizations (Section 318) be obtained from the Montana Dept. of Environmental Quality (MDEQ) prior to implementation of any road construction work (contact John Herrin in Helena at 444-3927 and Jeff Ryan at 444-4626, respectively).	**3.** A stormwater management plan will be prepared and a discharge permit and turbidity exemption authorization will be acquired from the Montana Department of Environmental Quality prior to construction. The stormwater management plan will include specifications for implementation of erosion and sediment control measures during construction.
4	Discharges of fill material into streams, wetlands and other waters of the United States are regulated by Section 404 of the Clean Water Act, 33 U.S.C. 1344, which is administered jointly by the U.S. Army Corps of Engineers and EPA. For purposes of Section 404 permits, where dredge or fill activity is proposed in waters of the United States, all aquatic resource areas, including streams and wetlands, should be clearly identified and assessed in relation to project impacts. We recommend that the National Park Service contact the U.S. Army Corps of Engineers to assure that the proper 404 permits necessary for road construction work in or near waters of the U.S. are obtained prior to carrying out road rehabilitation work (Contact Mr. Allan Steinle of the Corps of Engineers Office in Helena at 406-441-1375). Road rehabilitation planning and design should also seek to avoid or minimize wetlands impacts, and any unavoidable impacts to wetlands should be compensated for through wetland restoration, creation, or enhancement. Compensation should be directed at restoring or replacing lost wetland functions. Wetland mitigation requires a thorough evaluation of all less environmentally damaging project alternatives, to assure that all practicable efforts have been made to avoid or minimize wetland impacts. Alternatives to road siting in streams and wetlands are presumed to be available unless demonstrated otherwise. We also note that it is stated that the majority of construction staging areas would be located outside of the Park because of limitations in available space within the Park (page 62). It will be important to avoid siting construction staging areas in or near waters of the U.S., including wetlands, or other environmentally sensitive areas. We are pleased that it is stated that all wetlands near work zones would be identified and marked to prevent inadvertent disturbance during construction (page 189). The 404(b)(1) Guidelines (found at 40 CFR Part 230) and Corps of Engineers, EPA, and U.S. Fish & Wildlife ServiceWetland Specialists should be consulted for specific guidance on the scope of avoidance and minimization alternatives that need to be addressed under 404(b)(1). 6) We note that the flooding problems at the Divide Creek bridge are identified (pages 10, 30), and it is stated that the current plan is to "stay with the existing alignment elevating portions of the Road and/or constructing low water crossings" (page 58). It will be important to avoid or minimize encroachment of the road upon the Divide Creek channel and floodplain. Adequate capacity should be provided during bridge and roadway design to accommodate natural bedload deposition and stream channel migration. We 5 36	**4.** Impacts to wetlands during rehabilitation will be avoided to the maximum extent possible. No permanent loss of wetlands has been identified for any of the alternatives. If temporary impacts occur from culvert replacement or other roadside activities, disturbed areas will be promptly reclaimed and vegetated. Unavoidable impacts to wetlands will be determined during final design for each construction segment. If impacts are identified, the U.S. Army Corps of Engineers will be contacted to obtain the necessary 404 permit prior to construction. In addition, should unavoidable wetland impacts occur, the NPS will fully comply with Executive Order 11990 and NPS Director's Order 77-1, including preparation of a Statement of Wetland Findings and public review of wetland impacts and mitigation measures. The potential for direct impacts to wetlands would be similar for all of the alternatives, as would avoidance and minimization measures.

Comment #	Letter #36 continued	Response
5	recommend that aquatic biologists and staff with training and knowledge of fluvial geomorphology be consulted during design of the Divide Creek bridge and of any other bridges or road features that may encroach on stream channels. Any conflicts anticipated in addressing the hydrologic deficiencies of the Divide Creek bridge while also addressing desires to preserve the historic character of the bridge at this location should be fully described. Glacier National Park should also understand that Divide Creek is listed by the State of Montana as water quality impaired, since it does not fully support beneficial uses (i.e., Divide Creek is identified on Montana's Clean Water Act Section 303(d) list of impaired waters). Causes of water quality impairment are identified as channel incisement, fish habitat degradation, and other habitat alterations. The Montana Dept. of Environmental Quality (MDEQ) will be preparing a Total Maximum Daily Load (TMDL) with an associated water quality restoration plan to address these problems in Divide Creek (carried out as part of the Cut Bank-Two Medicine TMDL Planning Area). The TMDL process identifies the maximum load of a pollutant (e.g., sediment, nutrient) a waterbody is able to assimilate and fully support its designated uses; allocates portions of the maximum load to all sources; identifies the necessary controls that may be implemented voluntarily or through regulatory means; and describes a monitoring plan and associated corrective feedback loop to insure that uses are fully supported. Proposed road rehabilitation activities should be conducted in a manner that avoids further degradation of Divide Creek, and is consistent with long term restoration as identified in the water quality restoration plan being developed by the State in association with the TMDL. We recommend that Glacier Park staff contact the MDEQ (i.e., Robert Ray, 406-444-5319 in Helena) to ensure MDEQ concurrence on consistency of the proposed Going-to-the-Sun Road rehabilitation with MDEQ's TMDL development.	**5.** The NPS will coordinate proposed roadwork in the Divide Creek floodplain with the Montana Department of Environmental Quality and the EPA during final design to ensure that proposed improvements are consistent with the TMDL analysis and restoration plan currently under development for the Cut Bank-Two Medicine TMDL Planning area. Proposed Road improvements are not expected to impair water quality in Divide Creek or contribute to additional channel incisement, degradation of fish habitat, or result in long-term increases in sediment. Additional discussion of these issues was added to the *Water Resource* section of Chapters 3 and 4 in the FEIS.
6	7) A portion of the proposed Road rehabilitation is in areas adjacent to highly valued and fragile plant communities, alpine (tundra) and subalpine (mountain) meadow ecosystems. These sensitive plant communities are easily damaged and slow to recover, and may be disturbed during construction work. We note that potential long-term adverse effects to State rare velvet-leaf blueberry plant near the Apgar transit staging area is identified (page 79). Special precautions should be taken to avoid impacts to sensitive and fragile plant communities, especially during construction of new pullouts, parking areas, and trails and other visitor facility improvements.	**6.** The NPS intends to implement measures to minimize impacts to alpine and other sensitive plant communities adjacent to the Road during rehabilitation. New disturbances would be limited to the smallest area possible to complete work. Sensitive species identified near the Road would be avoided as much as possible, with barriers used to protect sensitive plant communities from inadvertent damage. The Discovery Center and transit staging area at Apgar would be located to avoid and minimize impacts to velvet-leaf blueberry habitat.
7	8) We are concerned that there would be some loss of wildlife habitat from construction of visitor facility improvements (e.g., new pullouts, parking areas, and trails), particularly at the Baring Creek trailhead and Logan Pit development (page 194). Noise, disturbance and artificial light used during nighttime construction would also adversely affect some wildlife species (page 191). We are pleased that measures are proposed to mitigate 6 36	**7.** A minor loss of wildlife habitat would occur adjacent to the Road and near areas of existing visitor use developments. The majority of the improvements to existing pullouts, parking areas, and trails would be located within or adjacent to previously disturbed areas. The parking area at the Baring Creek Trailhead and the oversized vehicle turnaround at Logan Pit have been eliminated from the preferred alternative because of the potential impact to wildlife and habitat.

Comment #	Letter #36 continued	Response
	impacts to wildlife such as seasonal construction restrictions at sensitive locations, provisions for wildlife crossings at culverts and bridges, minimizing area of disturbance.	
8	9) We are pleased that environmental justice concerns would be mitigated by making efforts to ensure that Blackfeet Tribal members would participate in road construction (page 172). We recommend that the efforts to ensure Blackfeet Tribal member employment in road construction and economic benefits from the project be described in greater detail.	**8.** The NPS encourages participation by Native Americans in construction-related employment and business opportunities associated with rehabilitation of the Going-to-the-Sun Road. Contractors could be required to implement hiring goals among minority and low-income populations. Preferences for minority businesses would be administered under provisions of the Federal Acquisition Requirements.
9	10) Glacier National Park is designated a Class I air quality area which is the most stringent air quality classification that allows only the smallest incremental growth and accommodates only a small degree of air quality deterioration (page 130). The Clean Air Act requires that all new and modified stationary sources of air pollution obtain a Prevention of Significant Deterioration (PSD) permit. We recommend that Glacier National Park staff contact the Montana Dept. of Environmental Quality (MDEQ) to assure that any air pollutant emissions that may be associated with carrying out road rehabilitation work (e.g., concrete batch plants) are properly permitted (contact Dave Klemp in Helena at 406-444-0286) and in compliance with PSD increment allowances to maintain National Ambient Air Quality Standards (NAAQS). Any air pollutant emissions that may occur on the Blackfeet Indian Reservations should be coordinated with Betsy Wahl of the EPA Montana Office (406-457-5013). We are pleased that dust abatement measures would be implemented to minimize particulates, and that a transit bus system would be expanded in the preferred alternative to reduce private vehicle travel and associated emissions (pages 205, 206). We are also pleased that there would be no asphalt batch plants located in the Park (page 62).	**9.** Prior to construction, GNP will acquire the air quality permits that may be necessary. It is not known at this time whether a concrete batch plant would be located in the Park or adjacent lands. The Montana Department of Environmental Quality and/or the EPA will be contacted regarding proper authorization for air pollutant emissions.
	11) We are also pleased that there would be no impact to the values for which the Middle Fork Flathead River was designated Wild and Scenic (page 211). 7 36	

Comment #	Comment #239	Response
	NOV-15-2002 04:18 PM SUN TOURS 406 226 9220 P.01 Sun Tours Cultural Tours in Glacier National Park To: Superintendent of Glacier National Park From: Ed Des Rosier, CEO, Sun Tours Subject: Comments on Going-to-the-Sun Road Rehabilitation Plan/Draft EIS I think the shared alternative #3 makes the most sense. Here's some points I would like considered. They are not in any order of priority.	
1	• Eliminating all non-concession dual wheeled vehicles, most all of these are over the maximum width allowed and have never been enforced on Going-to-the-Sun road. Many are 4-door crew cab design that is over length as well. (Aggressive enforcement of length and width restrictions).	**1.** The NPS intends to maintain vehicle size restrictions between Avalanche and Sun Point and currently enforces size limitations at the entrance stations by notifying visitors of the restrictions. Warnings and citations are given when drivers are found violating these restrictions. The NPS periodically reviews and updates the types and models of vehicles that exceed designated size restrictions.
2	• Some minimum widening, say 2 to 4 feet, of the narrowest sections from the loop to the top on the west side (these could easily be identified and many of them are quite short with out croppings that pose a hazard) and one section below the loop (less then 75 feet long). I would be happy to assist in identifying target areas.	**2**. There are no plans to widen the Road between the Loop and Logan Pass. While this is a narrow section of the Road, proposed rehabilitation of the Road would focus on repairs within the existing historic roadway. Road widening would adversely impact the character and visual quality of the Road, its designation as a National Historic Landmark, and natural resources values. Selective rock scaling could occur at some locations, but this would not materially change the width of the Road.
3	• Any preseason and after season closures after the snow has been cleared (prior to Independence Day and after mid September) should be open to concession tours only, to at least the top as the number of vehicles would be small in number and could move smoothly through construction sites with coordination with the contractor. 29 Glacier Avenue ▪ East Glacier Park, MT 59434-0234 (800) 786-9220 ▪ Fax (406) 226-9220 ▪ Email: edesrosi@3rivers.net 239	**3.** Traffic suspensions within construction zones during the shoulder season are needed because rehabilitation work for this period would focus on activities that require construction across both lanes of the roadway, such as roadbase excavation, cross drain installation, major retaining wall repairs, and work on the narrowest sections of the Road. Furthermore, the contractor can save time on setup and takedown at construction sites by suspending traffic.

Comment #	Letter #239 continued	Response
   4 5 6 7 8 9 10	NOV-13-2002 04:19 PM SUN TOURS 406 226 9228 [redacted] • Preference given to minority business and first option to existing concession service for any added services during the construction season. (transit services etc.). This would have to be subsidized to be viable. • Aggressive promotional efforts by the National Park Service to encourage travelers to use the existing tours by the concessionaires to reduce congestion. • Pull out improvement on the "big drift" area wide spot, with installation of guardrail. • Provide exclusive parking space for two buses for each concessionaire at the Trail of the Cedars area. • Improve communication between com. center, road maintenance, administration, and concessions services pertaining to any road issue that could affect the concession operation. • Place incentives in bids to contractors for expedited work, and less traffic flow restrictions. Monitor delays daily. • One of my most important concerns is a low cost, high profile transit system that will take clients away from our tours (a much more valuable service providing a more meaningful experience in Glacier National Park). I would suggest transit only to that clientele that wouldn't want to drive and want to get from point A to point B. Please consider my comments and concerns into the record of the Going-to-the-Sun Road Rehabilitation/Draft Environmental Impact Statement. Thank you, Ed Des Rosier Sun Tours NOV 19 2002	**4.** Procurement of new services is subject to Federal Acquisition Regulations (FAR). Any preference given for minority businesses would be subject to the provisions of these regulations. If non-subsidized transit or other commercial services are needed, contracts with existing concessioners would be reviewed to determine if services fall under the contract provisions. The NPS will be examining funding options for shuttle service and possible subsidies that may be needed to provide reasonably priced service. **5.** The NPS intends to encourage visitors to use available tours provided by concessioners, as well as the shuttle system to travel through the Park and reduce private vehicle traffic during rehabilitation. **6**. Improvements to the Big Drift pullout east of Logan Pass have been added to the visitor use measures included in Alternatives 3 and 4. During final design, the NPS would determine whether a guardrail is appropriate. **7.** There are no planned changes in the parking design or capacity at the Trail of Cedars area (Avalanche) as part of the Road rehabilitation. Dedicated parking space for tour operators is beyond the scope of the proposed project and would be determined at a later date. Should redesign or parking improvements at Avalanche occur in the future, dedicated parking space for tour vehicles would be considered. **8**. The proposed Intelligent Transportation System (ITS) would provide substantially improved communications for all Road users. This system would allow the NPS to provide real-time information on the status of the Road, delays, weather and roadway conditions, transit and tour schedules, and other information that would assist concession tour operators and the public. **9**. The selection of contractors will be competitively bid to ensure that experienced quality contractors at reasonable costs are used. It is anticipated that a traffic control contractor would be used. This would provide better coordination of work efforts and NPS oversight of traffic management. The use of incentive-based contracts to expedite work would be considered when developing construction contracts. **10.** The proposed transit service during rehabilitation would provide a modest, but beneficial increase in the transit service available in the Park. The shuttle system would provide point-to-point service for visitors to access attractions along the Road. The tour service offered by concessioners provides a unique experience to visitors. Tour operators provide guided personal service with interpretative and cultural information and additional stops that would not be available on shuttles. The proposed transit service is not expected to draw visitors seeking a tour from existing tour operators. A continuation or change in the level of transit service following Road rehabilitation would be evaluated in the future.

Comment #	Letter #240	Response
1	ent By: NPCA; 406 863 2803; Nov-15-02 5:39PM; Page 1 **NATIONAL PARKS CONSERVATION ASSOCIATION**® *Protecting Parks for Future Generations*® November 15, 2002 Superintendent Mick Holm Glacier National Park West Glacier, MT 59936 RE: NPCA Comments on Going-to-the-Sun Road Rehabilitation Plan DEIS Dear Mick, The National Parks Conservation Association appreciates this opportunity to provide comments on the Draft EIS for the Sun Road rehabilitation project. NPCA strongly supports Glacier's commitment to rehabilitating this National Historic Landmark, an engineering marvel and the primary means for most Glacier visitors to visit the park. We are committed to working with the park, gateway communities and other interested parties to secure full congressional funding for this project. Cognizant that historic funding levels for road maintenance have been less than 1/3 of levels necessary to adequately maintain the road, we also are committed to advocating full funding for long-term road maintenance and other core park functions, particularly protection of natural and cultural resources. We have several specific comments on the draft EIS: **Transportation and Visitor Use plan –** We agree with the comment made by Denver-based NPS transportation planner Kevin Percival, as quoted in the July 15, 2001 *Missoulian.* He told the paper that park officials will pay dearly in the long run if they insist on engineering a road before they know what the road's future use looks like. "The first step is to plan for the function of the road," he said. "Once you know how the road is going to be used, then you can work on engineering and cost estimates." NPCA is concerned that little discussion has been encouraged about the future function of the road and that the DEIS defers this issue for future discussions. We don't know to what extent future transportation systems in the park might affect engineering design considerations, but we would ask that the final design and engineering specifications maintain the option for the transportation system that might be in place in 50 or 100 years. This would mean, for example, trying to envision appropriate locations for handicap-accessible shuttle bus stops. NPCA envisions a future transportation system that increases visitor transportation options over the currently skewed reliance on private vehicles. While increasing visitor choices, this system should reduce traffic and parking congestion, thereby freeing park resources that are currently NORTHERN ROCKIES REGION Tony Jewett, *Regional Director* Patricia Borneman, *Program Assistant* P.O. Box 824 • Helena, MT 59624 (406) 495-1560 • Fax (406) 495-1559 tjewett@npca.org • pborneman@npca.org Steven Thompson *Glacier Field Representative* P.O. Box 4485 • Whitefish, MT 59937 (406) 862-6722 • Fax (406) 863-2803 sthompson@npca.org NATIONAL OFFICE 1300 19th Street, N.W. Washington, D.C. 20036 (202) 223-NPCA (6722) Fax (202) 659-0650 npca@npca.org • www.npca.org PRINTED ON RECYCLED PAPER 240	**1.** A comprehensive visitor use plan is not a component of the proposed Road rehabilitation plan. The rehabilitation of the Going-to-the-Sun Road focuses on repairs and improvements of the deteriorating structural and cultural features. Roadwork improvements at pullouts, including designating ADA accessible transit stops at popular sites, will accommodate transit use during rehabilitation and meet future transit needs. A parkwide transit system would be addressed after Road rehabilitation as would a visitor use plan. See response to comment 240-3.

Comment #	Letter #240 continued	Response
	Sent By: NPCA; 406 862 2806; Nov-15-02 5:40PM; Page 2/4	
2	expended to resolve such congestion (such as the ill-fated plan to cut down ancient cedar trees to expand parking at Avalanche or the rangers who serve as peak-season parking cops at Logan Pass). We advocate an affordable (or free), attractive, distinctive, convenient and frequent shuttle system that provides transportation service on the Sun Road, connecting to Many Glacier, Two Medicine and integrating with better public transportation to the park from gateway communities. In addition, the Sun Road could be a world-class bicycle destination, providing an outstanding way for Sun Road travelers to experience the park with all of their senses. We believe a transportation system should significantly increase biking opportunities.	**2.** Substantial new bicycling opportunities for the Park are not planned as part of this project. Construction of a bike lane would require road widening and result in significant impacts to cultural and natural resources. Most of the high-elevation portions of the Road cannot be widened easily because of the steep terrain and resource damage that would occur. The NPS will continue to allow bicycling on designated roads in the Park and proposed roadway improvements and paving would provide safer conditions for bicyclist; however, restrictions on bike travel during peak visitor use periods would continue similar to current conditions.
3	Among the transportation system options that we would like to see explored would be establishment of a car fee that would be assessed to visitors who choose to drive their own car. This fee (probably between $5 – 20) could be used to subsidize an appropriate shuttle system. Instead of subsidizing private cars (by expanding parking lots and hiring parking cops) with taxpayer dollars, this plan would create a free-market choice in which private vehicle drivers would support a shuttle system to reduce congestion. A variation on this basic approach would limit private vehicles to one-way travel on the Sun Road on alternate days, freeing one lane of traffic for shuttle buses and bicycles, which could travel in either direction. We believe this approach would increase visitor choices, improve visitor experience, reduce wear and tear on the road, and better protect natural and cultural resources. What are the implications of such future transportation schemes for engineering design today? We don't know, but this should be addressed in the Final EIS.	**3.** The NPS will be evaluating funding mechanisms for subsidizing shuttle service during rehabilitation. A variety of funding options were considered in the *Transportation and Visitor Use Study* (WIS 2001c). Options considered included nominal user fees in conjunction with additional entry fees or free shuttle service with surcharges for private vehicle use. These fees would not cover the initial start-up costs associated with cost of purchasing a fleet of shuttle vehicles, but would help cover operational costs. This project includes funding for capital improvements, maintenance, and operation of the transit service as part of the Road rehabilitation. One-way travel on the Road was considered, but rejected during rehabilitation because of the inconvenience to visitors and logistical problems. Similar difficulties are likely in the future with implementing an alternating one-way traffic scheme following rehabilitation. See the *Alternatives and Mitigation Excluded From Further Consideration* section in Chapter 2 of the FEIS for additional discussion. Implementation of a transit system during rehabilitation would give the Park an opportunity to experiment with different buses, schedules, fares, and stops. Depending on their success, various features could be part of a more permanent transit system after rehabilitation is complete. It was recognized that it would be difficult at this time to develop a system for transit service that would not be implemented until rehabilitation is complete. The industry is constantly changing and there may be opportunities for different types of shuttle vehicles or other methods to provide transit service. The implementation of future transportation options in the Park would be evaluated after Road rehabilitation, but proposed engineering design for rehabilitation of the Road is not believed to preclude any reasonably foreseeable transit options. This issue is addressed in the section on *Transit Service During Rehabilitation* for Alternative 3 in Chapter 2 of the FEIS.
4	Engineering design for Sun Road rehabilitation should maintain options for an aggressive shuttle transit system to be implemented following construction activities. The road design also should maintain future options for providing safe bicycle-riding opportunities along the road corridor.	
5	**Westside Discovery Center/Staging Area** – The Final EIS and Record of Decision should address and clarify this issue in far greater detail. The DEIS states (on p. 30) that, "Funding for the Discovery Center is included in the budget for the proposed Going-to-the-Sun Road Rehabilitation Plan." However, there is very little discussion about this in the DEIS. NPCA fully supports construction of a new Westside visitor center, but we believe this discussion needs to be conducted with full public involvement outside this EIS, including through the charette that previously has been discussed, which should consider location, function, design and integration of the center with a future transportation system (as discussed above).	
6	We also continue to be confused about the proposed budget for the Discovery Center. As recently as last spring, the Glacier Profile budget figures estimated a $20 million pricetag for construction of the Westside Discovery Center. A revised June 2002 budget profile eliminates that figure and instead lists approximately $10 million for construction of a new "visitor orientation and transportation center" for the park. The relationship between this center, which apparently is what is intended as a rehabilitation mitigation measure, and the future Westside Discovery Center is unclear.	
7	NPCA does not have a set preference right now about the location of the Discovery Center, but we do not believe the General Management Plan adequately and fully considered all options. We note that many Glacier employees agree with our belief that the appropriate location remains NOV 19 2002 240	

Comment #	Letter #240 continued	Response
		4. See response to comment 240-3 and 240-2. **5**. The General Management Plan (GMP) addressed the Westside Discovery Center location and function. The Going-to-the-Sun Road Rehabilitation Plan FEIS addresses development of a transit staging area within the area of the Discovery Center near Apgar. Depending on the timing of funding, construction of the transit portion of the Discovery Center could be developed prior to completion of the Discovery Center building. As stated in the GMP, a comprehensive design plan for the structural components of the Discovery Center, including visitor uses, needs, and services, would be prepared, but the location for this facility has already been selected and no new information has been discovered that causes the NPS to re-examine the decision made in the GMP. Assuming funding for these facilities is provided, design and construction planning would be conducted early in the rehabilitation process. **6**. The West Side Discovery Center is synonymous with a visitor orientation and transportation center. The Discovery Center would have multiple purposes including a visitor center, museum, and transit staging area. The estimated gross construction costs for the Discovery Center is approximately $10 million. The Rehabilitation Plan includes $6 million for public transportation staging, parking, intersection improvements, utilities, and vehicle and pedestrian circulation at the Discovery Center site. The NPS is seeking additional funding for the completing the Discovery Center separate from the Rehabilitation Plan. **7.** The initial size of the shuttle staging would be based on the level of transit service as described in the FEIS for Alternatives 3 and 4. Future expansion of shuttle service would be evaluated near completion of Road rehabilitation. It is likely that any expansion of transit service would be implemented in a phased approach and the Discovery Center area would be designed to accommodate future shuttle staging if necessary. If a regional transportation system is in place, perhaps a shuttle staging area would be located outside the Park. If this occurs the Discovery Center may become an additional shuttle stop. See also response to comment 240-5 on the location of the Discovery Center.

Comment #	Letter #240 continued	Response
	ent By: NPCA; 406 863 2803; Nov-15-02 5:40PM; Page 3/4 an open and unresolved question. A central issue that should be considered in relation to the Discovery Center is the appropriate size of a shuttle staging area for the next 50 years. If the shuttle system is well integrated with gateway communities, much of the parking needs could be met outside the park. If the shuttle system began and ended within the park, then parking needs inside the park would be much greater.	
8	If the immediate decision is to construct a Discovery Center and/or visitor orientation and transportation center in Apgar, then no action should be taken before completion of a comprehensive design plan and environmental analysis for the Apgar area, as required by the General Management Plan.	**8.** The NPS will prepare a comprehensive design for the Discovery Center and conduct plant, wildlife, and any necessary surveys.
	Shuttle system during rehabilitation – The only scenario worse than a poorly conceived shuttle system during the rehabilitation period is a poorly conceived shuttle system that fails because it is not affordable, attractive and/or convenient. An unpopular shuttle system during rehabilitation will make it that much harder to expand visitor use options, increase shuttle use and reduce traffic and parking options in the future.	
9	We note that the socioeconomic mitigation measure, "upgrade public transportation to and through Glacier National Park," was rated the top visitor development action by business focus groups conducted during the Sun Road Advisory Committee process, as discussed in Appendix F of the Socioeconomic Report. This priority outranked the second-highest ranked measure by more than a 2:1 ratio. We don't believe this priority has been given due attention in the DEIS.	**9.** The primary focus of the proposed project is the rehabilitation of the Road. To partially mitigate for the impact of construction activities and traffic delays, the NPS is proposing to implement expanded shuttle service within the Park between Apgar and the St. Mary Visitor Center as recommended by the Citizens Advisory Committee and local businesses. Development of transportation service to GNP from gateway communities and other locations outside the Park is beyond the scope of the EIS and the authority of the NPS. However, the NPS fully supports private development of a public transportation system with connections to the proposed Park shuttle system. Currently, GNP is coordinating with Eagle Transit in an effort to improve regional transportation services including possible stops at West Glacier and linkage with the existing hikers shuttle. This issue is addressed in the section on *Transit Service During Rehabilitation for Alternative 3* in Chapter 2 of the FEIS.
10	We favor the most aggressive possible shuttle system during reconstruction, and we believe the modest proposal in the preferred alternative is inadequate. Shuttle riders should be able to hop on and off shuttles at will with the expectation that they might catch the next shuttle to continue their journey. Shuttle intervals of an hour or longer are too long.	**10.** The shuttle schedule for the preferred alternative (Alternative 3) has been modified to provide shuttle service at ½-hour intervals, which is the same as proposed for Alternative 4. The NPS believes this level of service will provide a convenient and reliable alternative transportation option for visitors.
11	The park should establish incentives for people to park their private vehicles to use a shuttle system, which may mean some variation of the car fee mentioned above. The road orientation center should clearly and dramatically notify private vehicle drivers that they may not find open parking spaces at Logan Pass and other places along the road, such as Avalanche. On the other hand, shuttle users can access Logan Pass and other places at will. Shuttle drivers should provide entertaining and informative interpretive services, as well, which should also be explained clearly at orientation centers, on web sites and through other public outreach media. The park should explore options to allocate parking spaces at Logan Pass to private vehicles, perhaps through a permitting system integrated with the Intelligent Transportation System. The alternative to providing incentives for people to park their car is long lines of cars at construction stops, increased congestion, flared tempers, and compromised visitor experience. Any proposed shuttle system should be evaluated by three basic criteria: Is it affordable, attractive and convenient? The answer should be yes on all three counts.	**11.** The NPS will inform visitors of the various transportation options available in the Park including private tours, shuttle vehicles, bicycling, hiking, horseback riding, and private vehicles. The advantages of alternative methods of transportation would be emphasized. The proposed Intelligent Transportation System would greatly enhance the information provided to visitors on the status of road conditions and the parking status at Logan Pass and other popular sites. This information will assist visitors in making decisions about the form of transportation that best fits their activity. Currently, there are no plans for a permitting system for parking at Logan Pass, but the NPS will continue to evaluate options to improve parking and manage visitor use.
12	To develop an appropriate shuttle system during rehabilitation and to ensure smooth transition to an excellent transportation system post-construction, the park should move immediately to develop a shuttle implementation plan and the appointment of a shuttle coordinator. The plan 240	

Comment #	Letter #240 continued	Response
12	Sent By: NPCA; 406 863 2803; Nov-15-02 5:41PM; Page 4/4 should include recommendations for shuttle schedules, parking, integration with gateway communities, vehicles, shuttle stops, stop amenities, marketing and financing. In addition, we fully support Ford Transportation Scholar Susan Law's plan to organize a transportation committee composed largely of gateway community leaders to develop solutions to the the top visitor use development need already identified by gateway community leaders: Upgrade public transportation to and through Glacier National Park. **Visitor Orientation, Information and Interpretation –** NPCA supports strong visitor orientation, information and interpretation improvements during and after reconstruction to enhance the world-class visitor experience along the Sun Road. We believe the improvements discussed in the DEIS provide an excellent framework for providing these information services. We support the proposal to hinge details of the interpretive offerings on completion of the Park-wide comprehensive interpretive plan in 2003. **Rehabilitation Scheduling** – During the Sun Road Advisory Committee process, NPCA supported the shared-use alternative with several clear caveats: The plan should include a strong, visionary public shuttle system, provide multi-modal transportation options, including bicycle options and provide top-notch interpretive and orientation services. NPCA also asked for full evaluation of the costs and benefits of Glacier's original preferred reconstruction alternative, which was a fast-track approach. Under this approach, the road would have been closed for up to two years on the west side and up to two years on the east side (GMP, p. 47). This approach was favored by many respondents who commented during the Advisory Committee process or by business leaders who were interviewed during the focus groups or business survey (see p. 7, Business Survey). The Advisory Committee itself asked that the EIS evaluate the costs and benefits of the fast-track approach (p. 14, Advisory Committee Final Advice).	**12.** Implementation of a shuttle system is dependent on funding. Once the Record of Decision is signed and funding is secured, the NPS will begin developing an operation and maintenance plan including the acquisition of shuttle vehicles, and the development of shuttle schedules, and coordination with other transportation systems. The NPS is open to participating in a regional transportation committee to facilitate the planning and integration of regional transportation with Park transportation. See response to comment 240-9.
13	Unfortunately, the DEIS neither considers the fast-track approach nor lists it as an alternative considered but excluded from further consideration. It simply doesn't appear to be mentioned in the DEIS at all. At the least, the FEIS should discuss why the fast-track approach should be excluded from further consideration. Ideally, it should be developed as a possible action alternative. If numerous public comments indicate support for the fast-track approach -- either because it is less costly for taxpayers, completes construction prior to Glacier's 100th anniversary, reduces total visitor and business impacts, or whatever – then NPCA strongly recommends that a full alternative be developed for consideration. Thank you for this opportunity to provide comments on the Sun Road DEIS. Sincerely, Steve Thompson Steve Thompson Glacier Program Manager NOV 19 2002 240	**13.** A "fast-track" alternative for repair of the Going-to-the-Sun Road over 4 to 6 years was initially considered in the General Management Plan. This alternative would have closed the Road on each side of Logan Pass until repairs were completed. Because of substantial public concern over this alternative, the preferred alternative in the GMP was to conduct additional engineering and economic studies in consultation with a Citizens Advisory Committee, while maintaining the goal of completing the needed repairs before the road fails and minimizing impacts to cultural and natural resources, visitors, and the local economy. The result of the *Engineering Study* (WIS 2001a) and the recommendation of the Citizens Advisory Committee (NPS 2001a) were to evaluate a range of alternatives that provided for rehabilitation of the Road without closing the Road for extended periods. The NPS agreed with the results of the study and the Advisory Committee's recommendations. The alternatives recommended by the Advisory Committee were evaluated in detail in the Going-to-the-Sun Road Rehabilitation Plan/Draft EIS. The Accelerated Completion alternative (Alternative 4) is similar to the suggested alternative of closing half the Road at a time. This alternative includes suspension of traffic on weekdays with unrestricted visitor traffic on weekends and would complete the work in 6 to 8 years. A discussion of why a fast-track alternative was eliminated from detailed analysis was added to the *Alternatives and Mitigation Excluded From Further Consideration* section of Chapter 2 in the FEIS.

Comment #	Letter #245	Response
	MONTANA WILDERNESS ASSOCIATION NOV 2002 Received Glacier National Park Superintendent Mick Holm Glacier National Park, West Glacier, MT 59936 November 15, 2002 Dear Mr. Holm: This letter is submitted as the Montana Wilderness Association's official comments on the EIS regarding the comprehensive rehabilitation of the Sun Road. Please include this letter in the official comment record. MWA supports the "shared use" alternative. However, we have concerns on several issues:	
1	There appears to be no discussion on future transportation and visitor use options for the road corridor. One cannot really design a road unless one plans for future use and types of use. The park already faces major problems with traffic and parking congestion, which will increase with visitation unless bold steps are taken to improve public transportation and bicycling opportunities. Planning should occur now for handicap-accessible transit stops along the narrow road. There has been no planning for the function of the road in the current DEIS for road reconstruction.	**1.** See the response to comments 240-3.
2	We believe the Park should begin now to look seriously at the future mass transit opportunities for the Sun Road. Mass transit will be, for better or worse (and we believe the better) the future use pattern on the Sun Road. The preferred rehab plan calls for a modest transit system during construction work: 6 shuttle buses operating at 1 hour intervals. We favors a more ambitious transit system put forward by NPCA to reduce the inevitable traffic congestion and delays during construction activities. A minimum of 14 vehicles operating at intervals of no more than 30 minutes will be a good step toward providing a convenient and frequent shuttle option.	**2.** See the response to comment 240-10.
3	Lastly, please consider the NPCA suggestion of hiring a transit coordinator to develop a plan to implement a shuttle system during reconstruction work and to begin consultations with park advocates and gateway communities about a long-term transportation plan in and around the park. The goal would be to develop a transit system that is affordable (or free), attractive and convenient. The plan should include incentives for people to use public transportation through the park and to develop greater opportunities for safe bicycle travel on the Sun Road corridor. Thank you for this opportunity to comment. Dave Hadden David Hadden Montana Wilderness Association Northwest Field Office 307 1st Ave. E., #20 Kalispell, Montana 59901 t: 406-755-6304 f: 406-755-6334 e: mwanw@wildmontana.org www.wildmontana.org 100% post-consumer chlorine-free processing 245 Faxed to 888-7808 on 11/15	**3.** See the response to comments 240-3, 240-9, and 240-13.

Comment #	Letter #259	Response
	United States Department of the Interior FISH AND WILDLIFE SERVICE ECOLOGICAL SERVICES MONTANA FIELD OFFICE 100 N. PARK, SUITE 320 HELENA, MONTANA 59601 NOV 2002 Received Glacier National Park M.25 NPS Glacier NP Going to the Sun Road November 14, 2002 Memorandum To: Mr. Michael Holm, Superintendent, Glacier National Park From: R. Mark Wilson, Field Office Supervisor Subject: United States Fish and Wildlife Service's Comments Regarding the Draft Environmental Assessment for Glacier National Park's Going to the Sun Road Rehabilitation Project The U.S. Fish and Wildlife Service has reviewed the National Park Service's Draft Environmental Assessment regarding the Going to the Sun Road (GTSR) Rehabilitation Project in Glacier National Park, Montana, dated September 11, 2002. Our comments are provided below. General Comments	
1	Westslope cutthroat trout are prevalent throughout the GTSR corridor. However, an analysis of the effects to this species from the proposed project seems to be lacking. We recommend an analysis of the effects to westslope cutthroat trout from the proposed project be included in the Final Environmental Assessment (FEA). Specific Comments	**1.** Additional discussion on the potential impact to westslope cutthroat trout was added to the FEIS.
2	Page 62, 2nd column, last paragraph: You state that "water for dust abatement...would be needed." The final Environmental Assessment (FEA) should include an estimate for amount of withdrawals and a plan for water withdrawals to include criteria for location selection and any minimizations measures to prevent fish entrainment if applicable. The EA should also describe the months of the year wherein GNP anticipates that water withdrawals could have adverse effects on the aquatic resources.	**2.** The specific source, amount, and timing for water withdrawals from lakes, streams, or the Park's water system would not be determined until final design, construction plans and schedules are developed. Likely sources of water include Lake McDonald, McDonald Creek, and Saint Mary Lake. Water use could occur throughout the construction season from May to November. The NPS would provide contractors with acceptable locations for obtaining water. Preliminary criteria used in the selection of acceptable water sources include water bodies with sufficient water to prevent substantial changes in streamflow or volume, avoidance of spawning habitat, and locations that can be readily accessed with minimal resource damage. Pumps would be required to have screens to prevent the inadvertent entrainment of fish. Impacts to aquatic life from water withdrawals are expected to be minor. Additional discussion on water withdrawals, impacts to aquatic life, and mitigation measures was added to the FEIS and Chapter 2 includes additional conservation measures to protect water quality and native fish.
3	Page 65, 1st column, 6th bullet: The FEA should include rationale for refueling within 100 feet of streams as well as provide details of a spill containment plan. 259	**3**. No equipment servicing or refueling would be allowed within 100 feet of water bodies. Contract specifications would include restrictions on the location of fueling sites, requirements for spill containment, and other measures to safeguard aquatic and terrestrial habitat from construction-related contaminants. An additional mitigation measure to this effect was added to the FEIS.

Comment #	Letter #259 continued	Response
4	Page 65, 2nd column: For construction activities conducted within perennial flowing streams, timing restrictions may be appropriate to avoid impacts when native fish are present or when spawning areas are located downstream from the activity.	**4.** Construction activities, such as bridge or culvert work, in perennial streams would be conducted during low flow periods in the late summer and fall. There are no known spawning areas for bull trout near bridges or other drainage structures along the Going-to-the-Sun Road, although spawning habitat upstream from some crossings may be present. Construction activities downstream from spawning sites are expected to have minor short-term effects to aquatic life. Aquatic habitat and spawning activity would be further evaluated prior to construction to determine the need for restrictions in timing or other measures to avoid impacts to native fish. An additional mitigation measure was added to the FEIS indicating the need to protect spawning areas.
5	Page 67, 1st column, 2nd bullet: The Service recommends that GNP analyze the effects to bull trout from the Exotic Vegetation Management Plan and consult, pursuant to the Endangered Species Act, with the Service should the GNP determine that the Plan may affect bull trout.	**5.** Following revisions to the park-wide Exotic Vegetation Management Plan, the NPS will consult with the FWS on potential impacts to bull trout. This consultation is a separate action from the proposed Going-to-the-Sun Road Rehabilitation Plan because it is a parkwide plan.
6	Page 68, 1st column: Can GNP define what "best management erosion and sediment control measures..." they will be implementing?	**6.** Specific best management practices for erosion and sediment control measures would be developed as a component of the stormwater NPDES permitting process and incorporated into the construction specifications. Erosion and sediment control measures would be tailored to specific site conditions for each phase of work. The measures likely to be used include: straw bales, silt fence, temporary detention basins, berms, sideslope drains, inlet and outlet protection, rock check structures, and other suitable measures. Mulching and revegetation of disturbed areas would provide long-term erosion and sediment control. Chapter 2 includes conservation measures to protect water quality and aquatic habitat.
7	Page 129, 1st column, 1st paragraph (partial): You state that "Within the Going to the Sun Road Corridor, bull trout are present within Lake McDonald and McDonald Creek." Bull trout are also known to be present in St. Mary's Lake and Divide Creek and it is unknown whether bull trout are not present in other tributaries to both Lake McDonald and St. Mary's Lake. Please reflect this information in your FEA. Additionally, the Service recommends that surveys be conducted on the tributaries to Lake McDonald, McDonald Creek and St. Mary's Lake to determine fish assemblages.	**7.** Corrections were made to the FEIS on the distribution of bull trout on the east side of the Park. Fishery surveys would be conducted on streams as needed prior to construction to supplement existing information and the NPS will inform the FWS of the results in a Biological Assessment.
8	Page 195, 2nd column, 2nd paragraph: You state that "Proposed improvement to pullouts and parking areas at several locations adjacent to the Road would result in ground disturbances that would increase the potential for sediment entering the nearby streams or lakes." Does the GNP anticipate that any increases in angling will occur as a result of creating additional pullouts and improving existing ones? Could you detail in the FEA your analysis of this potential affect to the aquatic resources? If you have any questions regarding these comments, please contact Paul Hanna at (406) 758-6871 or Tim Bodurtha at (406) 758-6882. R. Mark Wilson cc: Kalispell Sub-Field Office bcc: USFWS, ES, 780 Creston Hatchery Rd, Kalispell, MT 59901 Office of the Solicitor, P.O. Box 25007, DFC, Denver, CO 80225 (Attn: Hoffman) Regional Environmental Officer, Denver ES:FERC:MT:Bigfork Hydro wp/db/DEA Response to Big Fork.wpd 259	**8.** No additional pullouts for visitor parking would be created for any of the alternatives. Improvements at existing pullouts will improve traffic flow and better delineate parking spaces, but there would be no substantial change in parking capacity. Pullout improvements are not expected to result in a measurable increase in angling or impact to aquatic resources. Additional discussion of this issue was included in the FEIS.

Comment #	Letter #260	Response
	U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION 610 EAST FIFTH STREET VANCOUVER, WA 98661-3893 November 29, 2002 Refer to: Mr. Mick Holm, Superintendent Glacier National Park GTSR/DEIS Project Management Office West Glacier, MT 59936 Dear Mr. Holm: The Federal Highway Administration/Western Federal Lands Highway Division (FHWA) appreciates the opportunity to provide comments on Glacier Park's *Going-to-the-Sun Road Rehabilitation/Draft Environmental Impact Statement* (GTSR/DEIS). As a cooperating agency this office has worked closely with Glacier Park to provide engineering support in the design and construction of GTSR rehabilitation projects with the limited funding available, and we have provided technical assistance to the park and the Citizens Advisory Committee (CAC) during the recent engineering studies and the development of alternatives for the GTSR rehabilitation. Following is a brief summary of comments on the GTSR/DEIS for your consideration. **CHAPTER 1**	
1	1. **Cooperating Agency.** Note on the cover page and in Chapter 1 that FHWA is a cooperating agency with the National Park Service (NPS). Then FHWA will be able to adopt the document by issuing our own Record of Decision (ROD) to cover our administrative actions on future GTSR rehabilitation projects.	**1.** The NPS appreciates FHWA assistance and guidance throughout this project. The FEIS reflects FHWA as a cooperating agency.
2	2. **Recent Studies.** Near the end of this section, suggest putting more emphasis on the fact that the *Engineering Study*, the *Socioeconomic Study*, the *Transportation and Visitor Use Study*, and the *Cultural Landscape Inventory and Report* contained detailed and well-documented data and recommendations that were used as the basis for discussion in the Purpose and Need section.	**2.** Additional information was added to the *Recent Studies* section in Chapter 1 of the FEIS on the importance of the previous studies in developing the purpose and need for the proposed project.
3	3. **Purpose and Need.** In the introduction, suggest more emphasis on the rehabilitation objective of addressing the needs described in detail in the following sections, which are to prevent further deterioration of the identified deficiencies in the road's condition and deficiencies in visitor use facilities adjacent to the road.	**3.** Additional description was added to the *Purpose and Need* chapter to clarify the objective of addressing the deficiencies in the Road condition and visitor facilities.
4	a. **Current and future traffic use.** The GTSR/DEIS states that the road is inadequate for the current traffic use and vehicle weights. Suggest stating what the traffic volumes and current vehicle sizes/weights are.	**4**. The FEIS includes additional information on how increased traffic over time has contributed to the condition of the Road.
5	b. **Needs.** In this chapter, there are many statements saying that things are needed such as transit facilities, parking areas, trail heads, etc. However, there is not always a description of the problems or desired opportunities that support these needs. Suggest summarizing from previous studies what the existing problems and/or opportunities are that support the need for these 260	**5**. Additional description was added to the FEIS indicating the concerns and deficiencies associated with visitor use facilities and transit.

Comment #	Letter #260 continued	Response
	facilities.	
6	3. **Decision Process (pg. 32).** Suggest adding the italicized text to the following sentence, "The NPS is the project proponent and lead agency under NEPA, *and FHWA is a cooperating agency*."	**6.** The suggested language was added to the FEIS.
7	**CHAPTER 2** 1. **Costs of Operations and Maintenance (pgs. 35 & 163).** Under Alternative 1 (no action) the park's O&M budget would remain the same. It might help to state that without the repairs, there would be a more rapid deterioration of the road that would eventually result in higher O&M costs (and reduce even further the funding that may be available for rehabilitation projects) just to keep the road open.	**7.** A discussion of the likely increase in O&M costs if the No Action alternative is implemented was added to the FEIS.
8	2. **Page 40.** Suggest rewording the second sentence to, "This alternative is the best balance of rehabilitation requirements and minimizing impacts to visitors and local businesses." Otherwise, it may not be true that this alternative maintains visitation to similar conditions. Also, suggest changing 'low visitor use' with '*reduced* visitor use' on this page and page 42 under '**Traffic Management**'.	**8.** The suggested edits were made to the FEIS.
9	3. **Page 43.** Delete the first sentence, "Historic scenic vistas…" since this is repeated twice.	**9.** The suggested edit was made to the FEIS.
10	4. **Traffic Management (pg. 42).** We recommend moving the shoulder season September 15 beginning date to the day after Labor Day, or at least to September 8. Adopting one of these earlier beginning dates for the shoulder season would be a significant help in the construction of the GTSR/DEIS preferred alternative. The chart on page 36 should also be modified to reflect this earlier shoulder season beginning date.	**10.** The NPS has decided not to modify the construction season for the preferred alternative. Visitation the first two weeks in September often remains high and restrictions in travel during this period would inconvenience visitors and impact commercial businesses that are typically open during this period.
11	5. **Guardwall Improvements (pg. 60).** The bulleted list should also include: • Install removable timber guardrail (with steel backing) in some avalanche prone locations.	**11.** The suggested bullet was added to the FEIS.
12	6. **Pg. 61, first paragraph.** The West Tunnel segment of the GTSR would probably need some pavement widening, as already called for in the Lake McDonald, Baring Creek, and St. Mary segments. The West Tunnel segment of road is similar in character to those other three segments (not generally constricted by walls as is the Alpine section), and so it may be possible to add some pavement widening on curves without impacting the historical fabric. Therefore, we recommend adding the West Tunnel segment to the list of the Lake McDonald, Baring Creek, and St. Mary segments.	**12.** Pavement widening on curves within the West Tunnel Segment of the Road (MP 16.2 to MP 23.4) is not anticipated, because oversized vehicles are not permitted between Avalanche and Sun Point.
13	7. **Avoidance Versus Mitigation.** On page 64, clarify that mitigation does not include measures to avoid. Mitigation comes into play when one cannot avoid an impact but hopes to lessen it.	**13.** The distinction between avoidance and mitigation has been clarified in the FEIS.
14	8. **Needed Resource Surveys (pg. 67).** Suggest noting that resource surveys (such as for wildlife) will be conducted prior to *design activities*, instead of before *ground disturbing* or *construction* activities.	**14**. The suggested change was made in the FEIS.
15	9. **Vehicle Inspection (pg. 67).** Since this will be the NEPA document from which all environmental commitments and mitigation measures will be extracted for FHWA's construction environmental checklist, suggest clarifying the construction vehicle inspection requirement. FHWA requires that all construction equipment be pressure washed clean of mud and weed seed prior to their initial entrance into the park. Subsequent re-entries do not require cleaning unless requested by the contracting officer.	**15.** The suggested change to this mitigation measure was made in the FEIS.
16	10. **Material Sources and Staging Areas (pg. 62).** Depending on where these material sources and staging areas may be located outside of the park, and how they will be used, NEPA and/or	**16.** The NPS will comply with any additional NEPA or permitting requirements that may be necessary to address possible material sources and staging areas outside of the Park. The NPS will work with contractors in the selection of offsite facilities that would not adversely affect the environment.

Comment #	Letter #260 continued	Response
	other environmental compliance may be needed prior to using these sites. __CHAPTER 3__ This is the **BEST** Affected Environment Chapter our environmental specialist has ever read!	
17	1. **CULTURAL RESOURCES. Top of page 111,** suggest that cultural inventory of un-surveyed areas ***start now*** before the FEIS is issued and to complete Section 106. If delayed until the beginning of work, this could delay the desired project schedule. 2. **NATURAL RESOURCES.**	**17.** The NPS and SHPO have agreed to review rehabilitation plans for each phase of construction. Cultural surveys would be completed at least one year prior to construction along with associated Section 106 consultation. Most of the areas where impacts could potentially occur have previously been evaluated. Every effort will be made to ensure that cultural resource and other environmental clearances are in place to avoid construction delays.
18	a. **Water Resources.** On page 116 under '***Water Quality***', suggest spelling out what the units for phosphorus concentrations are.	**18.** The suggested correction to the text was made.
19	b. **Threatened and Endangered Species and Species of Concern.** Under '***Threatened and Endangered Species***', the list provided by U.S. Fish & Wildlife Service (FWS) as shown in Table 27 on page 127, needs to be updated every six months. It's already over a year old.	**19.** An updated list and consultation with the FWS was conducted in December 2002. The list of threatened and endangered species remains the same as those discussed in the DEIS.
20	__CHAPTER 4__ **Definition and Coordination of Impacts.** In addition to the effects as described in the GTSR/DEIS, suggest impacts also be described as may be related to other laws, particalarly in regards to Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA).	**20.** Additional discussion was added to the Environmental Consequences chapter on the compliance requirements under the Endangered Species Act and Section 106 of the National Historic Preservation Act.
21	1. **Wetlands.** Under the '**Conclusion**' on page 190, since there will be some impact to wetlands (and unless otherwise defined, the impact will be adverse), isn't a Statement of Findings (SOF) also required with the GTSR/FEIS (from NPS Procedural Manual 77.1)?	**21.** A Statement of Wetland Findings (SOF) was not prepared for the FEIS because no direct loss of wetlands has been identified. NPS Directors Order 77-1 allows for exceptions from a SOF for maintenance, repair, and renovation structures, such as the minor temporary disturbances to wetlands (up to 0.1 acre) that may occur during the repair or replacement of existing facilities (e.g., culverts). The NPS intends to avoid wetlands to the maximum extent practicable, but should unavoidable impacts occur on more than 0.1 acre of wetlands, the NPS will comply with Executive Order 11990, secure the necessary permitting from the U.S. Army Corps of Engineers, and complete a SOF to address impacts and mitigation. Additional wetland surveys will be conducted during each design phase to assist with avoidance measures and identify any permitting requirements. Consultation was conducted with NPS Water Resources on this issue.
22	__CHAPTER 5__ 1. **ENDANGERED SPECIES ACT…**On page 216, the GTSR/DEIS states that GNP will request initiation of Section 7 consultation when the FEIS is issued. It might be much more effective to start this before the FEIS is issued because; (a) FWS may have some input that would be relevant to disclose in the FEIS, and (b) because of the adverse effects that are predicted for many species, formal consultation is likely. If keeping on schedule is imperative, it would be best to start this process as soon as possible.	**22.** The NPS initiated informal consultation with the FWS on June 5, 2000. A Biological Assessment and Programmatic Agreement was submitted to the FWS in February 2003. The FWS and NPS last met on this project in December 2002. Formal consultation has been initiated given the likely to adversely effect determination on grizzly bears. See page 203 for more information.
23	2. **EXECUTIVE ORDER 11990…***On page 216, it states that no wetlands would be affected by any of the alternatives, but this appears to be inconsistent with page 190. NPS Manual 77.1 appears to require a SOF if there will be an *adverse* effect to any wetlands, regardless whether there is an encroachment.	**23.** See the response to comment 260-21.
24	3. **WILD AND SCENIC RIVER ACT** – Does GNP have the FS concurrence on GNP's Section 7(b) determination under this act? If not, suggest it be procured.	**24.** The NPS has a Memorandum of Agreement with the U.S. Forest Service (September 2001), which provides for Forest Service (Flathead National Forest) concurrence with the Park Service determinations on NPS projects within designated Wild and Scenic River corridors. Consultation with the
25	4. **NATIONAL HISTORIC PRESERVATION ACT OF 1966** - Suggest that overall consultation occur prior to issuing the GTSR/FEIS and that SHPO's input be documented in the final published GTSR/FEIS. While there may be some site specific consultation needed for each construction phase, this would help prevent any unwanted delays.	

Comment #	Letter #260 continued	Response
		Forest Service is not required so long as projects within the Park do not affect the values of the Wild and Scenic River designations. The preferred alternative would not affect the values for which the Flathead River was designated. These values are "outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, and cultural, shall be preserved in a free-flowing condition." The preferred alternative would not affect the free-flowing status of the river, nor any of the values above. Furthermore, only a small portion of the project (about 300 feet) is within the corridor for the Wild and Scenic River near West Glacier. **25.** See the response to comment 260-17.

Comment #	Letter #260 continued	Response
	An attachment to this letter contains a list of minor comments/questions for consideration. If you have any other questions regarding these comments please call me at (360) 619-7729. Sincerely yours, Richard W. Gatten, P.E. Design Operations Engineer Enclosures: List of minor comments cc: Jody Marshall, WFLHD	

Comment #	Letter #260 continued	Response
	Attachment to November 29, 2002 letter **COMMENTS TO CONSIDER** ***Going-to-the-Sun Road, Rehabilitation Project*** ***Draft Environmental Impact Statement*** Following are some general comments on the *Going-to-the-Sun Road, Rehabilitation Project, Draft Environmental Impact Statement*, (Glacier National Park, August 2002) (GTSR/DEIS). **CHAPTER 1** 1. **BACKGROUND**	
26	a. **Historic Significance.** On page 3, perhaps define the significance or criteria for designation as a National Historic Landmark (NHL).	**26.** The Going-to-the-Sun Road meets National Historic Landmark (NHL) Criterion 1 for its association with the American Park movement. The Road also meets NHL Criterion 4 as an exceptionally valuable example of American landscape engineering, which blends the practices of civil engineering and landscape architecture. Additional discussion of the criteria meet by the NHL designation was added to the *Background* section of Chapter 1.
27	b. **Recent Studies.** On page 7, there is mention that the cultural resource investigations will be done in two phases. Why? Also, the DEIS states, "The first phase is documented in the *Cultural Landscape Inventory* (RTI 2001), which will be updated in 2002." Since 2002 is coming to a close, has it been updated, or should the date for update be changed? 2. **PURPOSE AND OBJECTIVES.** The list of objectives on page 8 is good. 3. **NEED FOR THE PROJECT**	**27.** The cultural resource investigations included two phases: 1) preparation of a Cultural Landscape Inventory (RTI 2001), which included a detailed field assessment and mapping of the historic features of the Road; and 2) a Cultural Landscape Report (RTI 2002), which provided descriptive information on the history of the Road, value of the resource, and recommendations for rehabilitation. An update to the report and supplemental mapping was completed in 2003 and is included as Volume 2 of the Cultural Landscape Report (RTI 2003). The text in Chapter 1 of the FEIS has been modified to describe this series of reports.
28	a. **Needs Associated with…** From pages 9 to 23, these sub-topics really don't state what the need is but state what problems exist under each category. Would it be better to modify the headings of these sections to, "**Problems Associated with…**"?	**28.** The headings were changed to identify the problems associated with each component of the Road.
29	b. **Needs Associated with Safety.** On pages 14 and 15, there is no mention of current and future travel demand, park management of use, and desired future condition for traffic. Consider adding these in this section. Can this be found from the transportation studies mentioned on page 4 under "**Previous Studies**"? c. **Needs Associated with Deficiencies in Visitor Use Facilities.**	**29.** The number of visitors and future travel demand are expected to grow slightly over the next 3 years and then level off until about 2020. Proposed Road improvements are not intended to increase the capacity of the Road, but rather to maintain and rehabilitate the condition of the Road and improve safety and the quality of visitor travel through the Park. The addition of slow-moving vehicle turnouts and proposed improvements to pulloffs and would further increase safety to motorists and pedestrians. These improvements plus the addition of transit service is expected to result in minor improvements in traffic flow and meet NPS objectives for a safe reliable roadway.
30	i. **Traffic.** The GTSR/DEIS states on page 15, "Over 80 percent of Park visitors travel the Road." It also states on page 15, "Peak summer traffic frequently causes crowding at pullouts and parking areas along the Road." If the park knows what number of Seasonal Average Daily Traffic (SADT) equates to 80% of Park visitors, and what SADT equates to this peak use, suggest the information be included.	**30.** Average daily traffic on the Going-to-the-Sun Road during the primary visitor use season ranges from about 3,600 vehicles per day near Lake McDonald to about 2,200 vehicles per day at St. Mary. Of the approximate 1.7 million annual visitors to the Park, about 80 percent travel the Road. Additional information on Park traffic was added to Chapter 2 of the FEIS.
31	ii. **Pullouts and Parking (Pgs. 16-20).** The GTSR/DEIS launches into proposals for transit facilities, yet there is no prior description of problems associated with transit service. Consider adding a section titled "Problems Associated with Transportation Circulation and Transit." There are numerous problems and needs listed under the 22 pullout and parking area locations listed. *Recommend adding the rationale for proposed improvements and locations* related to a) the West Side Discovery Center (identified in the park's 1	**31.** A new section on *Problems Associated with Transportation Circulation and Transit* was added to Chapter 1 of the FEIS.

Comment #	Letter #260 continued	Response
32	GMP?), b) transit center and transit stop locations, c) toilet facilities, d) visitor use improvements such as information services, education, and interpretive information, and e) vehicle circulation and pedestrian movement. iii. **Scenic Vistas**. While it may be a good idea to demonstrate the concerns of the narrative with before and after photos, Figure 3 on page 20 does not appear to be a good example to describe the problem proposed in the text. The 1987 photo seems to show less mature trees by the roadside, the vegetation appears to be quite younger.	**32.** The young vegetation shown in the 1987 photo illustrates roadside vegetation establishment because of better light and moisture conditions following original road construction. The new younger and denser trees and vegetation adjacent to the Road now obscure some of the scenic views that were originally present.
33	4. **ISSUES CONSIDERED IN THIS EIS**. a. **Natural Resource Issues, Wilderness and Wild and Scenic Rivers.** On page 27, the GTSR/DEIS states, "The Going-to-the-Sun Road begins on the west side of the Park at the Middle Fork of the Flathead River, which is designated a Wild and Scenic river." Just as a *heads-up*, depending on the vicinity of the road to the Middle Fork of the Flathead River, this proposed project may require a U.S. Forest Service (FS) finding that the proposed project is consistent with the management plan for the Middle Fork of the Flathead River, which is jointly managed by NPS/FS under the Wild & Scenic Rivers Act, commonly referred to by the FS as a section 7(d) determination.	**33.** See response to comment 260-24.
34	**CHAPTER 2** – All text pages relating to Transit Service During Rehabilitation, including Table 2, assumes no growth in park visitation, traffic, and base transit ridership during any of the intervals noted under each alternative. The text does make an assumption about using transit to mitigate construction via a mode shift in Alternatives 2, 3, and 4. Page 42 mentions that the system could operate using 15-passenger vans or 25-passenger buses but this is not reflected in cost or number of vehicles. Is the capacity of the system being taken into account?	**34.** Forecast estimates for the number of visitors to GNP indicates slight growth until 2006 (< 2% on average) and relatively constant visitor numbers thereafter to 2020. The cost estimate for transit service is based on the use of 25-passenger buses, if 15-passenger vans were used, acquisition and operating costs would be lower. Transit service for Alternatives 3 and 4 provides an increased level of service and capacity compared with Alternatives 1 and 2. While the demand for transit service is difficult to predict, the NPS will encourage efficient and full use of available transit capacity for whichever alternative is selected.
35	1. **ALTERNATIVE 1- NO ACTION (REPAIR AS NEEDED)** a. **Traffic Management**. Consider updating Table 2 with a footnote that longer delays or traffic suspensions may be needed if extensive damage occurs (the damage itself might close the road).	**35.** A footnote was added to Table 2 indicating possible delays or road closure if extensive road damage occurs prior to rehabilitation.
36	b. **Transit Service During Rehabilitation.** Suggest the existing transit service be described in Chapter 1 in greater detail than the one sentence description written in this sub-section. Also, what is a two-way loop system?	**36.** Additional information on the existing transit and tour service was added to the section on *Problems Associated with Transportation Circulation and Transit* in Chapter 1 and in the discussion of the No Action alternative in Chapter 2. The existing "two-way loop" includes shuttle service with eastbound departures from West Glacier and westbound departures from Swift Current, Many Glacier, and St. Mary Visitor Center. Multiple stops are made at points of interest throughout the length of the Road.
37	2. **ALTERNATIVE 2-PRIORITY REHABILITATION.** In '**Traffic Management**' on page 39, safety concerns are mentioned. Are these concerns related to construction, to the traveling public, or both? 2	**37.** The safety concern for night work is for construction crews. The steep terrain, possibility of rockfall, and other hazards are a safety issue for night work. Traffic would be suspended in night work zones to eliminate safety concerns for the traveling public.

Comment #	Letter #260 continued	Response
38	**3. ALTERNATIVE 3-SHARED USE WITH EXTENEDED REHABILITATION SEASON (PREFERRED)** a. **Visitor Use Improvements**. i. **Parking and Pullouts.** ▪ **In Figure 7**, suggest identifying the mileposts with the referenced slow-moving pullouts to help orientate the reader.	**38.** Mileposts were added to Figure 7.
39	▪ **Vista Management Plan**. Is this plan in existence, or does it need to be prepared?	**39.** Existing Roadside Maintenance Guidelines (NPS 1993) and Design Guidelines for Vista Clearing (NPS 1999) provide direction for vista management. GNP is currently preparing landscape/vista management guidelines for the Road in cooperation with the Forest Service.
40	▪ **Avalanche.** On page 44, suggest identifying what the ITS system will provide to visitors.	**40.** A brief description of the ITS was added to the introduction of *Visitor Use Improvements for Alternative 3* in Chapter 2.
41	▪ **Logan Pit.** Suggest you add e*ast-bound* as follows; "Currently, west-bound oversized vehicles…"	**41.** Use of Logan Pit for an oversized vehicle turn-around was eliminated from the proposed action to minimize wildlife impacts.
42	▪ **St. Mary Falls Trailhead.** This states, "Improvements at this popular trailhead are needed to meet safety standards." However, there are not corresponding problems identified in the Chapter 1, the Purpose and Need Chapter that describe the deficiencies in safety standards. Should they be?	**42.** Edits to the discussion in Chapters 1 and 2 of the St. Mary Falls Trailhead parking area were made to clarify the safety concerns associated with this narrow roadside parking area.
43	ii. **Visitor Orientation, Information and Interpretation** ▪ **Intelligent Transportation System.** In this sub-section, intelligent transportation systems (ITSs) are defined. Suggest defining it earlier in the chapter, so the reader might understand its inclusion at some sites.	**43.** See response to comment 260-40.
44	**4. ACTIONS COMMON TO ALL ALTERNATIVES** a. **Table 5.** For those not familiar with the road segments in Table 5, it would be very helpful to have a corresponding Figure to show were these are.	**44.** These road segments are shown in Figure 2. A reference was added to the text indicating this.
45	b. **Road Rehabilitation Techniques.** Suggest defining what a 'long life cycle' is as used on page 58. Is it 20 years, 50 years, etc.?	**45.** A long life cycle indicates the plan to use high quality materials and construction methods to ensure that road repairs last and that maintenance requirements are minimized. The actual life cycle will vary with the structure or material, but a life cycle of 20 years or more is expected for most components, except surface paving. Additional information was added to the section on *Road Rehabilitation Techniques* in Chapter 2.
46	**5. TABLE 7.** Under '**Cultural Resources**', on page 75, the narrative for Alternative 3 appears inconsistent with the text on page 69 under '***Cultural Resource Mitigation***'. The text on page 69 (under 'Actions Common to All Alternatives') states that all alternatives, including Alternative 3 may result in an adverse effect to the historic road and resources.	**46.** No adverse effect to cultural resources are anticipated for Alternatives 3 and 4 because repairs would be implemented over a relatively short period, prior to significant further deterioration. Section 106 consultation with the State Historic Preservation Office (SHPO) and Advisory Council on Historic Preservation (ACHP) would occur for each phase of rehabilitation to determine potential adverse effect to cultural resources. If, during the course of final design, an unavoidable adverse effect is identified, the NPS would work with SHPO and ACHP according to Section 106 procedures to determine mitigation requirements.
47	<u>CHAPTER 3</u> – This is the ***BEST*** Affected Environment Chapter our environmental specialist has ever read! 1. Visitation projections are missing from pages 82-83 including Figure 9. The GTSR/DEIS mentions trends but only provides visitation figures to the year 2000. We understand the projections for ridership or traffic over the next 20 years are relatively minimal; if so, this maybe should be stated.	**47.** Information on visitor projections is included primarily in Chapter 4. Additional information was added on projected visitor numbers in Chapter 3, but because of the relatively small projected change in visitor numbers, this data was not included in Figure 9.
48	<u>**CHAPTER 4**</u> **1. TABLE 29.** a. **Section 106.** From pages 129 to 142, in the park's coordination with SHPO it should be determined if SHPO agrees that 'minor adverse' impact equates to a *no* 3	**48.** Prior to construction, the NPS will seek concurrence from the SHPO on the determination of effects for cultural resources. See response to comment 260-17.

Comment #	Letter #260 continued	Response
49 50 51 52 53 54 55 56 57 58 59	*adverse effect* under Section 106 (for archaeological resources, historic, and cultural landscapes). b. **Ethnographic.** Suggest spelling out or footnoting what TCP is. c. **Wetlands (Pg. 144).** For the final GTSR/FEIS the park should confirm with the U.S. Army Corps of Engineers (Corps) if they agree with no guarantee to wetland mitigation if a Major Impact occurs. Usually, monitoring is required to regulate success, and if not successful, subsequent mitigation is usually required. Also, to not guarantee wetland mitigation seems inconsistent with Executive Order 11990. d. **Threatened and Endangered Species and Species of Concern (Pg. 145).** For the final GTSR/FEIS the park should confirm with the FWS if they agree that an affect that exists to Threatened & Endangered (T&E) species, although negligible, equates to a *no effect* under Section 7 of the Endangered Species Act (ESA). e. **Environmental Justice.** On page 146, suggest replacing 'low income areas' with 'low income and minority populations'. 2. **CUMULATIVE EFFECTS**. Figure 22 on page 149 is a great idea. Suggest providing a clearer copy. 3. **REASONABLY FORESEEABLE ACTIVITIES.** a. **National Forest Activities.** On page 150, might harvesting activities also have an additional effect to increased sediment? b. **Table 30.** Suggest adding CSP activities (pg. 150) under Glacier National Park Activities (page 148). 4. **CULTURAL RESOURCES**. Somewhere between pages 176 to 180, it might be very beneficial to also state what the impact is (by alternative) as assessed under Section 106, including documentation of SHPO's concurrence through Section 106 consultation. 5. **NATURAL RESOURCES** a. **Topography, Geology, and Soils.** Under '***Cumulative Effects***' on page 183, without additional data, it is not clear how the conclusion was reached, "Timber salvage and restoration activities…may result in an increase in soil erosion, but the incremental effect of soil loss…would not add appreciably to the cumulative effect". Is this specific to the Moose Fire site? b. **Threatened and Endangered Species and Species of Concern**. For all the T&E species from page 197 to 200, suggest also listing the effects using Section 7 ESA language. c. **Wilderness and Wild and Scenic Rivers**. What equates to a 'direct disturbance' for wild and scenic (W&S) rivers as noted on page 211? Is this direct into the W&S River or within its designated corridor? 4	**49.** Traditional Cultural Properties (TCP) was spelled out in Table 29. **50.** The impact threshold definition for a major wetland impact has been modified. All wetland impacts would be mitigated regardless of the extent of the impact for all alternatives. **51.** The U.S. Fish and Wildlife Service will make a determination on the significance of affects to threatened and endangered species in a Biological Opinion. See response to comment 260-22. **52.** The suggested edit was made in the FEIS. **53.** Improvements in printing were made in the FEIS. **54.** Additional discussion on cumulative impacts for Forest Service salvage operations was added to the *Water Resources* section of Chapter 4 in the FEIS. **55.** The Commercial Service Plan was added to Table 30. **56.** Section 106 consultation for the selected alternative would be conducted prior to each phase of rehabilitation. See response to comments 23-1 and 260-17. **57.** Timber salvage operations associated with the Moose Fire may result in erosion, which could result in a cumulative loss of soil resources for the greater GNP region. The proposed Going-to-the-Sun Road rehabilitation would have a negligible to minor contribution to regional soil loss when combined with the potential effect of the timber salvage operations on the Moose Fire. Additional discussion was added to the section on *Topography, Geology, and Soils* in Chapter 4 of the FEIS. See response to comment 260-54. **58.** The NPS determination of effects for threatened and endangered species was added to the FEIS. **59.** A direct effect to Wild and Scenic Rivers would include an impact within the designated corridor.

Summary of Comments From Individuals

Alternatives and Visitor Use Improvements

Locate the Westside Discovery Center adjacent to Lake McDonald.

The *General Management Plan* determined that the preferred location for the Westside Discovery Center is in the Apgar Village area near the intersection of the Camas Creek Road and the Going-to-the-Sun Road. While not directly on the shore of Lake McDonald, this location provides ready access to incoming visitors, proximity to the lake, Apgar Village, and campground.

Traffic on the Going-to-the-Sun Road should be limited to guided tours rather than commercial or private vehicles.

Closing the Road to private vehicles was considered in the *General Management Plan* (GNP 1999b) and rejected during that planning process. Private concessioners currently provide tour services along the Road. These tours provide a unique experience for visitors. Shuttle service is also currently available on a limited basis and the preferred alternative includes continued tours by concessioners and expansion of shuttle service. The NPS strives to provide a balance of transportation options to the public, including access to the Road by private vehicles.

The parking area at Logan Pass should be expanded.

Expansion of the Logan Pass parking lot was evaluated in the *General Management Plan* (GNP 1999), but was eliminated because of adverse impacts to sensitive alpine plant communities, loss of wildlife habitat and additional disturbance to wildlife from more visitors, the degradation of the visual quality of the area, and potential erosion and water quality concerns. Proposed expansion of shuttle service along the Road would provide visitors with an alternate means of accessing Logan Pass during peak periods when parking congestion is high.

Road rehabilitation should consider the addition of a shoulder or bike lane.

Substantial Road widening would be needed to accommodate a bike lane. This would have significant adverse impacts on the historic character of the Road and cultural resources and values. Most of the high-elevation portions of the Road cannot be widened easily because of the steep terrain and resource damage that would occur. The decision to not widen the Road was made in the Glacier National Park *Transportation Plan* (NPS 1990) and reaffirmed in the *General Management Plan*.

The NPS will continue to allow bicycling on designated roads in the Park and proposed roadway improvements and paving will provide safer conditions for bicyclist; however, restrictions on bike travel during peak visitor use periods would continue similar to current conditions.

Consider a combination of the Priority Rehabilitation Alternative (Alternative 2) and the Accelerated Completion Alternative (Alternative 4).

The Priority Rehabilitation alternative and Accelerated Completion alternative are distinguished by the amount of annual funding for rehabilitation, level of transit service, the number of visitor use improvements, and the traffic management plan. Applying the Accelerated Completion alternative schedule to the Priority Rehabilitation alternative would complete the work sooner, but would include lower levels of transit service and fewer visitor use improvements and mitigation measures. The NPS believes that the Priority Rehabilitation Alternative does not meet the needs of the Going-to-the-Sun Road and that the Shared Use alternative (preferred) provides the best combination of timely road rehabilitation and visitor use improvements.

Do not allow recreational and commercial vehicles to drive the Road.

Vehicle size restrictions of no wider than 8 feet or no longer than 21 feet will remain in effect between Avalanche and Sun Point following Road rehabilitation. These size limitations restrict use of the Road by most motor homes, trailers, and large trucks. Further temporary size limitations may be necessary during rehabilitation on sections of the Road.

The time estimate for Road rehabilitation is unrealistic because of the short construction season.

As directed in the 1999 Appropriation Bill, an independent engineering firm with professional experience on roads in mountainous alpine conditions was hired to evaluate the Road's condition and develop feasible rehabilitation alternatives. Washington Infrastructure Services was the selected firm. It looked at elements such as the mountainous winter environment and short construction season in forming the alternatives. The alternatives in this document are based on the *Engineering Study* Washington Infrastructure provided to NPS and recommended by the Citizen's Advisory Committee.

The cost estimate for rehabilitation of the Road seems unrealistic.

Washington Infrastructure Services spent almost two years developing and evaluating the condition of the Road, determining the needed repairs, and estimating the time and costs associated with Road rehabilitation (*Engineering Study*, WIS 2001a). The results of that study are the best available estimate of the anticipated construction schedule and cost for each alternative. More detailed cost estimates would be developed during final design for each phase of rehabilitation.

Consider a rail system for the Road rather than rehabilitation to accommodate private vehicles.

The conversion of the Going-to-the-Sun Road into a rail system was considered in the *General Management Plan*, but was rejected. The tracks and cables associated with a rail or cog system would be incompatible with the historic appearance of the Road and would preclude private automobile use, which is historic and valued by visitors.

Close the Road completely until roadwork is finished.

Complete closure of the Road was not considered as a feasible alternative because of the significant adverse effects on visitation, recreation opportunities, local businesses, and the regional economy. The preferred alternative provides a balance in completing the necessary Road rehabilitation in a timely and cost effective manner, while allowing continued visitor access and minimizing impacts to environmental resources and local businesses. An alternative that closes one side of the Road and then the other was considered in the *General Management Plan*. This alternative was considered, but rejected as discussed in the *Alternatives and Mitigation Excluded from Further Consideration* section in Chapter 2 of the FEIS.

Establish a task force with several engineering firms and contractors to develop alternatives for Road rehabilitation.

A range of feasible alternatives was considered in this EIS as well as the previous *General Management Plan*. A Citizens Advisory Committee participated throughout the development of alternatives during the preparation of an *Engineering Study*, *Socioeconomic Study*, *Transportation* and *Visitor Use Study,* and a *Cultural Landscape Inventory and Report*. The private consultant, Washington Infrastructure, consulted with several other engineering firms and contractors to develop the findings and recommendations in these studies. The alternatives considered in the EIS present the culmination of over two years of investigation, analysis, and discussion by a diversity of interests including, the Federal Highway Administration, Tribal communities, the National Park Service, consulting experts in engineering and economics, representatives from local and regional governments, and local business interests. The NPS believes the process described above accomplished this suggestion.

Additional roadside vegetation management is needed to create scenic views.

All of the alternatives include vista clearing to restore the scenic views that were historically present along the Going-to-the-Sun Road. The NPS will implement these measures on a selective basis according to existing Roadside Maintenance Guidelines and vegetation management direction to maintain vistas and sight distances along the Road. Vista clearing will continue to maintain and preserve the historic character of the Going-to-the-Sun Road and the traits that contributed to its designation as a National Historic Landmark.

The cost and schedule should be adjusted for bad weather.

The costs and scheduling estimates for the different Road rehabilitation alternatives include consideration for bad weather.

Mitigation

Consider compensating businesses for lost revenues during Road rehabilitation.

Direct compensation to businesses impacted by the Road rehabilitation is beyond the authority of the NPS. For the preferred alternative, the NPS is implementing several measures to encourage tourism to the Park during rehabilitation including improvements to existing pullouts, additional exhibits and interpretative information, additional transit service, improvements to the St. Mary Visitor Center, and construction of a Westside Discovery Center. In addition, the Park would work with local businesses and the public to clearly communicate the status of Road rehabilitation and any restrictions on access. There also may be additional opportunities for businesses to promote their services.

Consider improving access and promoting the west side of the Park via the Inside North Fork Road or outside North Fork Road during rehabilitation of the Going-to-the-Sun Road.

The Inside North Fork Road provides access to Polebridge, Bowman Lake, and other west side features in the Park. The NPS will encourage use of this area by visitors during rehabilitation work; however, road conditions and fewer visitor amenities affect the amount of visitation in this portion of the Park.

The outside North Fork Road in Flathead National Forest, located just outside the western boundary of GNP, currently provides access to the Canadian border. Currently the border crossing is closed and we are not aware of any plans to re-open this crossing. While some visitors may enjoy the remoteness of this unpaved route, road conditions and long distances are unlikely to make this a popular destination.

The NPS should facilitate communication with the public about the status of the Going-to-the-Sun Road and emphasize that it will remain open during rehabilitation.

One component of the proposed mitigation plan to be implemented by the NPS during rehabilitation is increased communication with the public, local businesses, concessioners, and tourism-related organizations on the status of the Road. Alternatives 3 and 4 include additional funding for new seasonal NPS staff to implement a public information system to aid visitors and local businesses. In addition, an Intelligent Transportation System would provide real-time data on the status of the Road and other activities. Under the Preferred Alternative, the entire Going-to-the-Sun Road would be accessible for visitors during the peak season, subject to short daytime traffic delays and longer traffic delays at night. During the early and late shoulder seasons, over 80 percent of the Road would remain open to public travel.

Create more opportunities for visitors to see other portions of the Park and provide additional interpretative material.

The visitor use improvements included primarily in Alternatives 3 and 4 would provide additional opportunities for visitors to enjoy the Park. In addition, the NPS intends to promote other attractions and portions of the Park not under construction to disperse use and encourage visitors to explore other sites. Mitigation measures include additional information, exhibits, and orientation materials for visitors. At any given time, for any of the alternatives, no more than 20 percent of the Going-to-the-Sun Road would be actively under construction.

Transit System

Would the shuttle system provide frequent stops?

The transit system would include shuttle stops at popular attractions, pullouts, trailheads, and parking areas throughout the length of the Road. Approximately 17 transit stops are anticipated.

Expand shuttle service to meet the current parking shortage.

The rehabilitation of the Road includes improvements in the layout and efficiency of existing roadside pullouts. There would be only a marginal increase in available parking space, primarily from improved configuration of existing parking areas. Proposed expansion of shuttle service is believed to be one of the primary methods to alleviate traffic and parking congestion rather than construction of substantial new infrastructure. The best available projections indicate a very minor growth in Park visitation over the next 20 years. Incremental expansion of shuttle service is one option to meet future visitor demand.

A transit system should not replace the individual's ability to access the Road in private vehicles.

The NPS has no plans to eliminate private vehicles from the Going-to-the-Sun Road; however, we encourage visitors to take advantage of other transportation options, including concession tour vehicles, the existing shuttle system, and the proposed expanded shuttle system if selected for implementation.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-421/April 2003