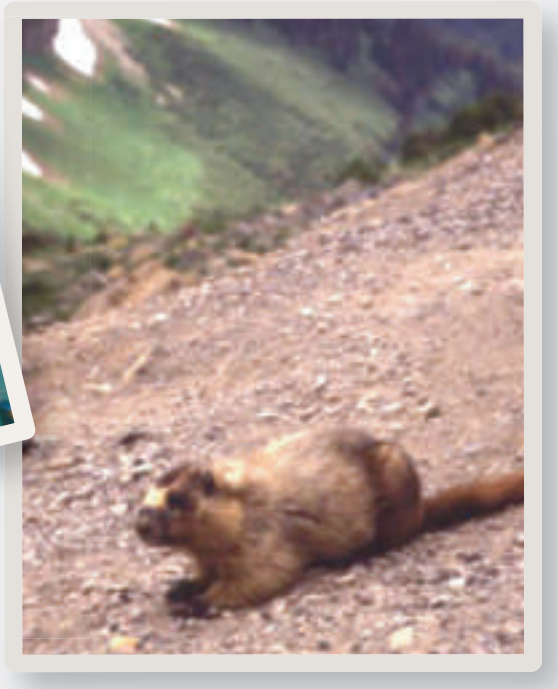
Chapter 4 Environmental Consequences



Chapter 4 Environmental Consequences

INTRODUCTION

This chapter describes the potential environmental consequences of the alternatives. The environmental consequences form the scientific and analytical basis for the comparison of the alternatives. To focus the discussion of potential consequences, specific impact topics were selected. The rationale for selecting each topic is discussed in the following section.

The chapter is organized by impact topic. Each topic section includes a discussion of the methodology used to identify and evaluate the impacts, impacts common to all alternatives, impact analysis for each alternative, and assessment of cumulative impacts. The impact analysis also examines the potential impairment to park resources and values.

Impacts are described in terms of context, intensity and duration. The context of impacts are 1) s*ite-specific* at the location of the action, 2) *localized* on a drainage- or district-wide level, 3) *widespread* throughout the park, or 4) *regional* outside of the park. The intensity and duration of impacts varies for each impact topic. Thresholds of impact for each topic are defined in Table 4-1.

Existing conditions are described for the *status quo/no action* alternatives. These alternatives provide the baseline conditions for evaluating changes and related environmental impacts for the remaining action alternatives. Impacts are often similar for all alternatives, but differences in impacts are identified and compared as appropriate. All impacts have been assessed assuming that mitigation measures would be implemented (see “Mitigation” in Chapter 2).

Table 4-1, Impact Threshold Definitions on the following pages defines the intensity levels (negligible, minor, moderate, major) and duration for all of the impact topics considered in this discussion. Descriptions of the impacts follow Table 4-1.

TABLE 4-1 IMPACT THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Water Quality	Water quality would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight.	Changes in water quality would be measurable, although the changes would be small and the effects would be localized.	Changes in water quality would be measurable and would be noticeable on a widespread scale.	Changes in water quality would be readily measurable, would have substantial consequences, and would be noticed on a regional scale.	Short-term – After implementation, recovery would take less than one year. Long-term – After implementation, recovery would take longer than one year or effects would be permanent.
Floodplains	Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, site-specific.	Changes in floodplains would be measurable, although the changes would be small and the effects would be localized.	Changes in floodplains would be measurable but site-specific.	Changes in floodplains would be readily measurable, would have substantial consequences, and would be noticed on a localized scale.	Short-term – After implementation recovery would take less than one year. Long-term – After implementation recovery would take longer than one year or effects would be permanent.
Soils	Effects on soils would be below or at the lower levels of detection. Any effects on soil productivity or fertility would be slight.	Effects on soils would be detectable. Effects on soil productivity or fertility would be small, as would the area affected.	Effects on soil productivity or fertility would be readily apparent, and effects would result in a change to soil character over a relatively wide area or at multiple locations.	Effects on soil productivity or fertility would be readily apparent and would substantially change the character of soil resources over a very large area.	Short-term – After implementation, would recover in less than 3 years. Long-term – After implementation, would take more than 3 years to recover or effects would be permanent.
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, and no species of concern would be affected.	Native plants would be affected over a relatively small area and a minor portion of a species' population.	Native plants would be affected over a relatively wide area (greater than 5 acres) or at multiple locations, and would be readily noticeable.	There would be a widespread effect on native species' populations or a considerable effect on native plant populations, including species of concern, over a very large area (greater than 10 acres).	Short-term–After implementation, would recover in less than 3 years. Long-term – After implementation, would take more than 3 years to recover or effects would be permanent.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Wildlife, including Aquatic Species	Effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.	Effects on wildlife would be detectable, although the effects would be localized, and would be small and of little consequence to the species' population.	Effects on wildlife would be readily detectable and widespread, with consequences at the population level.	Effects on wildlife would be obvious and would have substantial consequences to wildlife populations in the region.	Short-term – After implementation, would recover in less than 1 year. Long-term – After implementation, would take more than 1 year to recover or effects would be permanent.
Threatened and Endangered Species	The alternative would affect an individual of a listed species or its critical habitat, 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.	The alternative would affect an individual(s) of a listed species or its critical habitat, but the change would be small. Minor effect would equate with a "may affect" 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 individuals, population, or habitat. Moderate effect would equate with a "may affect" 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 vital consequence to the individual, population, or habitat. Major effect would equate with a "may affect" 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 or critical habitat.	Short-term – After implementation, would recover in less than 1 year. Long-term – After implementation, would take more than 1 year to recover or effects would be permanent.
Natural Sound	Effects would not be perceptible.	Effects would result in an increase in noise levels in localized areas.	Effects would result in a readily detectable, widespread introduction of noise.	Effects would result in an introduction of noise.	Short-term – Would occur during implementation. Long-term – Would be permanent

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Air Quality	Changes in air quality would not be measurable.	Effects would result in a measurable change in air quality, although the changes would be small and the impacts would be localized.	Effects on air quality would be readily measurable and widespread.	Effects would be readily measurable on a regional scale, and air quality standards could be exceeded.	Short-term – Would occur during implementation. Long-term – Would be continual or permanent.
Archaeological and Ethnographic Resources	Impacts would be at the lowest level of detection — barely measurable with no perceptible consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.	Disturbance of a site(s) would be 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 potential. For purposes of Section 106, the determination of effect would be *no adverse or adverse effect*.	Disturbance of the site(s) would be substantial and would result 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 – Would occur only during implementation. Long-term – Would be continual or permanent.
Historic Resources	Impact(s) would be at the lowest level of detection — barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.	Impact would alter a character defining feature(s) of a historic resource, but the work would be in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. For purposes of Section 106, the determination of effect would be *no adverse effect*.	Impact would alter a character defining feature(s) of the historic resource, diminishing the integrity of the resource, but still maintaining its eligibility for the national register. For purposes of Section 106, the determination of effect would be *adverse effect*.	Impact would alter a character defining feature(s) of a national historic landmark, diminishing the integrity of the resource to the extent that its designation is threatened. For purposes of Section 106, the determination of effect would be *adverse effect*.	Short-term – Would occur only during implementation. Long-term – Would be permanent.
Visual Resources	Effects would not result in any perceptible changes to existing viewsheds.	Effects would result in slightly detectable changes to a viewshed in a small area or would introduce a compatible human-made feature to an existing developed area.	Effects would be readily apparent and would change the character of visual resources in an area.	Effects would be highly noticeable or would change the character of visual resources by adding human-made features into a mostly undeveloped area or by removing most human-	Short-term – Would be temporary during implementation. Long-term – Would be permanent or continual.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
				made features from a developed area.	
Regional and Local Communities	Effects would be below or at the level of detection. The effect would be slight.	Effects would be detectable but would be slight.	Effects would be readily apparent.	Effects would be readily apparent and would cause substantial changes to socioeconomic conditions in the region.	Short-term – Would occur only during implementation (varies by site to a maximum of 10 years). Long-term – Would be continual or permanent.
Blackfeet and Salish-Kootenai Tribes	Effects would be below or at the level of detection.	Effects would be detectable but changes in employment rates or cultural impacts would be slight.	Effects would cause an apparent change in employment rates or would have apparent cultural impacts.	Effects would have an important impact on employment rates or park resources that have religious or cultural significance to the Blackfeet or Confederated Salish and Kootenai Tribes.	Short-term – Would occur during implementation. Long-term – Would be continual or permanent.
Visitor Use and Experience	Changes in visitor use and/or experience would be below or at the level of detection.	Changes in visitor use and/or experience would be detectable, although the changes would be slight.	Changes in visitor use and/or experience would be apparent.	Changes in visitor use and/or experience would be readily apparent and would have important consequences.	Short-term – Would occur during implementation. Long-term – Would be continual or permanent.
Energy Consumption	Effects would be below or at the level of detection. The effect would be slight.	The effects would be detectable, but impacts would be small and would not have an appreciable effect on parkwide energy consumption.	The effects would result in readily apparent widespread changes in energy consumption.	The effects would be readily apparent and would cause substantial changes to energy requirements on a regional scale.	Short-term – Would occur during implementation. Long-term – Would be continual or permanent.
Landowners In and Adjacent to Park Boundaries	Changes would be below or at the level of detection.	Changes would be detectable, although the changes would be slight.	Changes would be apparent.	Changes would be readily apparent and would have important consequences.	Short-term – Would occur during implementation. Long-term – Would be permanent.

IMPACT TOPICS CONSIDERED

The criteria for selecting impact topics was based on federal laws, regulations and executive orders, National Park Service management policies, knowledge of resources, and concerns expressed by the public.

Natural Resources

- Water Quality
  Water quality in Glacier National Park is very high, and some of the commercial services take place on or near bodies of water in the park. Actions in the park that affect water quality could have downstream effects as well.

- Floodplains
  Floodplains in proximity of Many Glacier, Swiftcurrent, Apgar Village, Lake McDonald, Rising Sun and Two Medicine developed areas are assessed to determine 1) effects of the alternatives on floodplains, or 2) risks posed by floodplains on human safety and park developments in accordance with Executive Order 11988 and National Park Service guidelines for implementing the executive order.

- Soils
  Many of the soil types in Glacier National Park limit construction or development. Soils are also a valued natural resource that supports valued vegetation and wildlife habitat in the park. Soils are assessed to determine how they would be affected by the alternatives.

- Vegetation
  Wide variations in elevation, climate and soil promote vegetation diversity in Glacier National Park. The park supports over 1,100 species of vascular plants and at least 870 non-vascular plants, including many rare and sensitive species. The park's plant communities and broad ecological communities are important park resources that could be affected by actions that would change human use and development patterns in the park.

- Wildlife, Including Aquatic Species
  Glacier National Park is noted for its abundant wildlife and as a refuge for sensitive and rare species. Habitat for over 300 terrestrial wildlife species is found within the park, which is also a corridor for wildlife interaction and migration. Alternatives are evaluated to determine impacts on wildlife and how actions may change human use and development patterns in the park.

  As aquatic habitats outside the park become more degraded, the importance of protecting waters inside the boundaries of the park becomes increasingly significant for aquatic species. Actions proposed by the alternatives are evaluated to determine impacts on aquatic resources in Glacier National Park.

- Threatened and Endangered Species
  The Federal Endangered Species Act requires an examination of impacts on all federally listed threatened or endangered species. Glacier National Park supports populations of these species that are federally listed as threatened: the bald eagle, grizzly bear, Canada lynx, bull trout, and the endangered gray wolf.

- Natural sound
  Natural sound and the opportunity to experience solitude are valued resources in Glacier National Park. The public has expressed concern that commercial services would affect noise levels in the park, and the actions of the proposed alternatives are evaluated to determine impacts on the noise level in the park.

- Air Quality
  Glacier National Park is a Class I air quality area under the Clean Air Act, which requires federal land managers to protect park air quality and air quality-related values. Impacts on air quality due to increased visitation, recreational use and regional effects on the park are of concern. Changes in visitor use patterns could also affect the park's air quality. Actions of the alternatives are therefore assessed to determine impacts on air quality in the park.

Cultural Resources

- Historic, Archaeological and Ethnographic Resources
  Many structures and buildings in Glacier National Park are listed in the National Register of Historic Places and there are six national historic landmarks in the park. Past and ongoing studies have found Glacier National Park to be rich in archaeological resources, and many ethnographic resources exist in the park that are associated with cultural and religious practices and that are still used by American Indian tribes today.

- Visual Resources
  The establishment of Glacier National Park was rooted in the preservation and appreciation of the scenic resources of the area. Because the park is highly valued for its breathtaking views, the alternatives are analyzed for their effects on scenic and visual resources.

Socioeconomic Resources

- Regional and Local Communities
  Glacier National Park contributes to the local and state economies in various ways, including tourism, employee and operational expenditures. The alternatives are analyzed for their effects on regional and local communities.

- The Blackfeet and the Confederated Salish and Kootenai Tribes
  The park has sacred and cultural significance for the Blackfeet and Salish-Kootenai Tribes. The effects of the alternatives on these resources are analyzed.

- Visitor Use and Experience
  Providing opportunities to experience, understand, appreciate and enjoy natural and cultural resources is one of the fundamental purposes of Glacier National Park. Many actions considered in this *Draft Commercial Services Plan and Draft Environmental Impact Statement* could affect patterns of visitor use and the type and quality of the visitor experience. The alternatives are therefore assessed to determine their impact on them.

- Energy Consumption
  Energy requirements of the alternatives are assessed in accordance with the National Energy Policy Act.

- Landowners In and Adjacent to Park Boundaries
  There is private land inside and adjacent to Glacier National Park's boundary and developed areas. Effects on private land are analyzed for each of the alternatives.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

- Wetlands
  Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, impacts on wetlands. A contractor conducted site surveys during the summer of 2001 (DeArment 2001) to determine whether there are wetlands within the Apgar Village, Lake McDonald, Rising Sun, Two Medicine, Many Glacier, or Swiftcurrent developed areas that would be affected by the alternatives. All proposed actions in the developed areas and all necessary and appropriate services would avoid wetland areas, and wetlands would not be affected.

- Wild and Scenic Rivers
  The North Fork and Middle Fork of the Flathead River, which border the west and south side of Glacier National Park, are designated as part of the Flathead Wild and Scenic River under the Wild and Scenic Rivers Act. The act requires the preservation of the free-flowing condition and water quality of wild and scenic rivers. Commercially guided rafting would continue to be provided on the Middle Fork and North Fork of the Flathead River under the conditions of a permit issued by the U.S. Forest Service under the authority of the Wild and Scenic River Act and would have no new impact on the Flathead Wild and Scenic River corridor. The commercial services plan would have no additional impact on wild and scenic rivers; therefore, this topic was dismissed from further analysis in this document.

- Prime and Unique Farmlands
  In 1980, the Council on Environmental Quality directed that federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service as prime or unique. There are no "prime or unique farmlands" in Glacier National Park.

- Environmental Justice
  Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to analyze the impacts of park actions on minority populations. The project would not have disproportionate health or environmental effects on minorities or low-income populations or communities. Decisions regarding who receives these concession contracts would be made during the contract award process. Therefore, environmental justice was dismissed as an impact topic in this document.

CUMULATIVE IMPACTS

The Council on Environmental Quality regulations, which implement the National Environmental Policy Act, require the assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to 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.

Because the impacts between individual alternatives under the commercial services plan would not be substantially different, cumulative impacts for all alternatives were analyzed for each impact topic under one heading. Cumulative impacts were determined by combining the impacts of the commercial services plan with other past, present and reasonably foreseeable future actions.

Over the past fifteen years, concessioners and the National Park Service have undertaken a variety of rehabilitation projects on the concessioner facilities in Glacier National Park. For example, at Lake McDonald Lodge, projects include the rehabilitation of the lodge building and improvements to the access drive, rehabilitation work on the lodge dormitories, cabins, auditorium and employee recreational facility, and upgrades to lodge electrical panels, fire and alarm systems, and sewage lines. At Swiftcurrent Motor Inn, improvements include upgrades of the sewer lines, shower facilities, handicapped accessibility in the motels and lobby, remodeling of the campstore and upgrades to electrical wiring and lighting throughout the complex. At Many Glacier, actions include upgrades to the electrical service, stabilization of one wing of the hotel, improvements to the alarm and sprinkler system and replacement of a bunkhouse for the horse concession. At Two Medicine, a ticket booth was added for the boat concession and repairs made to the roof and skylight at the campstore. At Apgar, parking was added, the Village Inn office expanded to enlarge a manager's quarters and a horse concession ticket office was added. While this is not an exhaustive list, it provides examples of the types of actions that have been taken on facilities in the recent past.

Other actions by the National Park Service include instituting vehicle size restrictions on the Going-to-the-Sun Road in 1992, rehabilitation to utility systems around the park, and continuing road rehabilitation on the Camas, Many Glacier and Going-to-the-Sun Roads.

To assess cumulative impacts, other past, ongoing or reasonably foreseeable future actions within or near the park were identified. Ongoing and reasonably foreseeable future actions are described in the following table, and an analysis of cumulative impacts is discussed in subsequent sections for each impact topic.

TABLE 4-2 PAST, ONGOING AND REASONABLY FORESEEABLE FUTURE ACTIONS ASSESSED FOR CUMULATIVE IMPACTS

Action	Geographic Location	Activity	Schedule
Glacier National Park			
Repairs to critical sections of the Going-to-the-Sun Road	Glacier National Park	Various repairs to the Going-to-the-Sun Road as needed and as funding becomes available.	Ongoing
Stabilization and rehabilitation of the Belton Bridge	Glacier National Park	Replace abutments and wingwalls, rehabilitate concrete arch, and install a new timber structure and decking.	2001–2003
Water system rehabilitation for Apgar and Park Headquarters	Glacier National Park	Convert to a fully pressurized system, implement water conservation measures, install new distribution pipelines and additional water storage tank for fire.	2003
Construction of West Side Discovery Center	Glacier National Park	Design and construct West Side Discovery Center for visitor information and orientation north of the T intersection.	Not funded. Date to be determined.
West Glacier entrance station improvements	Glacier National Park	Construct new kiosks, improve access lanes and parking, and provide visitor orientation pull-off.	Not funded

Action	Geographic Location	Activity	Schedule
Installation of a micro-hydro electric power generator at the Goat Haunt Ranger Station complex	Glacier National Park	Installed a micro-hydro electric power generator.	2002
Construction of a fire cache and housing in Two Medicine	Glacier National Park	Construct a wildland fire cache and a duplex employee housing unit.	2003
Construction of a fire cache in the St. Mary administrative area	Glacier National Park	Construct a wildland fire cache.	2003
Going-to-the-Sun Road rehabilitation	Glacier National Park	Rehabilitate the Going-to-the-Sun Road between West Glacier and St. Mary to address drainage deficiencies, slope stability, retaining walls, arches, guardwalls and tunnels, and deteriorating roadway pavement.	2004
Many Glacier Hotel stabilization: Phases I-VII	Glacier National Park	Emergency stabilization and code upgrades to address deteriorated condition of the hotel.	Ongoing
Historic rehabilitation of Sperry and Granite Park Chalets	Glacier National Park	Sperry: restored to full service and new toilet facilities installed. Granite Park is unfunded.	1997-2001 Unfunded.
West Glacier wastewater rehabilitation	Glacier National Park	Rehabilitate wastewater system to improve treatment.	2003
Dock rehabilitation	Glacier National Park	Rehabilitate selected boat docks for the physically challenged.	2003
Many Glacier sewage rehabilitation	Glacier National Park	Exact solution to be determined.	Not funded Some work completed.
Montana Department of Transportation			
US 2 reconstruction	Columbia Falls to Badrock Canyon and Badrock Canyon to Hungry Horse	Reconstruct highway; 2-lane, 2-way traffic maintained.	2003; 2005–2006
US 2 reconstruction	Badrock Canyon	Reconstruct highway; blasting delays possible.	Within the next 10 years.
US 2 reconstruction	Blackfeet Reservation	Reconstruct highway; 2-lane, 2-way traffic maintained.	2002–2009
US 89 reconstruction	Blackfeet Reservation	Reconstruct highway; 2-lane, 2-way traffic maintained.	2002–2012
US 93 reconstruction	Kalispell, Whitefish	Reconstruct highway; 2-lane, 2-way traffic maintained.	2003–2006
Two Medicine Bridge replacement	US 2 crossing of Two Medicine River	Replace bridge and improve approach.	2003
U.S. Forest Service			
Timber salvage and resource rehabilitation	Flathead National Forest	Timber salvage, logging, forest rehabilitation associated with forest fire	2002–2005
Canyon Creek Bridge replacement	Flathead National Forest, east side of Hungry Horse Reservoir	Bridge replacement	2004
Trail construction and reconstruction	Lewis & Clark National Forest, near southeastern border of Glacier National Park	Trail reconstruction, trail establishment and switchback construction	2002–2003
Montana State Forest			
Timber salvage and resource rehabilitation	Coal Creek State Forest	Timber salvage, logging, forest rehabilitation associated with forest fire	Ongoing

IMPAIRMENT OF PARK RESOURCES AND VALUES

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. National Park Service managers must always seek ways to avoid or minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on 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 National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that would harm the integrity of the park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's General Management Plan or other relevant National Park Service planning document.

Impairment may result from National Park Service activities in managing the park, visitor activities or activities undertaken by concessioners, contractors and others operating in the park. Determinations on impairment are made in subsequent sections for each impact topic.

ANALYSIS OF IMPACTS

In the analysis that follows, when a necessary and appropriate service and/or an alternative A is not affected by an impact topic, it is omitted from the discussion.

WATER QUALITY

Methodology

Current water quality conditions were assessed through consultation with Glacier National Park staff. Alternatives were evaluated on the basis of data and other information gathered from annual monitoring reports and current literature reviews. Data from field visits was used along with information from other environmental assessments and environmental impact statements.

Thresholds of impact are defined in Table 4.1.

- *Negligible:* Water quality would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight.

- *Minor:* Changes in water quality would be measurable, although the changes would be small and the effects would be localized.
- *Moderate:* Changes in water quality would be measurable and would be noticeable on a widespread scale.
- *Major:* Changes in water quality would be readily measurable, would have substantial consequences, and would be noticed on a regional scale.
- *Short-term:* After implementation, recovery would take less than one year.
- *Long-term:* After implementation, recovery would take longer than one year or effects would be permanent.

Impacts Common to All Alternatives

All alternatives involving construction and/or repair would have minor to negligible, localized, short-term, adverse impacts on water quality from an increase in sedimentation due to the erosion of disturbed soils. The greatest impacts on water quality would occur where construction or ground disturbance is adjacent to streams, rivers or lakes. Mitigation measures would prevent most of the erosion and contain sediment within work areas. Wastewater from all new or rehabilitated buildings would be connected to the existing sanitary sewage systems. Removing woody debris from Snyder Creek could increase sediment and affect water quality. Removing debris during low water periods would result in negligible to minor adverse, short-term impacts on water quality. Increasing the height and length of the berm at Rising Sun would have no effect on water quality because any material used would be imported to the site. This action would have a minor long-term, positive impact on water quality. Coordination with the U.S. Army Corps of Engineers would be undertaken and permits acquired for actions that occur within the stream channel.

Impact Analysis For Necessary and Appropriate Services Alternatives

Granite Park Chalet

- **Alternative A – Status Quo/No Action.** The water and sewage systems at Granite Park Chalet are in poor condition and are not functionally adequate for the level of use. Maintaining the existing water and sewage systems under alternative A would result in minor adverse impacts to groundwater.

- **Alternatives B (Preferred) and C.** These alternatives would improve the water and sewage systems at Granite Park Chalet by replacing and expanding restrooms and providing potable water, resulting in minor positive impacts on water quality.

Commercially guided day hiking (Cultural/Natural/Recreational)

- **Alternative A – Status Quo/No Action.** Maintaining current commercially guided day hiking services under alternative A would continue to contribute to erosion along trails, thereby increasing sedimentation in nearby streams, rivers and lakes. Adverse impacts on water quality from alternative A would be negligible and localized.

- **Alternative B (Preferred).** Alternative B reduces the potential for soil erosion and consequent sedimentation in streams, rivers and lakes. Negligible adverse impacts on water quality would also occur under this alternative from soil erosion.

Guided Underwater Diving Tours

- **Alternative A – Status Quo/No Action.** This alternative would have no impact on water quality.

- **Alternative B (Preferred).** Providing guided underwater diving activities would negligibly increase sedimentation from erosion at lakeshore staging areas, turbidity from diving activities. Adverse impacts on water quality from guided underwater diving tours would be localized.

Public Showers

- **Alternative A – Status Quo/No Action.** This alternative would have no impact on water quality.

- **Alternative B (Preferred).** Constructing new shower facilities would cause some sedimentation from possible ground disturbance associated with construction, resulting in negligible short-term, adverse impacts on water quality.

Boat Tours and Transportation (Boat Taxi)

- **Alternative A – Status Quo/No Action.** Maintaining current interpretive boat tours on Lakes McDonald and Josephine as well as St. Mary, Two Medicine, Swiftcurrent and Waterton Lakes would continue to result in negligible adverse impacts on water quality from increased turbidity in shallow waters. This action would also result in minor adverse impacts because of point source pollution from petroleum products.

- **Alternative B (Preferred).** Adverse impacts from **added** tour boat services on Lake McDonald and Two Medicine would not dramatically increase. Extending the present dock at Apgar to 40 feet would have minor short-term, adverse impacts on water quality from driving pilings into the lakebed. Alternative B would have negligible to minor adverse impacts on water quality overall.

Horseback Riding and Horse Packing Services

- **Alternative A – Status Quo/No Action (Preferred).** Continuing current horseback riding and horse packing services would continue to cause sedimentation from erosion and nutrient loading from horse manure into streams, rivers and lakes. Overall adverse impacts would be minor to moderate and widespread.

- **Alternative B.** Maintaining the Apgar stables as a base for packing operations while discontinuing trail rides from the stables, and maintaining all other current horseback riding and horse packing services would result in the same minor to moderate adverse impacts as alternative A.

- **Alternative C.** Adding horseback riding in the Two Medicine area would increase erosion and nutrient loading, resulting in the same adverse impacts as alternative A.

- **Alternative D.** Impacts for this alternative would be the same as under alternative A, except that removing the Lake McDonald stables would greatly reduce runoff from the horse stables in that area. Soils in the Lake McDonald area have porous subsoil, which allows wastes to move rapidly to either the surface or groundwater (Dutton 2001). Therefore, eliminating runoff from horse stables in the Lake McDonald area would cause a localized reduction in nutrient loading and a positive effect on water quality. Expanding facilities at the Apgar stables, however, would increase nutrient loading from runoff in that area. Nonpoint pollution control measures would be implemented to mitigate impacts, and impacts would be minor to negligible. Sedimentation from constructing new housing at the Apgar stables would have negligible, adverse, short-term impacts

on water quality. Eliminating day riders from the McDonald Valley would have positive long-term effects on water quality.

Overall, alternative D would have minor, widespread, adverse impacts as well as a minor positive impact on water quality in the Lower McDonald Creek drainage.

Alternatives A and B would result in an approximately equal amount of adverse impacts on water quality. Alternative C would affect water quality in a greater overall area than would alternatives A, B or D. Alternative D would have both positive and adverse impacts on water quality, with the least overall adverse impact on water quality.

Conclusion

Granite Park Chalet alternative A would continue to have minor, localized, long-term, adverse impacts on water quality due to poor water and sewage system conditions. Alternatives B and C would improve existing water and sewage system conditions, resulting in a minor, localized, long-term, positive impact on water quality.

Although impacts on water quality under alternative B for commercially guided day hiking services would be slightly less than under alternative A, both alternatives would increase sedimentation. This increase would result in overall negligible, localized, long-term, adverse impacts on water quality.

Alternative A for guided underwater diving tours would have no impact on water quality. Alternative B would have overall negligible, localized, long-term, adverse impacts on water quality from pollution.

Alternative A for public showers would have no impact on water quality. Alternative B for public showers would have negligible, site-specific, short-term, adverse impacts on water quality from sedimentation.

Continuing to provide current boat tours and transportation (boat taxi) under alternative A would continue to have negligible, localized, long-term, adverse impacts on water quality. These impacts would be the same under alternative B.

Alternatives A and B for horseback riding and packing services would have minor to moderate, localized, long-term, adverse impacts due to sedimentation from erosion and nutrient loading from horse manure. Impacts for alternative C would be the same as for alternative A, with the addition of localized impacts in the Two Medicine and St. Mary areas. Alternative D would have the same adverse impacts as alternative A. The removal of the Lake McDonald stables, elimination of day rides in the Upper McDonald Valley and expansion of the Apgar stables would have an overall minor, localized, long-term, positive impact in the Lower McDonald Creek drainage.

There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Apgar Village Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would have minor, short-term adverse impacts during implementation.

  Sedimentation would occur during the stabilization of the Lake McDonald shoreline and result in minor, short-term, adverse impacts on water quality. However, stabilizing the shoreline would reduce sedimentation from erosion over the long-term, resulting in a minor, localized, positive impact on water quality.

  Formalizing and hardening pedestrian pathways along the shoreline would reduce a negligible amount of lakeside soil and vegetation available to filter sediments and pollutants in runoff from the surrounding developed area. Developing hardened pathways along the shoreline would increase localized runoff and would have a negligible adverse impact on water quality.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative.

  Removing parking and creating a pedestrian green space in Area I along Lake McDonald would increase the amount of vegetation and soil available to filter sediments and pollutants in water runoff from the surrounding pavement, resulting in a minor positive impact on water quality.

  Proposed new parking lots in Areas I and II would be designed to move parking away from the side of Apgar Loop Road. The total amount of non-point source pollution from vehicles would not increase significantly. Hardened, impermeable surfaces reduce the amount of soil and vegetation available to filter runoff, thereby increasing pollution; however, drainage control measures would capture and dissipate runoff to minimize impacts on water quality. Adverse impacts on water quality would be minor and long-term.

- **Alternative C.** Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

  Removing the Village Inn and associated parking from the lakeshore in Area I and restoring the site would increase the amount of vegetation and soil available to filter sediments and pollutants in water runoff from the developed area, resulting in a moderate positive impact on water quality. Although the site would be restored, the area along the lakeshore would be rehabilitated for public use. Consequently, adverse impacts from developing hardened paths along the shoreline would also be negligible since a greater amount of vegetation and soil in the surrounding area would be available to filter sediments and pollutants in water runoff.

  Constructing new lodging units and parking in Area II to replace the Village Inn would not increase sediments or pollutants. Moving guest lodging away from the lakeshore would increase the amount of available vegetation and soil to filter sediments and pollutants from water runoff before it reaches the lakeshore. Also, drainage control measures would be implemented to capture and dissipate runoff and minimize impacts on water quality. Although the new lodging would

continue to have minor adverse impacts associated with sediments and pollutants in water runoff, overall impacts from moving development away from the lakeshore would be positive.

- **Conclusion.** Although alternative A would have positive and negative impacts on water quality, the overall impact would be minor to negligible, localized, long-term and adverse.

  Alternative B would also have both positive and negative impacts on water quality. However, overall impacts from new development in the Apgar Village developed area would be minor, localized, long-term, and adverse.

  Alternative C would have the greatest amount of new development but would have the least negative impact on water quality over the long-term because development is moved away from the lake. This action, and restoring the vegetation and soil would result in an overall minor, localized, long-term, positive impact on water quality.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Lake McDonald Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would have minor to negligible, short-term, adverse impacts on water quality during implementation.

  Formalizing and hardening pedestrian pathways throughout Areas I and II would increase the amount of hardened surfaces in the area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause negligible to minor, adverse impacts on water quality.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Constructing additional parking in Areas I and II would increase the amount of localized runoff due to additional hardened, impermeable surface area. New parking would also increase non-point source pollution from vehicles. With the implementation of drainage control measures to capture and dissipate runoff, adverse impacts would be minor.

  Constructing a new housing village for employees in Area II would increase sediments and pollutants associated with water runoff. Drainage control measures would capture and dissipate runoff to minimize impacts on water quality, and adverse impacts on water quality would be minor and long-term.

  Removing the existing Coffee Shop parking lot and Girls' Dormitories 1 and 2 from Area II and replacing them with open green spaces would increase the amount of soil and vegetation available to filter sediments and pollutants from water runoff, having a negligible to minor, positive impact on water quality.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

  Constructing a new access road and parking adjacent to the guest cabin units in Area II would increase the amount of hardened surfaces in the area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause minor adverse impacts on water quality.

- **Conclusion.** Overall, alternative A would have a negligible to minor, localized, long-term, adverse impact on water quality from developing hardened paths.

  Although alternative C would have the greatest amount of new development and increase in hardened surfaces, alternatives B and C would both have overall minor, localized, long-term, adverse impacts on water quality.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Rising Sun Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would have minor to negligible, short-term, adverse impacts during implementation.

  Formalizing and hardening pedestrian pathways throughout Areas I, II and III would increase the amount of hardened surfaces in the Rising Sun developed area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause negligible to minor, adverse impacts on water quality.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Constructing five new cabins with parking in Area I, as well as a new employee dormitory with parking and an outdoor recreation facility would increase sediments and pollutants associated with water runoff. Drainage control measures would capture and dissipate runoff to minimize impacts, and impacts would be negligible.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

  Constructing ten new cabins and associated parking, as well as two new employee dormitories, including an outdoor recreation facility in Area I would increase localized runoff due to new development and additional impermeable surface area. Drainage control measures would capture and dissipate runoff to minimize impacts on water quality, and adverse impacts on water quality would be negligible.

Reinforcing and lengthening the existing earth berm in Area II would curtail erosion over the long-term, reducing sediments associated with water runoff and resulting in negligible positive impacts on water quality. Occasional removal of deposition would increase turbidity in the short-term, causing minor short-term, adverse impacts.

- **Conclusion.** Overall, alternative A would have a negligible to minor, localized, long-term, adverse impact on water quality from developing hardened paths.

  Although alternative B would have both positive and negative impacts, overall impacts would be negligible, localized, long-term and adverse from development and increased hardened surfaces in the Rising Sun developed area.

  Alternative C would have the greatest overall positive and negative impacts on water quality. Although alternative C would result in more development and a greater increase in hardened surfaces than would alternative B, overall adverse impacts from development under this alternative would also be negligible, localized and long-term. There would be more erosion-reducing actions under alternative C than under alternative B, and positive impacts on water quality from reduced sediments in water runoff would be minor, localized and long-term.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Two Medicine Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would result in minor to negligible, short-term adverse impacts during implementation.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative.

  Constructing hardened, accessible walkways throughout the Two Medicine developed area, including a pedestrian bridge over Appistoki Creek and accessibility upgrade to the ticket booth office, would increase the amount of hardened surfaces in the area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause minor adverse impacts on water quality.

  The comfort station would be removed and a new one constructed at a new location. This action and constructing a service road and service/bus parking area for the General Store would also have minor adverse impacts from an increase in localized runoff due to the additional hardened, impermeable surface area; however, drainage control measures would be used to minimize impacts on water quality.

  Restoring historic landscape features in front of the General Store, including the former comfort station site, would increase the availability of soil and vegetation to filter sediments and pollutants

from water runoff. Because a relatively small area would be restored, this action would have negligible positive impacts.

- **Conclusion.** Overall, alternative A would have minor to negligible, localized, short-term, adverse impacts on water quality from baseline repairs and improvements.

  Alternative B would have an overall minor, localized, long-term, adverse impact on water quality due to increased hardened surfaces in the developed area.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Many Glacier Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would have minor to negligible, short-term adverse impacts during implementation.

  Formalizing and hardening pedestrian pathways throughout Areas I and II would increase the amount of hardened surfaces in the Many Glacier developed area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause negligible to minor adverse impacts on water quality.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Improving pedestrian access to and around the hotel could increase hardened surfaces in the area. Increased runoff from additional hardened surfaces would cause negligible to minor adverse impacts.

  Developing a hardened trail around Swiftcurrent Lake would increase sediments and pollutants associated with water runoff from the additional hardened, impermeable surface area, causing minor adverse impacts on water quality.

  See the Swiftcurrent Developed Area below for impacts on water quality from constructing additional employee accommodations in the Swiftcurrent area.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

  Constructing a new dormitory, associated parking and an outdoor recreational facility in Area II, and redesign of the present parking area would increase sediments and pollutants associated with water runoff. Because drainage control measures would be implemented to minimize impacts on water quality, adverse impacts on water quality would be minor and long-term.

- **Conclusion.** Overall, alternative A would have a negligible to minor, localized, long-term, adverse impact on water quality from developing hardened paths.

  Although alternative B would have both positive and negative impacts, development and increased hardened surfaces would result in minor, localized, long-term and adverse overall impacts.

  Alternative C would have the greatest overall adverse impact on water quality. Constructing a new dormitory with an outdoor recreational facility under this alternative would result in more development and hardened surfaces in the Many Glacier developed area than would alternative B. However, because sediments and pollutants associated with runoff would not increase dramatically, adverse impacts for alternative C would also be minor, localized and long-term.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Swiftcurrent Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Baseline improvements and repairs would have minor to negligible, short-term adverse impacts during implementation.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative.

  Formalizing the trail network throughout Areas I, II and III to better separate vehicle and pedestrian circulation could increase hardened surfaces in the Swiftcurrent developed area. Sediments and pollutants associated with increased water runoff from expanded hardened surfaces would cause negligible to minor adverse impacts on water quality. Drainage control structures would be used to minimize impacts.

  Constructing a fourth motel in Area I, three new cabin rings on the former Bath House and Motel 4 site in Area II, and approximately five new cabins to complete the existing cabin rings in Area II would increase sediments and pollutants associated with water runoff. Because drainage control measures would be implemented to capture and dissipate runoff and minimize impacts, adverse impacts on water quality would be minor.

  Realigning the west access road in Area III, constructing additional visitor parking, and formalizing employee parking adjacent to the Restaurant/Store would develop additional hardened surfaces resulting in minor adverse impacts from increased runoff. Drainage control measures would be used to minimize impacts. Creating a new trailhead at the main parking area and a trail to the existing trailhead would cause increased sedimentation from erosion, but would have a negligible impact on water quality.

- **Alternative C.** Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

This alternative would construct new employee dormitories, showers, and indoor and outdoor recreation facilities. It would expand employee parking, construct a new cabin ring for employee housing and fill in the existing employee cabin ring with one cabin. These actions would increase sediments and pollutants associated with water runoff from new development and the increased amount of hardened surfaces. However, drainage control measures would be implemented, and impacts on water quality would be minor.

- **Conclusion.** Overall, alternative A would have minor to negligible, localized, short-term, adverse impacts on water quality from baseline repairs and improvements in the Swiftcurrent area.

  Alternatives B and C, overall, would result in roughly the same amount of impact. Both alternatives would have an overall minor, localized, long-term, adverse impact on water quality from new development and the increased amount of hardened surfaces.

  There would be no significant adverse impacts on water resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of water resources as a result of the implementation of any of the alternatives.

Cumulative Impacts

In areas throughout and adjacent to the park, water resources have been affected by a variety of past actions such as development, and are being affected by present actions such as rafting and boating services. Some reasonably foreseeable actions are road and bridge construction and improvement projects, and U.S. Forest Service timber salvage operations and trail construction outside the park, as well as the Going-to-the-Sun Road rehabilitation project inside the park. These future actions would have localized impacts on water quality. The combined impact of all the actions and any of the alternatives would be a minor long-term, regional, adverse cumulative effect on water resources.

FLOODPLAINS

Methodology

Floodplain literature reviews for the six developed areas (Apgar Village, Lake McDonald, Rising Sun, Two Medicine, Many Glacier and Swiftcurrent) were conducted by a contractor during the fall of 2001. The National Park Service Water Resources Division surveyed the areas in the summer of 2002 to determine where floodplains occur and to what extent floods would occur. The floodplain literature reviews showed that all of the developed areas are adjacent to streams or lakes, and existing facilities might be located within a floodplain.

Thresholds of impact are defined in Table 4.1.

- *Negligible:* Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be

considered slight and site-specific.

- *Minor:* Changes in floodplains would be measurable, although the changes would be small and the effects would be localized.
- *Moderate:* Changes in floodplains would be measurable, but would be site-specific.
- *Major:* Changes in floodplains would be readily measurable, would have substantial consequences, and would be noticed on a localized scale.
- *Short-term:* After implementation, recovery would take less than one year.
- *Long-term:* After implementation, recovery would take longer than one year or effects would be permanent.

Impact Analysis For Necessary and Appropriate Services Alternatives

Other Services

None of the other services alternatives would affect floodplains.

Apgar Developed Area

- **Alternative A – Status Quo/No Action.** There would be no effects on floodplains because the developed area is outside the 100-year floodplain of McDonald Creek. Stabilization of the shoreline would have no effect on the floodplain.
- **Alternative B (Preferred).** There would be no effects on floodplains since the developed area lies outside the 100-year floodplain of McDonald Creek.
- **Alternative C.** There would be no effects on floodplains.

Lake McDonald Developed Area

- **Alternative A - Status Quo/No Action.** Since no additional development is proposed under this alternative, there would be no additional effects on the floodplain of Snyder Creek.
- **Alternative B.** Removal of dormitories located on the south bank of Snyder Creek would have minor long-term, beneficial effects on the floodplain by removing structures from the floodplain and providing unimpeded flows of flood waters.
- **Alternative C (Preferred)** would have the same effects as alternative B.

Rising Sun Developed Area

- **Alternative A - Status Quo/No Action.** Raising and lengthening the berm and stabilizing the bank would have a moderate localized, long-term, adverse impact on the floodplain by controlling flood flows.
- **Alternative B** would have a minor, beneficial, long-term effect on the floodplain from removing the boat concessioner housing and ticket booth.
- **Alternative C (Preferred)** would have the same effects as alternatives A and B.

Two Medicine Developed Area

- **Alternative A - Status Quo/No Action.** Maintaining the present channel of Appistoki Creek would have a moderate localized, long-term, adverse impact on the floodplain by controlling flood flows.

- **Alternative B** would have the same effects as alternative A.

Many Glacier Developed Area

- **Alternative A - Status Quo/No Action.** No effects would occur to the floodplain of Swiftcurrent Lake.

- **Alternative B** would have the same effects as alternative A.

- **Alternative C (Preferred)** would have the same effects as alternative A.

Swiftcurrent Developed Area

- **Alternative A - Status Quo/No Action.** No effects on the floodplain would occur.

- **Alternative B (Preferred).** No effects on the floodplain would occur.

- **Alternative C.** No effects on the floodplain would occur.

Conclusion

Proposed improvements and actions taken to protect human life and property at Lake McDonald, Rising Sun, Many Glacier and Two Medicine would have no effect at Many Glacier and moderate, localized, long-term effects at Rising Sun and Two Medicine. There would be minor beneficial, long-term effects at Lake McDonald and Rising Sun.

Cumulative Impacts

Actions of maintaining development in floodplains combined with past actions would result in continued control and floods in these areas, resulting in a major adverse, long-term impact.

There would be no significant adverse impacts on floodplains whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of floodplains as a result of the implementation of any of the alternatives.

SOILS

Methodology

Current soil conditions were assessed through consultation with Glacier National Park staff and professional soils scientists. Alternatives were evaluated on the basis of data and other information gathered from the

following sources: "Soils of Glacier National Park," prepared by Barry Dutton (2001); Geographic Information System (GIS) thematic layers available through the park's GIS coordinator, interviews with technical experts, monitoring reports and current literature reviews. Data from recent field surveys were used along with information from other compliance documents.

The following criteria were used to assess impacts: soil removal, soil profile mixing, soil compaction, soil erosion, soil contamination and soil restoration.

Thresholds of impact are defined in Table 4.1.

- *Negligible:* Effects on soils would be below or at the lower levels of detection. Any effects on soil productivity or fertility would be slight.
- *Minor:* Effects on soils would be detectable. Effects on soil productivity or fertility would be small, as would the area affected.
- *Moderate:* Effects on soil productivity or fertility would be readily apparent, and effects would result in a change to soil character over a relatively wide area or at multiple locations.
- *Major:* Effects on soil productivity or fertility would be readily apparent and would substantially change the character of soil resources over a very large area.
- *Short-term:* After implementation, would recover in less than 3 years.
- *Long-term:* After implementation, would take more than 3 years to recover or effects would be permanent.

Impacts Common to All Alternatives

For alternatives involving construction and/or repair, compaction from equipment and erosion would result in negligible site-specific, short-term, adverse impacts during construction. In all alternatives that involve the construction of parking lots, paving and construction would have negligible long-term, site-specific, adverse impacts on soils. Stabilizing the bluff where historic guest cabins are located above Rose Creek would curtail erosion in this area, resulting in minor positive impacts. Reinforcing the existing earth berm in Area II would curtail erosion, resulting in minor positive impacts on soils.

Impact Analysis For Necessary and Appropriate Services Alternatives

Granite Park Chalet

- **Alternative A – Status Quo/No Action.** Alternative A would continue to have minor adverse impacts on soils from trampling and soil hardening caused by visitor movement between the chalet and the drinking water source.

- **Alternative B (Preferred).** The replacement of the water line and installation of a new water tank would temporarily disturb approximately 4,250 square feet of previously disturbed soils. Placement of a new toilet facility and the replacement of associated components would permanently disturb approximately 634 square feet of soil. Repairing the existing infiltration gallery and replacing the water line, water tank and toilet facilities would reduce system maintenance, thereby decreasing the amount of soil disturbance and potential soil contamination. Overall impacts on soils would be minor, long-term and positive.

- **Alternative C** would have the same impacts as alternative B. In addition, the construction of a new gray water system would result in slightly more ground disturbance. System placement would result in 1,500 additional square feet of soil disturbance.

Commercially Guided Day Hiking (Cultural/Natural/Recreational)

- **Alternative A – Status Quo/No Action.** Continuing current commercially guided day hiking services would result in continued adverse impacts on soils due to increased soil compaction and erosion, and decreased soil productivity along trails. Large guided hiking groups contribute to greater erosion and compaction because of the tendency groups to step off the trail when gathering around the guide, or to allow others to pass by.

- **Alternative B (Preferred)** would place group size limits on commercially guided day hikes and on the number of trips per day on backcountry trails. This would reduce the potential for soil erosion and compaction surrounding the trail. Alternative B would have a less negative impact than alternative A.

Firewood Sales

- **Alternative A – Status Quo/No Action** would have no impact on soils because firewood sales do not occur in campgrounds.

- **Alternative B (Preferred).** Providing firewood sales in specific campgrounds in the visitor services zone would have no effect on soils unless new facilities were constructed to facilitate sales. The placement of new facilities would likely be limited to existing developed areas and would cause negligible adverse impacts from construction.

Public Showers

- **Alternative A – Status Quo/No Action** would have no impact on soils.

- **Alternative B (Preferred).** New shower facilities would likely be constructed in relatively small areas that are within previously developed areas at or near campgrounds in the visitor services zone. This action would cause negligible adverse impacts from disturbance due to construction and the permanent placement of structures on the soil surface.

Boat Tours and Transportation (Boat Taxi)

- **Alternative A – Status Quo/No Action.** Continued soil disturbance and turbidity in shallow waters, as well as negligible soil contamination from petroleum products would persist at Lakes McDonald and Josephine, and St. Mary, Two Medicine, Swiftcurrent, and Waterton Lakes.

- **Alternative B (Preferred).** This alternative would have the same impacts as alternative A, but with increased adverse impacts on Lake McDonald due to added tour boat services from Apgar Village to Lake McDonald Lodge.

Horseback Riding and Horse Packing Services

- **Alternative A – Status Quo/No Action (Preferred).** Continuing current horseback riding and horse packing services would continue to erode and compact soil, and decrease productivity along trails, resulting in minor adverse impacts. Nonpoint source pollution from horse stables would

continue to contribute to soil contamination.

- **Alternative B.** Maintaining the Apgar stables as a base for packing operations while discontinuing trail rides from the stables, and maintaining all other current horseback riding and horse packing services would result in the same minor adverse impacts as alternative A, except that the elimination of commercial horseback riding day trips from the Apgar stables would reduce impacts along Apgar area trails.

- **Alternative C.** Adding horseback riding in the Two Medicine area would result in the same adverse impacts as alternative A, but with a slight increase in erosion and compaction, and decrease in soil productivity along trails.

- **Alternative D.** Impacts would be the same as under alternative A, except that removing the Lake McDonald stables and discontinuing day rides in the Upper McDonald Valley would reduce soil contamination in that area, resulting in a positive impact. Soils in the Lake McDonald area have a porous subsoil, which allows wastes to move rapidly to surface or groundwater (Dutton 2001). Consequently, these soils are not well suited for horse use due to the high potential of nitrogen in soils from horse manure. Expanding the Apgar stables and possibly constructing additional housing could result in minor adverse impacts from some increased soil disturbance due to construction and permanent placement of structures in that area.

Conclusion

Alternative A for Granite Park Chalet would continue to have minor, site-specific, long-term, adverse impacts due to soil contamination and periodic disturbance from maintenance. Generally, although alternative B would result in slightly more ground disturbance than alternative C, both alternatives would have overall minor, site-specific, long-term, positive impacts on soils due to decreased soil contamination.

While alternative A for commercially guided day hiking would continue minor long-term, localized, adverse impacts on soils from soil compaction and erosion, alternative B would have negligible long-term, localized, adverse impacts.

Alternative A for firewood sales would have no impact on soils. If new facilities are constructed for firewood sales under alternative B, impacts from disturbance to soils would be negligible long-term, site-specific, and adverse.

Alternative A for public showers would have no impact on soils. Alternative B would have negligible long-term, site-specific, adverse impacts on soils from ground disturbance.

Continuing to provide current boat tours and transportation (boat taxi) under alternative A would continue the negligible to minor long-term, adverse impacts specific to Lakes McDonald and Josephine, and St. Mary, Two Medicine, Swiftcurrent, and Waterton Lakes. These impacts would increase under alternative B due to added tour boat services, resulting in minor long-term, site-specific, adverse impacts.

Alternatives A and B for horseback riding and horse packing services would result in an approximately equal amount of adverse impacts on soils, except that impacts along Apgar area trails would be less under alternative B. Alternatives A and B would have minor long-term, localized, adverse impacts from compaction and erosion due to horse use on trails. Soil contamination would

result in minor long-term, site-specific, adverse impacts. Impacts for alternative C would be the same as for alternative A, with the addition of localized impacts from erosion and compaction in the Two Medicine and St. Mary areas. Alternative C would affect a greater overall area of soils along trails than would alternative A, B or D. Alternative D would have the same impacts as alternative A. In addition, the removal of the Lake McDonald stables would have minor long-term, site-specific, positive impacts, while potential new development in the Apgar stables area would result in minor long-term, site-specific, adverse impacts. Permanent placement of new structures in alternative D would adversely impact a greater amount of soils than would the other alternatives.

There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Apgar Village Developed Area

- **Alternative A – Status Quo/No Action.** Improvements and repairs would have negligible short-term, adverse impacts during implementation.

  Stabilizing the Lake McDonald shoreline and addressing basic erosion issues along the lakefront would reduce shoreline soil erosion, resulting in minor positive impacts. Stabilization activities would cause some short-term adverse impacts from sedimentation into Lake McDonald.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative. In addition, alternative B would develop approximately 2.5 acres of soil and restore over 0.5 acre of previously disturbed soil. All impacts would occur within the existing developed area.

  Creating a pedestrian green space in Area I along Lake McDonald would restore approximately 0.5 acre of soil, resulting in a minor positive impact on soils.

  Permanent placement of parking lots in Areas I and II would disturb soil and cause long-term loss of productivity of approximately 2.5 total acres of soil, resulting in minor adverse impacts. New parking would be designed to move parking away from the Apgar Loop roadside rather than increase the total amount of parking in the village. The area along Apgar Loop Road currently used for parking would be restored, resulting in a positive impact on soils along the roadside. The total amount of nonpoint source pollution from vehicles would not increase significantly, and there would be no increase in soil contamination. Nonpoint source pollution controls would be implemented.

  Constructing trails and walkways throughout the village would disturb ground and compact soil, resulting in negligible adverse impacts. However, the development of main trails would discourage the use of multiple social trails, thereby reducing overall erosion and compaction of soils throughout the Apgar Village area and resulting in a positive impact.

  Extending the operating season of the Village Inn eight weeks (three weeks earlier and five weeks later) could affect soil resources by concentrating more people along the shoreline and riparian areas when soils are saturated early in the year. This concentration could result in compaction,

unwanted "social trails" and if vegetation were lost, soil erosion. The effects would be negative, minor and long-term.

- **Alternative C.** Alternative C would develop a total of approximately 5.5 acres of soil and restore approximately 1.75 acres of soils. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Removing the Village Inn and associated parking from Area I and rehabilitating the site for public space would restore approximately 0.75 acre of soils, resulting in minor positive impacts. Constructing new lodging units and parking in Area II to replace rooms lost from the Village Inn would cause disturbance. It would also cause the long-term loss of soil productivity of approximately 2.5 acres of soil within the existing developed area, resulting in minor adverse impacts.

  Permanent additional boat ramp parking in Area I would disturb soil and cause long-term loss of productivity of approximately 0.5 total acre, resulting in minor adverse impacts.

  Removing the environmental education cabin from Area II would restore less than 0.5 acre of soils, resulting in a positive impact. Extending a bicycle path adjacent to Area II to the campground would result in some adverse impacts on soils in the immediate area due to paving and soil compaction. Impacts would be negligible if the path follows the existing utility corridor and social trail.

  Permanent additional boat ramp parking in Area I would disturb soil and cause long-term loss of productivity of approximately 0.5 total acre, resulting in minor adverse impacts.

- **Conclusion.** Although improvements and repairs would have negligible short-term, site-specific, adverse impacts, alternative A would have an overall minor long-term, site-specific, positive impact.

  Overall, alternative B would restore soils and stabilize the shoreline, creating a minor long-term, site-specific, positive impact. Development of soils would result in negligible long-term, site-specific, adverse impacts. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would have the greatest overall impact on soils. It would cause substantially more ground disturbance and soil restoration than alternative A or B. Although alternative C would restore a greater overall amount of soils than would alternative A or B, overall positive impacts under this alternative would also be minor, long-term and site-specific. Overall adverse impacts under alternative C would be minor, long-term and site-specific.

  Shoreline stabilization and soil restoration within the Wild and Scenic River corridor and Apgar Village developed area would have significant positive impacts.

  None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning

documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Lake McDonald Developed Area

- **Alternative A – Status Quo/No Action.** Improvements and repairs would have negligible short-term, adverse impacts during implementation. Improvements to the exterior surfaces of some existing structures might involve the removal of lead-based paint, which could contaminate soils in the area surrounding the structures. Proper mitigation measures would ensure that adverse impacts would be negligible and short-term.

  Some ground disturbance, soil compaction and the permanent placement of walkways from constructing new accessible trails and walkways throughout the area would have negligible adverse impacts on soils because the trails and walkways would take advantage of current social trails. The development of main trails would also have a positive impact by discouraging the use of multiple social trails, thereby reducing overall erosion and compaction of soils throughout the Lake McDonald developed area.

- **Alternative B.** Impacts described under alternative A also apply to this alternative. In addition, alternative B would develop approximately 3 acres of soil and restore approximately 0.5 acre of previously disturbed soil. All impacts would occur within the existing developed area.

  Constructing new guest and employee parking in Areas I and II would disturb soil and cause long-term loss of productivity of approximately 2 acres because placement of the new parking lots would take advantage of previously disturbed areas; this action would result in negligible adverse impacts. New parking would result in increased nonpoint source pollution from vehicles. However, with the implementation of nonpoint source pollution controls, adverse impacts from soil contamination would be negligible.

  Constructing a new housing village for employees in Area II would develop approximately 1 acre of soil, resulting in minor adverse impacts from soil disturbance and long-term loss of soil productivity. Constructing a new public comfort station in Area II would create minimal ground disturbance and negligible adverse impacts.

  Removing the Boys' Dormitories 1 and 2 from Area I, the Johnson, Jammer and Hydro Dormitories, and constructing a parking lot, laundry and maintenance facility on part of this site, would restore only a relatively small area of soils. Therefore, positive impacts from removing dormitories in Area I would be negligible. Removing the existing Coffee Shop parking lot and Girls' Dormitories 1 and 2 from Area II and replacing them with open green spaces would restore less than 0.5 acre of soil, resulting in minor positive impacts. Removing the driveway and parking by the cabins in Area II, and dedicating the area to pedestrian use would restore soil in the area. This action would result in less compaction from vehicles, causing minor positive impacts.

  Extending the operating season of the Lake McDonald Lodge, General Store, Coffee Shop and other visitor accommodations five weeks (two weeks earlier and three weeks longer) would encourage visitor use along the shoreline and riparian areas when soils are saturated early in the year. The result could be soil compaction, unwanted "social trails" and if vegetation were lost, soil erosion. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Alternative C would develop a total of approximately 3 acres of soil and restore approximately 0.5 acre of previously disturbed soil. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Removing the Coffee Shop and constructing a new restaurant with employee dining and post office in Area II would have negligible adverse impacts because the new restaurant would be constructed on previously disturbed soil. Constructing a new access road and parking adjacent to the guest cabin units in Area II would result in negligible adverse impacts because there is currently an access road and informal parking in the area of the cabin units, and minimal new soil disturbance would occur. There is a potential for better erosion control under this alternative that would reduce sediment transport.

- **Conclusion.** Overall, alternative A would have a negligible short-term, site-specific, adverse impact on soils due to minimal disturbance from improvements and repairs.

  Alternative B would have an overall minor, long-term, site-specific, positive impact from restoration, and an overall minor, long-term, site-specific, adverse impact from development of soils. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would cause the greatest overall amount of new disturbance to soils, but just slightly more soil disturbance than alternative B. Development under alternative C would have an overall minor, long-term, site specific, adverse impact. Alternative C would restore approximately the same amount of soil as would alternative B, resulting in an overall minor, long-term, site specific, positive impact.

  None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Rising Sun Developed Area

- **Alternative A – Status Quo/No Action.** Soils have been previously disturbed throughout the Rising Sun developed area, and current conditions would be maintained under this alternative. Improvements and repairs would have negligible short-term, adverse impacts during implementation. Improvements to the exterior surfaces of some existing structures might involve the removal of lead-based paint, which could contaminate soils in the area surrounding the structures. However, proper mitigation measures would ensure that adverse impacts would be negligible and short-term.

  Some ground disturbance, soil compaction and permanent placement of walkways from constructing new accessible trails and walkways throughout the area would have negligible adverse impacts on soils because the trails and walkways would take advantage of current social trails. However, the development of main trails would discourage the use of multiple social trails,

reducing the overall erosion and compaction of soils throughout the area and resulting in a positive impact.

- **Alternative B.** Alternative B would develop a total of less than 2 acres of soil. All impacts would occur within the existing developed area, and impacts described under alternative A also apply to this alternative.

  Constructing five new cabins with parking, a new employee dormitory with parking and an outdoor recreation facility, and a second boat concessioner employee cabin in Area I would result in disturbance and long-term loss of soil productivity of less than 2 acres of soil. Since Area I has been previously developed, this new construction would have negligible adverse impacts.

  Extending the operating season of the visitor overnight accommodations, Coffee Shop and General Store/Motel/Dormitory five weeks (three weeks earlier and two weeks longer) would encourage earlier visitor use in areas where soils might still be saturated and susceptible to compaction, and if vegetation were lost, to erosion. The effects would be negative, minor and long term.

- **Alternative C (Preferred).** Alternative C would develop a total of over 2 acres of soil, and all disturbance would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Constructing ten new cabins and associated parking, and two new employee dormitories including an outdoor recreation facility, in Area I would develop less than 4 acres of soil. Since Area I has been previously developed, this new construction would have negligible adverse impacts from soil disturbance. Modifying the intersection to the campground would have negligible adverse impacts because minimal soil disturbance would be involved and all disturbance would be immediately adjacent to the existing road.

- **Conclusion.** Overall, alternative A would have a negligible short-term, site-specific, adverse impact due to minimal disturbance from improvements and repairs.

  Alternative B would have both positive and negative impacts. It would have an overall negligible, long-term, site-specific, adverse impact from development and an overall minor, long-term, site-specific, positive impact from reduced erosion potential. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would have the greatest overall impact on soils. Although alternative C would disturb slightly more soil than alternative B, overall negative impacts from development under this alternative would also be minor, long-term, and site-specific. There would be more action to reduce erosion under alternative C than under alternative B; however, beneficial impacts under this alternative would also be minor, long-term and site-specific.

  None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning

documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Two Medicine Developed Area

- **Alternative A – Status Quo/No Action.** Soils have been previously disturbed throughout the Two Medicine developed area, and current conditions would be maintained under this alternative. Improvements and repairs would have negligible short-term, adverse impacts during implementation.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative. In addition, alternative B would develop less than 2 acres of soil and restore as much as 0.5 acre of previously disturbed soil. All impacts would occur within the existing developed area.

  Some ground disturbance, soil compaction and permanent placement of walkways from constructing new accessible trails and walkways throughout the area, including a pedestrian bridge over Appistoki Creek, would have negligible adverse impacts on soils because the trails and walkways would take advantage of current social trails. The development of main trails would also have a positive impact on soils by discouraging the use of multiple social trails, thereby reducing overall erosion and compaction of soils throughout the area.

  The comfort station would be removed and a new one constructed at a new location in Area I, restoring soils at the former site and developing less than 0.5 acre at the new comfort station location. This minimal ground disturbance would have negligible adverse impacts. Restoring historic landscape features in front of the General Store, including the former comfort station site, would restore approximately 1 acre of soil, resulting in minor positive impacts.

  Extending the operating season for the General Store four weeks (one week earlier and three weeks later) would encourage visitor use earlier in the season when soils would be saturated and susceptible to damage. The effects would be negative, negligible and long-term.

- **Conclusion.** Overall, alternative A would have negligible short-term, site-specific, adverse impacts from repairs and improvements.

  Alternative B would have an overall positive impact. Although this alternative would result in negligible long-term, site-specific, adverse impacts from ground disturbance and extending the operating season, soil restoration would have overall minor long-term, positive, and site-specific impacts.

  None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning

documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Many Glacier Developed Area

- **Alternative A – Status Quo/No Action.** Soils have been previously disturbed throughout the Many Glacier developed area, and current conditions would be maintained under this alternative. Improvements and repairs would have negligible short-term, adverse impacts during implementation.

  Some ground disturbance, soil compaction and permanent placement of walkways from constructing new accessible trails and walkways throughout the area would have negligible adverse impacts on soils because the trails and walkways would take advantage of current social trails. The development of main trails would also have a positive impact on soils by discouraging the use of multiple social trails, thereby reducing overall erosion and compaction of soils throughout the area.

- **Alternative B.** This alternative would develop approximately 1 acre of soil. Less than 0.5 acre of soil would be restored. All impacts would occur within already developed areas, and impacts described under alternative A also apply to this alternative.

  Rehabilitating the approach road, including screening and parking modifications in Area I would disturb a minimal amount of soil, most of which has been previously disturbed. Adverse impacts to soils would be negligible. Limiting access on the service road and landscaping the surrounding area would improve soil conditions along the lakeshore, resulting in minor positive impacts. Improving pedestrian access to and around the hotel would reduce the use of multiple social trails in the area, thereby reducing overall erosion and compaction of soils, and resulting in minor positive impacts.

  Developing an accessible trail around Swiftcurrent Lake would result in the permanent placement of a hardened surface along the trail. Because the trail is currently heavily traversed, new impacts would be negligible.

  Constructing an information/orientation pull-off on Many Glacier Road could potentially cause new soil disturbance. Depending on the location and amount of disturbance, adverse impacts could range from negligible to moderate.

  For impacts on soils from constructing additional employee accommodations in the Swiftcurrent developed area, see the Swiftcurrent Developed Area below.

  Extending the operating dates of the Many Glacier Hotel and other accommodations two weeks (one week earlier and one week later) would encourage visitor use earlier in the season when soils might still be saturated, and susceptible to compaction and if vegetation were lost, to erosion. The effects would be negligible, negative and long term.

- **Alternative C (Preferred).** This alternative would develop approximately 2 acres of soil. Less than 0.5 acre of soil would be restored, and all disturbance would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

Constructing a new dormitory, associated parking and outdoor recreational facility, and redesigning the present parking area in Area II would develop approximately 1 acre of soil. Some of the area has been previously disturbed and has been used for prior recreational purposes. Adverse impacts would be minor.

- **Conclusion.** Overall, alternative A would have a negligible sort-term, site-specific, adverse impact on soils due to minimal disturbance from improvements and repairs.

  Alternative B would have both positive and negative impacts on soils. Some soil conditions would be improved from reducing the use of social trails throughout the Many Glacier developed area and restoring some areas with landscape. However, overall, alternative B would have a negligible to minor long-term, site specific, adverse impact depending on how much soil would be disturbed from the construction of a new pull-off along Many Glacier Road.

  Alternative C would have the greatest overall adverse impact on soils since more soils would be developed under this alternative than under alternative A or B. Overall adverse impacts would be minor, long-term and site specific. Alternative C would restore the same amount of soils as alternative B. Extending the operating season for both alternatives B and C would have negligible negative, long-term impacts.

  None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Swiftcurrent Developed Area

- **Alternative A – Status Quo/No Action.** Soils have been previously disturbed throughout the Swiftcurrent developed area, and current conditions would be maintained under this alternative. Improvements and repairs would have negligible short-term, adverse impacts during implementation.

- **Alternative B (Preferred).** Alternative B would affect approximately 4 acres of soil and restore 0.5 acre of previously disturbed soil. All impacts would occur within the existing developed area. Impacts described under alternative A also apply to this alternative.

  Reconfiguring the trail network throughout Areas I, II and III to separate vehicle and pedestrian circulation would cause minimal disturbance of new soil and negligible adverse impacts. The development of main trails would discourage the use of multiple social trails, and reduce overall erosion and compaction of soils throughout the area, having a positive impact on soils.

  Constructing a fourth motel in Area I would disturb soil and cause long-term loss of productivity of approximately 0.5 acre of soil, resulting in negligible adverse impacts. Constructing three new cabin rings on the former Bath House and Motel 4 site in Area II, and approximately five new cabins to complete the existing cabin rings in Area II disturb soil and cause the long-term loss in soil productivity of approximately 0.5 acre. However, since construction would occur in areas that have been previously developed, adverse impacts would be negligible.

Moving parking from the inside cabin rings to the loop road in Area II would result in both positive and negative impacts. The permanent placement of new parking lots would disturb soil and cause long-term loss of productivity of less than 1 acre of soil, resulting in negligible adverse impacts. There would be a net increase in parking in the Swiftcurrent developed area that would cause increased nonpoint source pollution from vehicles. However, with the implementation of nonpoint source pollution controls, adverse impacts from soil contamination would be negligible. Also, the areas within the cabin rings where parking currently exists would be restored, resulting in minor positive impacts.

Realigning the west access road in Area III would disturb soil and cause long-term loss of productivity of less than 0.5 acre of soil, resulting in negligible adverse impacts. Constructing additional visitor parking and formalizing employee parking adjacent to the Restaurant/Store in Area III would develop approximately 1 acre of soil, but would use previously developed areas, including the area occupied by the existing access road. Adverse impacts from this action would be negligible. Creating a new trailhead at the main parking area and a trail to the existing trailhead would disturb a minimal amount of soil, and cause increased soil compaction and erosion along the new section of trail. However, adverse impacts would be negligible because of the relatively small area affected.

Extending the operating dates of the visitor accommodations and Restaurant/Store three weeks (two weeks earlier and one week later) would encourage visitor use in areas when soils might still be saturated and susceptible to compaction, and if vegetation is lost, to erosion. The effects would be negative, minor and long term.

- **Alternative C.** Alternative C would develop approximately 5 acres of soil and restore less than 0.5 acre of soil. All disturbance would occur within the existing developed area. Applicable impacts described for alternatives A and B remain the same under this alternative with the following exceptions.

  This alternative would construct new employee dormitories, showers, and indoor and outdoor recreation facilities; expand employee parking; construct a new cabin ring for employee housing; and fill in the existing employee cabin ring with one cabin. These actions would develop between 1 and 2 acres of soil in Area II. Since placement of the new employee complex would take advantage of previously developed areas, including the former Bath House site, there would be negligible adverse impacts.

- **Conclusion.** Alternative A would have a negligible short-term, site-specific, adverse impact on soils due to minimal disturbance from improvements and repairs. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would result in somewhat more soil disturbance than alternative B, and both alternatives would restore approximately the same amount of soil. Both alternatives would have an overall minor, long-term, site-specific, adverse impact on soils.

  None of the alternatives would adversely affect rare or sensitive soils. None of the alternatives would adversely affect rare or sensitive soils. There would be no significant adverse impacts on soils whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan

(NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of any of the alternatives.

Cumulative Impacts

In areas throughout and adjacent to the park, past actions such as development have led to disturbance of park soils, as do ongoing services. This disturbance is within developed areas, along roads and trails, and near lakes and rivers. Reasonably foreseeable projects outside the park such as constructing additional employee housing, improving roads and bridges, U.S. Forest Service timber salvaging and reforestation are small in scope compared to the total area of the region. Impacts on soils from these projects would be either site-specific or localized. The combined impact of all actions both inside and outside the park and any of the alternatives would have a minor long-term, regional, adverse cumulative effect on soils.

VEGETATION

Methodology

Current vegetation conditions were assessed through consultation with the park's staff ecologist and biological technicians, synthesis of research reports and databases, and field surveys conducted during the summer of 2001.

Thresholds of impact are defined in Table 4.1.

- *Negligible*: 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, and no species of concern would be affected.
- *Minor*: Native plants would be affected over a relatively small area and a minor portion of a species' population.

- *Moderate*: Native plants would be affected over a relatively wide area (greater than 5 acres) or at multiple locations, and would be readily noticeable.
- *Major*: There would be a widespread effect on native species' populations or a considerable effect on native plant populations, including species of concern, over a very large area (greater than 10 acres).
- *Short-term:* After implementation, would recover in less than 3 years.
- *Long-term:* After implementation, would take more than 3 years to recover or effects would be permanent.

Impacts Common to All Alternatives

All construction work would have negligible to minor short-term, site-specific, adverse impacts on vegetation from temporary disturbance and vegetation trampling. Installation of new structures would have minor to moderate long-term, adverse impacts. Besides

the extent of vegetation removal, a primary factor in analyzing impacts is the seasonal timing of construction work. Vegetation is most sensitive to trampling and destruction during spring and early summer (March through June) when soils are wettest and plant root structures are more easily damaged. The next most sensitive time period is the fall season (mid-September through mid-November), when soils are wetter than during summer and plants are, or soon will be inactive. Ground that is disturbed in the fall is subjected to freeze-thaw conditions and springtime erosion caused by thawing before plants have an opportunity to recover through new growth. Ground disturbance during summer (mid-June through mid-September) would occur when soils are relatively dry and vegetation has some growing time to recover.

Greater levels of vegetation disturbance require longer recovery times and cause increased levels of soil erosion and compaction, and increased potential for invasion by exotic plants, including noxious weeds. While vegetation may recover in a short amount of time, the resulting expansion of exotic plant species may be a long-term consequence. The spread of exotic species, including noxious weeds into disturbed areas under any of the alternatives would have a minor to moderate long-term, adverse impact on vegetation, depending on the area of disturbance and the potential area of spread. The revegetation of disturbed areas with native vegetation and implementation of a noxious weed management program would mitigate the spread of noxious weeds. Maintaining or expanding development in any area also alters fire regimes of nearby vegetation communities, as fires are generally extinguished to protect park structures.

Impact Analysis For Necessary and Appropriate Services Alternatives

Granite Park Chalet

- **Alternative A – Status Quo/No Action.** In alternative A, periodic ground disturbance for system maintenance and possible soil contamination would continue to have minor adverse impacts on vegetation. Alternative A would continue to have minor adverse impacts from trampling and vegetation loss from visitors accessing the drinking water source.

- **Alternative B (Preferred).** Water system improvements and toilet construction would disturb approximately 4,250 square feet of ground. Disturbance would occur in herbaceous and shrub cover vegetation types near tree line, dominated by subalpine fir, swamp-gooseberry, slender wheatgrass, mountain hairgrass and smooth woodrush. This grass/forb subalpine meadow vegetation type is fairly common, and typically recovers very slowly from disturbance. Exotic species present in currently disturbed sites around the chalet include timothy, dandelion and Kentucky bluegrass. Some subalpine meadows are very slow to recover from ground disturbance, and may never fully rebound to original plant composition due to soil erosion and compaction, and due to exotic species invasion (Hartley 1999). Ground disturbance would cause minor short-term, adverse impacts on vegetation resources, while vegetation removal would cause minor long-term, adverse impacts. Improving the water and sewage system would also have a minor positive impact on vegetation resources by reducing the frequency of soil contamination and ground disturbance.

- **Alternative C.** This alternative would have the same impacts as alternative B; however, the construction of a new gray water system would result in slightly more ground disturbance and vegetation removal. System placement would result in 1,500 additional square feet of disturbance.

Commercially Guided Day Hiking (Cultural/Natural/Recreational)

- **Alternative A – Status Quo/No Action.** Although trained guides offer some enhancement to visitor awareness of sensitive resources and leave-no-trace backcountry travel techniques, the lack of limits to group size or number of trips per day under alternative A could cause increased trailside vegetation trampling and erosion when large groups are assembled. Participants could crowd trails and erode them into wider trail cuts. This alternative would cause negligible adverse impacts on vegetation resources.

- **Alternative B (Preferred).** This alternative would limit group size for commercially guided day hikes and the number of trips per day on backcountry trails, thereby reducing the potential for vegetation trampling and soil erosion. Alternative B would also have a negligible adverse impact on vegetation.

Guided Underwater Diving Tours

- **Alternative A – Status Quo/No Action.** This alternative would have no impact on vegetation because guided underwater diving tours would not be available in the park.

- **Alternative B (Preferred).** This alternative would cause negligible adverse impacts on vegetation along informal lakeshore social trails. Although trained guides would direct visitors to appropriate locations, vegetation trampling and soil erosion could occur at staging areas and along social trails associated with guided diving from lakeshores.

Firewood Sales

- **Alternative A – Status Quo/No Action.** Continuing to sell firewood in camp stores would continue to reduce the extent of wood gathering around campgrounds, thereby reducing trampling along social trails surrounding campgrounds. This operation would have a minor beneficial impact on vegetation.

- **Alternative B (Preferred).** Although expanding firewood sales operations at developed campgrounds might entail new ground disturbance, it would also reduce the impacts associated with visitors gathering wood from around the campgrounds. Overall, this reduction in vegetation trampling along social trails surrounding campgrounds would cause minor long-term, beneficial impacts on vegetation resources.

Public Showers

- **Alternative A – Status Quo/No Action.** This alternative would have no impact on vegetation.

- **Alternative B (Preferred).** Impacts from alternative B associated with the construction of new shower facilities would be minor. Relatively small areas would likely be adversely affected.

Guided Interpretive Motor Vehicle Tours and Public Transportation

- **Alternative A – Status Quo/No Action.** The increasing number of vehicles traveling park roads has caused the proliferation of informal roadside social trails and undesignated parking along road shoulders in congested areas. Vegetation trampling and soil erosion along these social trails and at undesignated parking areas has adversely impacted vegetation. It is not known whether the availability of commercial vehicle tours decreases or adds to the number of private vehicles on park roads. Generally, the shuttle and taxi services cause a negligible reduction in the number of

private vehicles on park roads. If commercial vehicle tour services decreases the number of private vehicles, then this alternative would continue to cause minor positive impacts by slightly reducing vegetation trampling and soil erosion along roadside social trails. Mitigation measures under this alternative would include requiring tour buses to stop only at designated areas and commercial vehicle tour concessioners to educate visitors about the impacts of social trails on vegetation.

- **Alternative B (Preferred).** Because taxi and private vehicle shuttle services are usually used primarily by visitors without personal vehicles and visitors completing loop hikes, the expansion of these services under alternative B would have a negligible influence on the number of vehicles on park roads. Assuming that the expansion of commercial vehicle tours would decrease the number of private vehicles on park roads, a slight reduction in trampling and erosion along undesignated, roadside social trails and at undesignated overflow parking sites, as well as the education of visitors by tour providers regarding protection of natural resources would result in positive impacts under alternative B.

Horseback Riding and Horse Packing Services

- **Alternative A – Status Quo/No Action (Preferred).** Continuing current horseback riding and horse packing services under alternative A would continue to cause moderate adverse impacts on vegetation due to vegetation trampling and soil erosion. Trampling and destruction of vegetation occurs along designated trails open to horse traffic, especially during the spring and fall periods, when soils are at their wettest and vegetation is most susceptible to damage. Where horse impacts are greatest along high-use trails and at stables and corrals, this disturbance promotes the establishment and spread of noxious weeds. Cutting new trails by hikers and horses in order to avoid deep ruts in high-use trails also causes impacts.

- **Alternative B.** Impacts described for alternative A are the same for alternative B, except that the elimination of commercial horseback riding day trips from the Apgar stables under alternative B would reduce impacts to vegetation along Apgar area trails. Within the Apgar area, the reduction of vegetation trampling, soil erosion and spread of noxious weeds along Apgar area trails would cause minor positive impacts.

- **Alternative C.** Adding horseback riding in the Two Medicine area would result in the same adverse impacts as alternative A with an increase in vegetation trampling, erosion and spread of noxious weeds along trails. New impacts on vegetation would be minor since additional horseback riding trips would occur only during July, August and September when soils are relatively dry. The trails chosen are well-drained and generally avoid wet areas.

- **Alternative D.** Impacts described for alternative A also apply to alternative D, except that the removal of the Lake McDonald Lodge stables and corral would reduce site-specific impacts on vegetation resources. Since there would be trailhead parking and a stock-loading ramp in the area and guided horseback riding day trips would continue on area trails, the removal of the stables and corral would result only in negligible to minor site-specific, positive impacts on vegetation. Although detailed site plans will undergo future analysis, the expansion of facilities at the Apgar stables would likely cause minor adverse impacts due to vegetation removal, increased vegetation trampling, and the increased threat of spreading noxious weeds.

Conclusion

At Granite Park Chalet, possible soil contamination and periodic ground disturbance for system maintenance in alternative A would continue to have minor long-term, site-specific, adverse impacts.

Alternatives B and C would have both positive and negative impacts. Generally, although alternative B would result in more ground disturbance than alternative C, both alternatives would have minor long-term, site-specific, adverse impacts from ground disturbance. Improvements to the water and sewage system under both alternatives would cause minor long-term, site-specific, positive impacts.

Although under alternative B, commercially guided day hiking would have a less negative impact on vegetation than alternative A because it limits group sizes and the number of trips per day on backcountry trails, impacts from trailside vegetation trampling and increased erosion would be negligible long-term, localized, and adverse for both alternatives.

Guided underwater diving tours under alternative A would not be available in the park; therefore there would be no impact on vegetation. In alternative B, vegetation trampling and erosion along informal lakeshore social trails and at staging areas would cause negligible long-term, site-specific, adverse impacts.

Alternatives A and B for firewood sales would reduce trampling from visitors gathering wood, resulting in overall minor long-term, site-specific, positive impacts near campgrounds.

Alternative A for public showers would have no impact on vegetation. In alternative B, vegetation removal associated with the construction of new facilities would have overall minor long-term, site-specific, adverse impacts.

Assuming that guided interpretive motor vehicle tours and public transportation services reduce the number of private vehicles on park roads, alternative A would reduce the amount of vegetation trampling and erosion along roadsides and at undesignated parking areas, continuing to have minor long-term, widespread, positive impacts. Alternative B would not dramatically decrease the number of private vehicles on park roads and would have the same impacts as alternative A.

Alternatives A and B for horseback riding and packing services would result in vegetation trampling and erosion due to horse use on trails, having moderate long-term, localized, adverse impacts; however, impacts along Apgar area trails would be less significant under alternative B. Impacts for alternative C would be the same as for alternative A, with the addition of localized impacts from vegetation trampling and erosion in the Two Medicine area. Alternative D would have the same impacts as alternative A. The removal of the Lake McDonald stables and the use of the area as a trailhead in alternative D would have negligible to minor long-term, site-specific, positive impacts, while potential new development in the Apgar stables area would result in minor long-term, site-specific, adverse impacts. Because alternative D reduces horse-related facilities, there are fewer impacts than in alternatives A and C, but greater impacts than alternative B.

There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Apgar Village Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Most of the disturbance would affect herbaceous and shrub cover types adjacent to

Lake McDonald's cobble beach. Vegetation impacted in these riparian areas would include cottonwood, birch, redcedar and spruce trees with an understory dominated by willows, alder and sedges. Exotics already present in the area include knapweed, oxeye daisy and common tansy. This riparian cover is not especially common because it is restricted to lakeshore and streamside sites. Improvements and repairs that disturb ground or cause trampled vegetation would have negligible to minor short-term, adverse impacts on vegetation resources.

Constructing new accessible trails and walkways, including the hardening or paving of some pathway surfaces, would remove and/or trample some vegetation, resulting in minor adverse impacts. All trails and pathways would cause long-term impacts on vegetation resources while they are maintained; unpaved trails, however, would be easier to reclaim if abandoned. The development of main trails, however, would also have a positive impact on vegetation by discouraging the use of multiple social trails, thereby reducing overall vegetation trampling and erosion throughout the Apgar Village area.

The shoreline stabilization actions would create ground disturbance as well as the potential for spread of exotic plant species, including noxious weeds, and would have negligible adverse impacts.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative. In addition, alternative B would disturb and remove vegetation over approximately 2.5 acres and restore more than 0.5 acre of vegetation. All impacts would occur within the existing developed area.

  Creating a pedestrian green space in Area I along Lake McDonald would restore 0.5 acre of vegetation, resulting in a minor positive impact on vegetation. Revegetating the area with native vegetation would help mitigate vegetation damage and the potential spread of exotic plants, including noxious weeds.

  The construction of new parking lots in Areas I and II would result in approximately 2.5 acres of ground disturbance and vegetation removal. Vegetation removed would include trees, woody shrubs and herbaceous ground cover. The majority of new disturbance would be in forest that is currently under successional larch-lodgepole pine cover type, and whose climax cover type is western redcedar-western hemlock. As described in Chapter 3, this cover type has spruce, redcedar, hemlock, white pine, and Douglas fir regenerating in the understory, with mature cottonwood and birch in forest openings. Common understory species include twinflower, prince's pine, queencup beadlily, spiraea, bunchberry dogwood, and thimbleberry. This cover type is common in the Apgar Village area. Some disturbance to stands dominated by large-diameter black cottonwood trees might take place in Area II. In addition, mature trees located near new parking lots would be removed if identified as safety hazards under the park's Hazard Tree Management Plan. Adverse impacts on vegetation from constructing new parking lots would be minor because of the relatively small area of disturbance. New parking would move parked vehicles away from the Apgar Loop roadside; the area along Apgar Loop Road currently used for parking would be reclaimed and planted with native vegetation, resulting in a positive impact on vegetation.

  Extending the operating season of the Village Inn eight weeks (three weeks earlier and five weeks later) could effect vegetation by encouraging visitor use of the area earlier in the season when soils are saturated and vegetation is just emerging and vulnerable to trampling. The result could be

damage or loss of vegetation, change in species composition and the possible spread of exotic plants. The effects would be negative, minor and long-term.

- **Alternative C.** Alternative C would result in a total of approximately 5.5 acres of ground disturbance and vegetation removal, and 1.75 acres of restoration. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative, with the following exceptions.

  Removing the Village Inn and associated parking from Area I and rehabilitating the site to be used as public space would restore over 0.75 acre of ground. The rehabilitation of the area for public use would offset positive impacts from restoration because of vegetation trampling and soil erosion, and because exotic species would likely be used in landscaping. Overall, positive impacts on vegetation would be minor. Constructing new lodging units and parking in Area II to replace the Village Inn would result in approximately 2.5 acres of ground disturbance and vegetation removal. The majority of new disturbance would occur in forest that is currently under successional larch-lodgepole pine cover type and whose climax cover type is western redcedar-western hemlock. This action would have minor adverse impacts on vegetation.

  Permanent additional boat ramp parking in Area I would disturb vegetation and cause long-term loss of approximately 0.5 total acre, resulting in minor adverse impacts.

  Removing the environmental education cabin from Area II would restore less than 0.5 acre of ground, resulting in a negligible but positive impact. Extending a bicycle path adjacent to Area II to the campground would result in some adverse impacts on vegetation in the immediate area, due to the removal and trampling of vegetation. Impacts would be negligible if the path follows the existing utility corridor and social trail.

- **Conclusion.** Alternative A would have an overall negligible to minor long-term, site-specific, adverse impact on vegetation from ground disturbance.

  Alternative B would disturb approximately 2.5 acres of vegetation and restore 0.5 acre, resulting in both positive and negative impacts. Ground disturbance and vegetation removal would result in minor long-term, site-specific, adverse impacts; restoration actions would result in minor long-term, site-specific, positive impacts.

  Extending the operating season for both alternatives B and C would have minor negative, long-term impacts. Alternative C would have the greatest overall impact on vegetation. It would cause substantially more ground disturbance and vegetation removal than alternative A or B (approximately 5.5 acres). Adverse impacts under alternative C would be moderate, long-term and site-specific. Although alternative C would restore a greater overall amount of vegetation than would alternatives A or B (approximately 1.75 acres), overall positive impacts under this alternative would also be minor, long-term and site-specific.

  There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Lake McDonald Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Improvements and repairs that disturb ground and cause trampled vegetation would have negligible to minor short-term, adverse impacts on vegetation resources.

  Constructing new accessible trails and walkways, including hardening or paving of some pathway surfaces, would cause the removal and trampling of some vegetation, resulting in minor adverse impacts. All trails and pathways would cause long-term impacts on vegetation resources while they are maintained; unpaved trails, however, would be easier to reclaim if abandoned. The development of main trails, however, would also have a positive impact on vegetation by discouraging the use of multiple social trails, thereby reducing overall vegetation trampling and erosion throughout the Lake McDonald area.

- **Alternative B.** Impacts described under alternative A also apply to this alternative. In addition, alternative B would involve approximately 3 acres of ground disturbance and vegetation removal, and less than 0.5 acre of restoration. All impacts would occur within the existing developed area.

  Constructing new guest and employee parking in Areas II and I would clear approximately 2 acres. The construction of a new parking lot in Area I would require the removal of some large trees from a mature forest stand containing large-diameter western redcedars, black cottonwoods and western larch. All understory vegetation, described in Chapter 3, would also be removed and over time, some old growth trees from the surrounding area would be removed if identified as safety hazards under the park's Hazard Tree Management Plan. This cover type is fairly common for the Lake McDonald area and impacts would be minor. The expansion of parking in Area II would require the removal of mature larch trees and young cedar and western hemlock trees, the removal of herbaceous and shrub vegetation, and the gradual removal of hazard trees. Because the placement of the new parking lots would take advantage of previously disturbed areas and result in a relatively small area of impact, adverse impacts on vegetation would be moderate.

  Constructing a new employee housing village in Area II would clear approximately 1 acre of vegetation. A number of trees, including larch, cottonwood, paper birch, and young cedar and hemlock trees, along with understory vegetation would be removed. The area affected would be relatively small and the vegetation cover type in the area is common; therefore, adverse impacts would be minor. Constructing a new public comfort station in Area II would cause minimal ground disturbance and vegetation removal, resulting in minor adverse impacts.

  Converting the Garden Court, Cobb House, and Snyder Hall Dormitories to guest accommodations and the Stewart Motel to employee housing would result in vegetation trampling during construction, causing negligible short-term, adverse impacts.

  Removing Boys' Dormitories 1 and 2, as well as the Johnson, Jammer and Hydro Dormitories from Area I, and constructing a parking lot, laundry and maintenance facility on part of this site would have negligible positive impacts on vegetation. The construction of a laundry and maintenance facility could require the removal of very large diameter cottonwood and cedar trees. However, tree removal would be minimal, and adverse impacts would be negligible. Removing the existing Coffee Shop parking lot and Girls' Dormitories 1 and 2 from Area II and replacing them with open green spaces would restore less than 0.5 acre. If native vegetation is planted in these open green spaces, impacts would be minor and positive. The use of native vegetation for this revegetation work would be preferable to a lawn cover of exotic grasses.

Extending the operating season of the Lake McDonald Lodge, General Store, Coffee Shop and other visitor accommodations five weeks (two weeks earlier and three weeks longer) would effect vegetation by encouraging visitor use earlier in the season when soils are saturated and vegetation is just emerging and vulnerable to trampling. The result could be damage or loss of vegetation, change in species composition and the possible spread of exotic plants. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Alternative C would result in a total of approximately 3 acres of ground disturbance and less than 0.5 acre of restoration. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B would remain the same under this alternative with the following exceptions.

  Removing the Coffee Shop and constructing a new restaurant with employee dining and post office in Area II would have negligible adverse impacts from minimal vegetation removal because the new restaurant would be constructed in a previously disturbed area. Constructing a new access road and parking adjacent to the guest cabin units in Area II would result in minimal vegetation removal because there is already an access road and informal parking in the area of the cabin units. Adverse impacts would be negligible.

- **Conclusion.** Alternative A would have an overall negligible to minor long-term, site-specific, adverse impact on vegetation from ground disturbance.

  Alternative B would have both positive and negative impacts on vegetation, with greater negative impacts. This alternative would clear just less than 3 acres, which would have an overall minor long-term, site-specific, adverse impact. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would have slightly more negative impacts than alternative B. Clearing approximately 3 acres would result in an overall minor long-term, site-specific, adverse impact on vegetation. Alternative C would result in approximately the same amount of revegetated areas as alternative B.

  There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Rising Sun Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Improvements and repairs that disturb ground and cause trampled vegetation would have negligible to minor short-term, adverse impacts on vegetation resources.

  Constructing new accessible trails and walkways, including hardening or paving of some pathway surfaces, would entail removal and/or trampling of some vegetation. Primarily grassland vegetation type would be impacted, including fescues, brome, bluebunch wheatgrass, junegrass, needle grass and sedges. The grassland vegetation type is fairly common to the area, but is

sensitive to disturbance, particularly to the spread of exotics. Exotics are already quite prevalent in the Rising Sun developed area, including knapweed, oxeye daisy, Canada thistle, houndstongue, and St. John's wort, and the threat of further spread is of concern. Impacts on vegetation would be minor and adverse. All trails and pathways would cause long-term impacts on vegetation resources while they are maintained; unpaved trails, however, would be easier to reclaim if abandoned. The development of main trails would also have a positive impact on vegetation by discouraging the use of multiple social trails, and thereby reducing overall vegetation trampling and erosion throughout the Rising Sun area.

- **Alternative B.** Impacts described under alternative A also apply to this alternative. In addition, alternative B would disturb less than 2 acres of ground. All impacts would occur within the existing developed area.

  Stabilizing the bluff where historic guest cabins are located above Rose Creek would disturb and remove some riparian vegetation. Riparian areas support cottonwood, spruce and lodgepole pine trees, with willows, alder and diverse forbs in the understory. This vegetation is not very common in the area, and ground disturbance and vegetation trampling would have minor short-term, adverse impacts on vegetation.

  Constructing five new guest cabins with parking and a second employee cabin for the boat concessioner in Area I would remove approximately 2 acres of vegetation, including mature Douglas fir trees, and increase vegetation trampling from visitor recreation activities. The Douglas fir community type is not especially common to the St. Mary Valley; however, in the Rising Sun area, these Douglas fir stands support a diverse understory of shrubs and forbs common to the adjacent grassland vegetation type. The area has been previously developed and adverse impacts on vegetation would be minor to negligible

  Constructing a new employee dormitory with parking and an outdoor recreation facility in Area I would remove less than 1 acre of vegetation with grassland, herbaceous and shrub species, and a few mature Douglas fir trees. Because the area is small and has been partially disturbed by previous development, adverse impacts on vegetation would be minor. The new employee facility would be situated adjacent to sensitive grassland habitat, which is susceptible to the spread of exotic plants, including noxious weeds that are currently present throughout the Rising Sun area. The potential for exotic plant species to spread into a wide area of grassland habitat could have moderate adverse impacts on this sensitive vegetation resource.

  Removing the boat concessioner employee housing from Area III would also remove a source of disturbance from sensitive riparian vegetation, causing minor long-term, positive impacts. Moving the ticket booth out of the high water zone would remove vegetation, including aspen trees, alder shrubs, and understory vegetation; however, the amount of removal would be minimal, and adverse impacts would be negligible.

  Extending the operating season of the visitor overnight accommodations, Coffee Shop and General Store/Motel/Dormitory five weeks (three weeks earlier and two weeks longer) would encourage visitor use earlier in the spring when soils might be saturated and emerging vegetation more vulnerable to trampling. Five more weeks of occupancy would increase overall effects to vegetation in the vicinity of the developed area. The result could be damage to or loss of vegetation, change in species composition and the possible spread of exotic plants. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Alternative C would disturb more than 2 acres. All disturbances would take place within the existing developed area. Impacts described for alternatives A and B, including extending the operating season, would remain the same under this alternative with the following exceptions.

  Constructing ten new guest cabins and associated parking in Area I would result in more ground disturbance and vegetation removal (over 1 acre) than would constructing five new cabins under alternative B. However, because the area of disturbance is small and the area has been previously disturbed, minor adverse impacts on vegetation would occur. Vegetation removal would include mature Douglas fir trees as well as shrub and herbaceous understory growth.

  Constructing two new employee dormitories and an outdoor recreation facility in Area I would result in more ground disturbance and vegetation removal (over 1 acre) than would constructing one new employee dormitory under alternative B; however, the area of disturbance would still be relatively small, and adverse impacts on vegetation would also be minor. Vegetation removal would involve herbaceous and shrub cover as well as some mature Douglas fir trees. The potential for the spread of exotic plant species into sensitive grassland habitat described under alternative B also applies to this alternative.

  Impacts to vegetation from stabilizing the bluff would not occur.

  Converting the Main Dormitory to visitor accommodations, Power House Dormitory to storage, and the Lower Motel to employee housing would entail vegetation trampling associated with temporary staging and materials storage, causing negligible short-term, adverse impacts.

  Modifying the intersection to the campground would cause minimal vegetation removal for new pavement, and would result in negligible adverse impacts on vegetation. Revegetation would have positive impacts and mitigate the spread of exotic species and noxious weeds.

- **Conclusion.** Alternative A would have an overall negligible to minor long-term, site-specific, adverse impact on vegetation from ground disturbance.

  Although alternative B would have some positive impacts on vegetation, overall impacts would be minor long-term, site-specific and adverse from ground disturbance, vegetation removal, and the potential spread of exotic species into sensitive grassland habitat. Alternative B would disturb less than 2 acres of ground.

  Extending the operating season for both alternatives B and C would have minor negative, long-term impacts. Alternative C would result in only slightly more ground disturbance and vegetation removal than would alternative B, and the total area of impact would be relatively small (approximately 2 acres). Overall impacts on vegetation from alternative C would also be minor, long-term, site-specific, and adverse.

  There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Two Medicine Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Improvements and repairs that disturb ground and cause trampled vegetation would have negligible to minor, adverse impacts on vegetation resources.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative. In addition, alternative B would disturb less than 2 acres of ground and restore as much as 0.5 acre. All impacts would occur within the existing developed area. Most of this disturbance would affect a riparian vegetation type along the Two Medicine Lake shore near the General Store and along Appistoki Creek. These riparian areas support cottonwood, alder, willow, and various forbs, sedges and grasses common to the adjacent grassland vegetation. Riparian areas are fairly common in the Two Medicine developed area, but are already impacted by heavy visitor use.

  Constructing new accessible trails and walkways, hardening or paving some pathway surfaces, and constructing a pedestrian bridge over Appistoki Creek would have minor adverse impacts on vegetation due to the removal and trampling of some vegetation. All trails and pathways would cause long-term impacts on vegetation resources while they are maintained; unpaved trails, however, would be easier to reclaim if abandoned. The development of main trails would also discourage the use of multiple social trails, thereby reducing overall vegetation trampling and erosion throughout the Two Medicine developed area and creating a positive impact on vegetation.

  Constructing a service road and service/bus parking area for the General Store would disturb less than 1 acre of ground in a site of gravelly soils and sparse black cottonwood trees, shrubs, and herbaceous plant cover adjacent to Appistoki Creek. This area is already somewhat disturbed due to creek channelization and informal service vehicle access. Adverse impacts from some vegetation removal would be negligible to minor. Screening around the service road and parking area with native vegetation would mitigate adverse impacts.

  Constructing a new comfort station would disturb less than 0.5 acre of vegetation at the edge of a sensitive grassland community, which includes fescues, brome, bluebunch wheatgrass, junegrass, needle grass and sedges. Grassland vegetation type is not common in the Two Medicine developed area and is particularly sensitive to the spread of exotic plants. Exotic plants already prevalent in the Two Medicine developed area include knapweed, common tansy, Canada thistle, butter-and-eggs and yellow bedstraw. This disturbance would cause minor adverse impacts because of its small area. The increased potential for exotic plant species that are currently present in the Two Medicine area to spread into a relatively pristine and sensitive grassland community could have minor adverse impacts on vegetation.

  It is unknown how vegetation would be impacted by restoring historic landscape features in front of the General Store, including the former comfort station site, because landscaping plans have not yet been specified. Impacts would be positive if native vegetation rather than exotic species lawn cover were used for revegetation.

  Extending the operating season for the General Store four weeks (one week earlier and three weeks later) would encourage visitor use in areas when soils might still be saturated and emerging plants susceptible to trampling. The result could be damage or loss of vegetation, change in species composition and the possible spread of exotic plants. The effects would be negligible, negative and long-term.

- **Conclusion.** Overall, alternative A would have negligible to minor long-term, site-specific, adverse impacts on vegetation from repairs and improvements.

  Alternative B would disturb less than 2 acres of ground, and would have minor long-term, site-specific, adverse impacts on vegetation. Minor long-term, site-specific, positive impacts could occur if restored areas are planted with native species. Extending the operating season would have negligible negative, long-term impacts.

  There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Many Glacier Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Improvements and repairs that disturb ground and cause trampled vegetation would have negligible to minor, short-term, adverse impacts on vegetation resources.

  Constructing new accessible trails and walkways, including hardening or paving of some pathway surfaces, would have minor adverse impacts on vegetation due to the removal and trampling of some vegetation. All trails and pathways would cause long-term impacts on vegetation resources while they are maintained; unpaved trails, however, would be easier to reclaim if abandoned. The development of main trails would also discourage the use of multiple social trails, thereby reducing overall vegetation trampling and erosion throughout the Many Glacier developed area and resulting in a positive impact on vegetation.

  Most disturbance would occur in an open, rocky grassland vegetation type with common grassland species, such as fescues, brome, bluebunch wheatgrass, junegrass, needle grass and sedges. Grassland vegetation type is fairly common in the Many Glacier developed area. Disturbance is likely to cause further spread of exotic plants. Exotics already present in Many Glacier developed area include knapweed, Canada thistle, houndstongue, and butter-and-eggs.

- **Alternative B.** Impacts described under alternative A also apply to this alternative. In addition, alternative B could disturb approximately 1 acre of ground and restore less than 0.5 acre. All impacts would occur within the existing developed area.

  Assuming some native species would be used, planting vegetation for screening and landscaping along the approach road and in the area surrounding the hotel would result in minor to negligible, positive impacts on vegetation by restoring native vegetation in the area.

  Improving pedestrian access to and around the hotel would reduce the use of multiple social trails, thereby reducing overall vegetation trampling and erosion around the hotel, and resulting in negligible to minor, positive impacts on vegetation. Developing an accessible trail around Swiftcurrent Lake would result in minimal vegetation removal. Because the accessible trail would primarily follow the existing trail, most impacts would be negligible. If new switch-backing is required across steeper sections, there would be new minor long-term impacts on vegetation, including vegetation removal in a mature forest stand of Engelmann spruce and subalpine fir.

The intensity, duration and context of adverse impacts associated with development of an orientation pullout along the Many Glacier Road would depend on final site plans. The area developed for a pullout would be relatively small, and depending on the location and amount of disturbance, adverse impacts on vegetation could range from negligible to minor.

Extending the operating dates of the Many Glacier Hotel and other accommodations two weeks (one week earlier and one week later) would result in encouraging visitor use in areas earlier in the season when soils might still be saturated and emerging plants susceptible to trampling. The result could be damage or loss of vegetation, change in species composition and the possible spread of exotics. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Alternative C would disturb approximately 2 acres and restore less than 0.5 acre of ground. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Converting the Lower Dormitory in Area II to visitor accommodations would entail vegetation trampling associated with temporary staging and materials storage, resulting in negligible short-term, adverse impacts.

  Constructing a new dormitory, parking and outdoor recreational facility in Area II would disturb ground and remove vegetation in approximately 1 acre. Some of the area has been previously disturbed and used for prior recreational purposes. The area is adjacent to a wetland that supports wetland understory species, primarily alder, willow and sedges. Wetlands are not common in the Many Glacier developed area; however, the placement of the new employee facility would avoid the wetland area. The area of disturbance would also be relatively small, and adverse impacts on vegetation would be minor. Increased employee recreation in the area would also increase vegetation trampling, which would result in additional minor adverse impacts. This area encompasses a transitional site supporting lodgepole pine, subalpine fir, spruce forest, and grassland vegetation types. Disturbance is likely to result in the further spread of exotic plants.

- **Conclusion.** Alternative A would have an overall negligible to minor long-term, site-specific, adverse impact on vegetation from ground disturbance.

  Alternative B would have both positive and negative impacts on vegetation from disturbing approximately 1 acre and restoring approximately 0.5 acre of ground. Planting some native vegetation and reducing trampling around the hotel would result in an overall minor long-term, site-specific, positive impact on vegetation. Ground disturbance and some vegetation removal throughout the Many Glacier developed area and at a pullout site along Many Glacier Road would have minor long-term, site-specific, adverse impacts on vegetation. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  Alternative C would have the same positive impact on vegetation as alternative B but would have additional adverse impacts. More ground disturbance and vegetation removal on approximately 2 acres would occur under alternative C than under alternatives A or B. However, the total area of disturbance would still be relatively small, and overall adverse impacts from alternative C would be minor, long-term, and site-specific.

There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Swiftcurrent Developed Area

- **Alternative A – Status Quo/No Action.** Minimal ground disturbance would occur under this alternative. Improvements and repairs that disturb ground and cause trampled vegetation would have negligible to minor adverse impacts on vegetation resources.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative. In addition, alternative B would disturb approximately 4 acres and restore less than 0.5 acre of ground. A little less than half of this new disturbance would occur in forest stands supporting mature lodgepole pine trees plus shrub and herbaceous understories. As described in Chapter 3, these forest stands are dominated by lodgepole pine with some cottonwood, aspen, subalpine fir and spruce. Understory species include beargrass, snowberry, false huckleberry, serviceberry, buffaloberry, willow, honeysuckle, queencup beadlily and arnica. This vegetation is a common forest type. The remainder of the new disturbance would occur in sparse shrub and herbaceous cover types in previously disturbed areas. All impacts would occur within the existing developed area.

  Reconfiguring the trail network throughout Areas I, II and III to separate vehicle and pedestrian circulation would cause some vegetation removal and trampling, and would have minor adverse impacts on vegetation. The development of main trails would also discourage the use of multiple social trails, thereby reducing overall vegetation trampling throughout the Swiftcurrent developed area and having a positive impact.

  Constructing a fourth motel in Area I would disturb approximately 0.5 acre of ground and remove a minimal amount of vegetation. This alternative would construct three new cabin rings on the former Bath House and Motel 4 site in Area II and approximately five new cabins to complete the existing cabin rings in Area II. The construction would disturb less than 1 acre of new ground and remove a minimal amount of vegetation, and would occur in relatively small areas that have been previously developed. Adverse impacts from this activity on vegetation would be minor to negligible.

  Removing parking from the inside cabin rings and providing parking along the loop road in Area II would disturb less than 1 acre and remove a minimal amount of vegetation. Impacts would be minor and adverse.

  Realigning the west access road in Area III would disturb approximately 0.5 acre of ground and remove some vegetation. Because the disturbed area is small, adverse impacts on vegetation would be minor. Constructing additional visitor parking and formalizing employee parking adjacent to the Restaurant/Store in Area III would use some previously disturbed areas, including the area occupied by the existing access road. Vegetation removal would be minimal

These forest stands are dominated by lodgepole pine with some cottonwood, aspen, subalpine fir and spruce.

and would result in negligible adverse impacts on vegetation. Creating a new trailhead at the main parking area and a trail to the existing trailhead would remove less than 0.5 acre of vegetation, and impacts on vegetation would be negligible because of the small area and amount of vegetation affected.

Extending the operating dates of the visitor accommodations and Restaurant/Store three weeks (two weeks earlier and one week later) would encourage visitor use in areas when soils might still be saturated and emerging plants susceptible to trampling. The result could be damage or loss of vegetation, change in species composition and the possible spread of exotic plants. The effects would be negative, minor to moderate and long-term.

- **Alternative C.** Alternative C would disturb approximately 5 acres and restore less than 0.5 acre of ground. All disturbances would occur within the existing developed area. Applicable impacts described for alternatives A and B, including extending the operating season, would remain the same under this alternative with the following exceptions.

  In Area II, alternative C constructs new employee dormitories, showers, and indoor and outdoor recreation facilities; expands employee parking; constructs a new cabin ring for employee housing; and fills in the existing employee cabin ring with one cabin. These activities would disturb between 1 and 2 acres of ground and remove some vegetation. Placement of the new employee complex would take advantage of previously developed areas, including the former Bath House site, and would have minor adverse impacts on vegetation. This area is also primarily lodgepole pine forest, similar to the vegetation described above.

- **Conclusion.** Overall, alternative A would have negligible to minor long-term, site-specific, adverse impacts on vegetation from repairs and improvements.

  Alternative B would clear approximately 4 acres of vegetation and alternative C would clear approximately 5 acres. Both alternatives would use previously disturbed areas for new development and would have overall minor to moderate long-term, site-specific, adverse impacts on vegetation. Extending the operating season for both alternatives B and C would have minor to moderate, negative, long-term impacts.

  There would be no significant adverse impacts on vegetation resources whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of vegetation resources as a result of the implementation of any of the alternatives.

Cumulative Impacts

In areas throughout and adjacent to the park, past actions such as development have affected vegetation resources. Present ongoing services within the park disturb vegetation in developed areas, along roads and trails, and near lakes and rivers. Reasonably foreseeable projects outside the park such as constructing additional employee housing, improving roads and bridges, and U.S. Forest Service timber salvaging would have localized adverse impacts on vegetation. On the other hand, projects such as Forest Service reforestation and noxious and invasive weed management would have positive impacts.

Future development projects inside the park, including the Going-to-the-Sun Road rehabilitation project that could include the removal of vegetation in areas with little or no existing disturbance, would have moderate site-specific, adverse impacts on vegetation. In addition, projects within or near the park that involve ground disturbance, as well as transportation and recreation, would contribute to the spread of invasive species on a regional scale. The combined impacts of all actions both inside and outside the park, and any of the alternatives would have an overall minor, regional, long-term, adverse cumulative impact on vegetation.

WILDLIFE, INCLUDING AQUATIC SPECIES

Methodology

Current conditions of wildlife in general were assessed through informal consultation with the U.S. Fish and Wildlife Service, and wildlife biologists from Glacier National Park and from outside the National Park Service. Alternatives were evaluated on the basis of data and other information gathered from the following sources: Glacier National Park inventory, monitoring and sighting databases, as well as research information from U.S. Geological Survey scientists, universities, and independent researchers; geographic information systems (GIS) themes (provided by the park's GIS specialist); interviews with terrestrial and aquatic wildlife experts; Glacier National Park monitoring reports; and current literature.

Knowledge of ecological relationships and processes on the landscape and regional scale is well established, but knowledge of the status of wildlife populations and local conditions at the site-specific level is largely incomplete or unavailable for many areas in the park. In light of these knowledge gaps, this analysis describes impacts on wildlife in terms of changes to habitat quality, quantity and distribution, such as habitat loss or gain, degradation or enhancement, fragmentation or connectivity, amount of human disturbance, and potential for increased or decreased conditioning of wildlife.

The response of wildlife to human presence is complex, and different species of wildlife have different tolerances for interaction with humans. Tolerance levels for interaction also vary by time of year, reproductive status, age, habitat type, food availability, topography and degree of habituation. This analysis assesses potential impacts from construction and operation by season. The seasons analyzed are:

Spring (15 March – 15 June)
Summer (15 June – 15 September)
Fall (15 September – 15 November)
Winter (15 November – 15 March)

In this discussion, construction includes major repair and/or rehabilitation, demolition, deconstruction, rehabilitation, maintenance, etc. The type of construction activity (i.e., heavy or light, interior or exterior, major or minor) and the scheduling of the work (both time of day and season) are factors that influence the duration, intensity and context of the associated impacts. Any extended or increased concessioner services will also influence the duration, intensity and context of associated impacts.

Thresholds of impact are defined in Table 4.1.

- *Negligible*: Effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.
- *Minor*: Effects on wildlife would be detectable, although the effects would be localized, and would be small and of little consequence to the species' population.
- *Moderate*: Effects on wildlife would be readily detectable and widespread, with consequences at the population level.
- *Major*: Effects on wildlife would be obvious and would have substantial consequences to wildlife populations in the region.
- *Short-term:* After implementation, would recover in less than 1 year.
- *Long-term:* After implementation, would take more than 1 year to recover or effects would be permanent.

Impacts Common to All Alternatives

Construction activities would result in short-term impacts on wildlife due to increased levels of noise, human activity, erosion, dust, artificial lighting, vegetation trampling, vegetation removal, spread of exotic species, wildlife attractants and environmental pollutants. Mitigation measures would be implemented during construction under all alternatives to minimize these impacts.

Construction activities and added concessioner services during the summer would have fewer adverse effects on wildlife. Existing development, including concessioner services, and a past history of human disturbance in these areas have already affected habitat quality in summer. Adverse effects would be more likely during spring, fall and winter when wildlife are accustomed to decreased visitor use. Many species of wildlife are more vulnerable to the effects of human-induced stress in spring, fall and winter when energy expenditure is greatest and food resources are less abundant. Sustained (year after year) construction activities during late fall, early spring and winter in the Rising Sun, Two Medicine, Many Glacier and Swiftcurrent developed areas would have greater consequences for wildlife because roads into these areas have not historically been maintained for motorized access in winter. Year-round construction at these four sites would require that seasonally closed roads be kept open throughout the winter. Increased human presence and activity at these sites in winter would result in a moderate to major impact on wildlife because of the greater likelihood of human-induced stress, displacement, harassment and habituation.

Expanding the season for construction in the Apgar Village and Lake McDonald developed areas from current dates would increase the level of human disturbance to wildlife during the sensitive spring and fall seasons, resulting in a moderate long-term, adverse impact. The proposed actions would create the following long-term adverse impacts on special status wildlife species and habitat: loss of riparian woodland and upland forest habitats, noise and light disturbance from new facilities, creation of new areas for brown-headed cowbirds, increased human disturbance in adjacent habitats, increased trampling of vegetation, increased chance of wildlife conditioning to human food, disturbance from traffic and people, increased need for hazard tree management, reducing snag habitat, and increased chance of human/wildlife conflicts.

Formalizing pedestrian pathways would have negligible, localized impacts on aquatic special status species. Sedimentation from ground disturbance would cause short-term adverse impacts, and sediments and pollutants associated with increased water run-off would cause long-term adverse impacts. Pollutants associated with increased water run-off from the sidewalks situated immediately adjacent to the waterways would create long-term adverse impacts. Formalizing and hardening pedestrian pathways along the waterways would reduce the amount of soil and vegetation available to filter sediments and pollutants in run-off from the surrounding developed areas. This could alter natural erosion processes around and in the waterways, and in some cases downstream, thereby resulting in additional adverse impacts on wildlife.

Impacts from other activities on wildlife and wildlife habitat generally would be characterized as long-term. Long-term impacts are associated with the new development in previously developed areas and operation of facilities and services or with actions resulting in the permanent modification or loss of habitat. The long-term impacts of new development on wildlife would include: habitat loss (such as plant communities, snags, down logs, etc.), habitat fragmentation and loss of connectivity, habitat modification (such as floodplain, streambank, and lakeshore stabilization), and adverse edge effects. These impacts also would entail displacement and avoidance behavior, vulnerability to poaching and illegal collection, increased potential for chronic negative interactions with humans, direct mortality from vehicles, harassment and disturbance, and disruption of wildlife movement (e.g., dispersal and migration). The introduction and spread of non-native species and degradation of rare and unique communities (such as those found in talus slopes, cliffs, caves, meadows, riparian areas and wetlands) could occur. There would also be increased levels of human-induced physiological stress, lowered success in reproduction and rearing of young, and loss of habitat complexity. Site-specific and species-specific long-term impacts are described in more detail for each alternative. Removing debris at low water from Snyder Creek in the vicinity of the bridges within the developed area would have minor adverse, short-term impacts on aquatic species.

Impact Analysis For Necessary and Appropriate Services Alternatives

Granite Park Chalet

- **Alternative A – Status Quo/No Action.** Operation of the chalet as a hiker shelter and concentration of visitor activity would have no additional effect on wildlife. Wildlife would continue to be disturbed by human activity in the area. The chalet sits at the subalpine to alpine transition zone, and the area is interspersed with high value wildlife habitats. Human/wildlife conflicts would persist because food storage and sanitation that attract wildlife would continue to be available in the area. The use of helicopters for removing waste would continue to disturb wildlife and cause minor adverse effects.

- **Alternative B (Preferred).** The very few ground disturbing activities that are proposed under this alternative would occur in a relatively small area that has been previously disturbed by human activities. As a result of the currently disturbed nature of the site and existing adjacent development, long-term adverse impacts would be negligible. Moderate short-term, adverse impacts would occur during construction due to numerous helicopter flights and the additional pack trips needed to transport construction materials. Under this alternative, removing sanitary waste by helicopter would cease, resulting in minor long-term, positive impacts on wildlife.

- **Alternative C** would have the same impacts as alternative B. However, the area disturbed by development would increase slightly under this alternative. Maintenance and operation of a full-

service dining and overnight facility would increase human use and therefore increase the levels of human disturbance to wildlife, resulting in minor long-term, adverse impacts on wildlife.

Commercially Guided Day Hiking (Cultural/Natural/Recreational)

- **Alternative A – Status Quo/No Action.** Although trained guides offer some enhancement to visitor awareness of sensitive resources and leave-no-trace backcountry travel techniques, the lack of limits to group size or number of trips per day under alternative A exacerbates wildlife disturbances. This alternative poses minor adverse impacts on wildlife resources due to continued disturbance and displacement of wildlife.

- **Alternative B (Preferred)** would limit group size for commercially guided day hikes and the number of trips per day on backcountry trails; however, it would also have a minor adverse impact on wildlife due to continual disturbance and displacement of wildlife.

Guided Underwater Diving Tours

- **Alternative A – Status Quo/No Action** would have no impact on wildlife because guided underwater diving tours would not occur in the park.

- **Alternative B (Preferred)** would cause minor adverse impacts on wildlife and aquatic species in and around Lakes McDonald, Sherburne and Josephine, as well as Swiftcurrent, Two Medicine, Pray, Lower Two Medicine, and St. Mary Lakes due to trampling of vegetation in aquatic habitats, increased levels of noise in remote habitats, and increased human disturbance in adjacent habitats. Additional causes would be the introduction of non-native plant and animal species, increased turbidity, sanitary waste disposal problems, the deposition of oil/gas mixtures on the water surface, and the increased chance of human/wildlife conflicts.

Firewood Sales

- **Alternative A – Status Quo/No Action** would continue firewood sales in camp stores, reducing the extent of wood gathering around campgrounds, and thereby reducing wildlife disturbances along social trails surrounding campgrounds. This operation would have a negligible beneficial impact on wildlife.

- **Alternative B (Preferred).** Although expanding firewood sales operations at developed campgrounds under this alternative might entail new short-term wildlife disturbance during construction, it would also reduce the impacts associated with visitors gathering wood from around the campgrounds, resulting in negligible long-term, beneficial impacts on wildlife.

Boat Tours and Transportation (Boat Taxi)

- **Alternative A – Status Quo/No Action.** The use of large, motorized boats directly affects wildlife by displacing individuals from high-value riparian and aquatic habitats into marginal habitats where forage quality and habitat security might be lower. Wave action from boats can disturb aquatic vegetation and smaller animals that nest or live there. Indirect impacts on water quality and other habitat components also affect wildlife. Boats contribute to increased turbidity, sanitary waste disposal problems, and the deposition of oil/gas mixtures on the water surface. Continued boat tour and transportation services would continue to have minor adverse impacts on wildlife.

- **Alternative B (Preferred).** Impacts under this alternative would not dramatically increase from what is described under alternative A in the Lower McDonald Creek drainage due to added tour boat services on Lake McDonald and on Two Medicine Lake. Impacts would be minor and adverse.

Horseback Riding and Horse Packing Services

- **Alternative A – Status Quo/No Action (Preferred).** Horseback riding and horse packing services would continue to cause minor to moderate adverse impacts on wildlife due to trampling of habitat along trails, noise in remote habitats, and human disturbance in adjacent habitats. Additional impacts occur from are influx of nutrients from livestock droppings and urine, wildlife conditioning to human and livestock food, spread of non-native plant species affecting wildlife habitat, human/wildlife conflicts and spread of disease.

- **Alternative B** would have the same impacts as alternative A, but would result in a reduction of impacts associated with guided horseback riding on trails originating from the Apgar stables.

- **Alternative C** would have the same impacts as alternative A, with an increase in impacts in the Two Medicine area due to added horseback riding services.

- **Alternative D** would have the same impacts as alternative A, but would result in a reduction of impacts for guided horseback riding and horse packing in the Lake McDonald area.

Conclusion

Alternative A for Granite Park Chalet would continue to have minor long-term, site-specific, adverse impacts on wildlife. Alternative B would have negligible long-term, site-specific, impacts from wildlife disturbance and displacement, while alternative C would have minor long-term, site-specific impacts. In addition, alternatives B and C would cause minor long-term, site-specific, positive impacts because hauling of sanitary waste by helicopter would cease.

Alternative B for commercially guided day hiking would have a less negative impact on wildlife than alternative A because it limits group sizes and the number of trips per day on backcountry trails. Although both alternatives would have minor long-term, localized, adverse impacts on wildlife from human disturbances, alternative B's impacts would be less due to the limited number of visitors at any given time.

Under alternative A, guided underwater diving tours would not be available in the park; therefore, there would be no impact on park wildlife. Alternative B would have minor long-term, localized, adverse impacts on wildlife.

Alternatives A and B for firewood sales would result in overall negligible long-term, site-specific, positive impacts on wildlife near campgrounds by reducing disturbances from visitors gathering wood.

Alternatives A and B for boat tours and transportation (boat taxi) would have minor long-term, localized, adverse impacts from wildlife disturbance.

Alternatives A, B and D for horseback riding and packing services would have overall minor to moderate, long-term, localized, adverse impacts. Impacts for alternative C would be the same as for alternative A, with the addition of localized impacts in the Two Medicine and St. Mary areas.

There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Apgar Village Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would have minor short-term, adverse impacts on wildlife during construction due to noise and movement.

  If implemented during the current maintenance and operating season, this alternative would have no new effect on wildlife.

- **Alternative B (Preferred).** Impacts described for alternative A would remain the same under this alternative.

  This alternative involves approximately 2.5 acres of new disturbance and would restore over 0.5 acre.

  Plans to improve pedestrian pathways and roadways in the developed area and to renovate the Village Inn would affect a relatively small area previously disturbed by human activities. Converting a social trail and utility corridor to a new bike path between Apgar Village and the campground would result in a negligible impact, since the area is already disturbed. This social trail already appears to receive regular use by visitors traveling to and from the campground in summer. The impacts of trail construction would be short-term and negligible to minor, depending on the season. If construction occurred in the summer, impacts would be negligible. If construction occurred during the spring, fall or winter, impacts would be short-term and have greater adverse effects because these are sensitive seasons for most wildlife in Glacier National Park, and the trail runs through habitat occupied by wildlife. Constructing new parking lots in the Apgar area would adversely affect about 2.5 acres of undeveloped land and result in a long-term adverse impact. Construction of the parking lots and other visitor-related items in the summer would have short-term and less adverse impacts. Construction in the spring, fall and winter would have moderately adverse impacts on wildlife.

  Extending the operating season of the Village Inn eight weeks (three weeks earlier and five weeks later) could affect wildlife by encouraging more visitor use in the early and late season at Apgar. Early in the year, nesting birds could be affected and the total time extension could affect migrating aquatic avian species that use the foot of Lake McDonald. Other species could be displaced within and adjacent to the developed area during the sensitive spring and fall seasons. Increased activity during the spring and fall could affect energy expenditure and productivity, and increase mortality. Overnight users might also impact other nearby areas since the duration and time of their stay would be different than for day users. The effects would be negative, minor and long-term.

- **Alternative C.** Impacts described for alternatives A and B, including extending the operating season, would remain the same under this alternative with the following exceptions.

Removing the Village Inn and constructing a public space at this site adjacent to the Lake McDonald outlet would result in minor to moderate long-term, adverse impacts on wildlife. Although the continued use of the area by residents from the Inn would be eliminated, visitor use at the lake outlet would likely increase the amount of human disturbance to important wildlife habitat.

The construction of the new parking lots and new visitor lodging would result in a greater likelihood of measurable but minor losses of habitat quality and quantity at Apgar relative to alternatives A and B. Consequently, moderate long-term, adverse effects on wildlife would be expected to occur as a result of the proposed actions in the Apgar Village developed area.

Proposed construction activities would result in minor short-term impacts in summer, and moderate short-term impacts in spring, fall and winter.

- **Conclusion.** Alternative A would have minor short-term, localized adverse impacts on wildlife during construction. Under alternative B, the construction of new parking lots would result in a greater likelihood of measurable but minor losses of habitat quality and quantity in the Apgar Village developed area than would alternative A. Consequently, minor long-term, adverse impacts on wildlife would result from the proposed actions in the Apgar Village developed area. The construction of the new parking lots and new visitor lodging under alternative C would result in a greater likelihood of measurable losses of habitat quality and quantity in the Apgar Village developed area relative to alternatives A and B. Consequently, moderate long-term, adverse impacts on wildlife would result from the proposed actions. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Lake McDonald Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would have minor short-term, adverse impacts during implementation. If implemented during the current maintenance and operating season, this alternative would have no new effect on wildlife.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Removing several structures (Boys' Dormitories 1 and 2, and Johnson, Jammer and Hydro Dormitories from Area I, as well as the existing Coffee Shop parking lot and Girls' Dormitories 1 and 2 from Area II) and revegetating would have a negligible impact on wildlife, given the small area restored and the proximity of adjacent development. Removal of these facilities might slightly reduce the need to remove hazard trees from within the Snyder Creek floodplain. This alternative would result in a slight decrease in the number of guests and/or employees at this site.

The new employee housing area proposed near the Coffee Shop would result in expanded human presence in the adjacent forested habitat; however, human presence and adjacent development have previously disturbed this area. Short-term impacts associated with construction would also be moderate during all seasons. Parking lot and road improvement projects north of Snyder Creek would have minor to moderate, long-term impacts due to loss of habitat. Impacts from construction would be minor and short-term if construction occurs in summer. If construction were scheduled during spring, fall or winter, impacts would be of minor to moderate and short-term because these are sensitive seasons for most wildlife in Glacier. Construction of new facilities south of Snyder Creek would result in the removal of an important vegetation type (western redcedar and black cottonwood mature forest); this action would result in moderate long-term, adverse impacts. Construction activities would cause short-term adverse impacts, which would be negligible to minor if work were scheduled in summer, and minor to moderate in spring/fall/winter (depending on the proximity of the project site to sensitive habitats). Construction planned for buildings located immediately adjacent to Snyder Creek or Lake McDonald would have a greater potential to impact wildlife than would construction in areas nearer to the Going-to-the-Sun Road.

Extending the operating season of the Lake McDonald Lodge, General Store, Coffee Shop and other visitor accommodations five weeks (two weeks earlier and three weeks longer) would displace wildlife from habitat within and adjacent to the developed area during sensitive spring and fall seasons. Increased activity during this time could affect energy expenditure and productivity, and increase mortality. Overnight visitors might also impact other nearby areas since the duration and time of their stay would be different than for day users. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Constructing a new access road and parking adjacent to the guest cabin units in Area II would increase the loss of wildlife habitat and the amount of wildlife disturbances in the area, having an overall minor long-term, localized, adverse impact.

- **Conclusion.** Overall, alternative A would have a minor long-term, localized, adverse impact on wildlife and wildlife habitat from developing paths. Although alternative C would result in a greater amount of new development and some increase in loss of habitat, both alternatives B and C would have overall minor to moderate, localized, long-term, adverse impacts on wildlife. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

The St. Mary Valley is winter range for elk and other ungulates.

Rising Sun Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would have minor short-term, adverse impacts during implementation. If implemented during the current maintenance and operating season, this alternative would have no new effect on wildlife.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Removal of boat concession housing from the St. Mary Lake shoreline would result in the restoration of some lakeshore habitat, resulting in a negligible long-term, positive impact on wildlife.

  Stabilizing the bluff where historic guest cabins are located above Rose Creek would cause minor short-term, adverse impacts on wildlife due to construction. Constructing five new cabins with parking in Area I, as well as a new employee dormitory with parking and an outdoor recreation facility, would result in some increased loss in wildlife habitat; thus, the impacts would be minor to moderate and long-term.

  The short-term impacts of construction would be minor to moderate, depending on the construction schedule. Winter work would require the park to plow the Going-to-the-Sun Road so that construction crews could access the site at a time of year when this segment of the road is normally closed. The St. Mary Valley is winter range for elk and other ungulates. Increased human disturbance of wintering wildlife could result in displacement, greater energy expenditure, decreased productivity, and increased mortality. These impacts on ungulate populations would likewise impact carnivores that rely on these prey species (mountain lions, gray wolves, coyotes, grizzly bears, black bears, and wolverine). Maintenance of the road in winter would also increase the potential for poaching and illegal collection of wildlife.

  Extending the operating season of the visitor overnight accommodations, Coffee Shop and General Store/Motel/Dormitory five weeks (three weeks earlier and two weeks longer) would displace wildlife species from habitat within and adjacent to the developed area during the sensitive spring and fall seasons. Increased activity during the spring and fall could affect energy expenditure and productivity, and increase mortality. Overnight visitors may also impact other nearby areas since the duration and time of their stay would be different than for day users. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Constructing ten new cabins and associated parking, and two new employee dormitories including an outdoor recreation facility in Area I would result in loss of wildlife habitat, creating minor to moderate adverse impacts.

- **Conclusion.** Overall, alternative A would have a minor short-term, localized, adverse impact on wildlife. Overall impacts for alternative B would be minor to moderate long-term, localized, and adverse from construction and development. Extending the operating season for both alternatives

B and C would have minor negative, long-term impacts. Although alternative C would result in more development than would alternative B, overall adverse impacts from development under this alternative would also be minor to moderate long-term, and localized. There would be more habitat loss under alternative C than under alternative B.

There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Two Medicine Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would result in minor to negligible short-term, adverse impacts during implementation.

- **Alternative B.** Impacts described under alternative A also apply to this alternative. Under this alternative, several small ground-disturbing activities are proposed that would occur mainly in areas previously disturbed by human activities. As a result of the currently disturbed nature of the sites and existing adjacent development, long-term adverse impacts would be negligible to minor. Short-term adverse impacts associated with maintenance, repairs and construction would be negligible if work occurs in summer. If construction is scheduled during spring or fall, short-term impacts would be of moderate intensity (construction would not occur in winter at this site). Work scheduled in late fall or early spring would require the park to plow the Two Medicine Road so that construction crews could access the site at a time of year when this road is often closed. The Two Medicine Valley contains year-round range for bighorn sheep and other ungulates. Increased human-caused disturbance to wildlife in early spring could result in displacement, greater energy expenditure, decreased productivity, and increased mortality. Impacts on ungulate populations would likewise impact carnivores that rely on these prey species (mountain lions, gray wolves, coyotes, grizzly bears, black bears, and wolverine). Maintenance of the road in these seasons would also increase the potential for poaching and illegal collection of wildlife.

  Extending the operating season for the General Store four weeks (one week earlier and three weeks later) might displace some wildlife species adjacent to the store, but the effects would be negligible, negative and long-term.

- **Conclusion.** Overall, alternative A would have minor short-term, localized, adverse impacts on wildlife from repairs and improvements, and alternative B would have an overall minor long-term, localized, adverse impact on wildlife due to wildlife disturbance and displacement. Extending the operating season in alternative B would have negligible negative, long-term impacts.

  There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Many Glacier Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would have minor to negligible short-term, adverse impacts during implementation.

- **Alternative B.** Impacts described under alternative A also apply to this alternative.

  Very few ground-disturbing activities are proposed under this alternative, and those described would occur in a relatively small area previously disturbed by human activities. As a result of the currently disturbed nature of the site and adjacent development, long-term adverse impacts would be negligible. Plans to improve employee outdoor recreation opportunities would have minor to moderate long-term, adverse impacts depending on the size and location of the project site. Short-term adverse impacts would occur because of construction activities. Short-term adverse impacts associated with construction for all proposed actions would likely be negligible if work occurs in summer. If construction is scheduled during spring, fall, or winter, short-term impacts would be of minor to moderate intensity in spring/fall and moderate to major intensity in winter. Winter work could require the park to plow the Many Glacier Road so that construction crews could access the site at a time of year when this road is normally closed. The Many Glacier Valley contains year-round range for bighorn sheep and other ungulates. Increased human-caused disturbance to wildlife in early spring could result in displacement, greater energy expenditure, decreased productivity, and increased mortality. Impacts on ungulate populations would likewise impact carnivores that rely on these prey species (mountain lions, gray wolves, coyotes, grizzly bears, black bears, and wolverine). Maintenance of the road in these seasons would also increase the likelihood of poaching and illegal collection of wildlife.

  Extending the operating dates of the Many Glacier Hotel and other accommodations two weeks (one week earlier and one week later) would affect wildlife by displacing species from habitat within and adjacent to the developed area during the sensitive spring and fall seasons. To open the hotel and related facilities, the staff is usually present in the valley five to six weeks prior to opening. Increased activity in the spring and fall could affect energy expenditure and productivity, and increase mortality. Overnight visitors might also affect wildlife in nearby areas since the duration and time of their stay would be different than for day users. The effects would be more pronounced because the operating seasons for both the Many Glacier and Swiftcurrent facilities would be extended, since they are in the same valley. The effects would be negative, minor and long-term.

- **Alternative C (Preferred).** Applicable impacts described for alternatives A and B, including extending the operating season, remain the same under this alternative with the following exceptions.

  Constructing a new dormitory, parking and outdoor recreational facility, and redesigning the existing parking lot in Area II would result in a moderate, long-term adverse impact on wildlife and wildlife habitat because they would be constructed within an important wildlife corridor.

- **Conclusion.** Overall, alternative A would have a minor long-term, localized, adverse impact on wildlife from disturbance and temporary displacement. Alternative B would result in an overall minor, long-term, localized, adverse impact. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts. Alternative C would have the greatest

overall adverse impact, with disturbances and loss of wildlife habitat resulting in impacts that would be minor to moderate long-term, and localized.

There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Swiftcurrent Developed Area

- **Alternative A – Status Quo/No Action.** Current conditions would be maintained under this alternative, and maintenance of existing visitor facilities would be ongoing. Improvements and repairs would have minor short-term, adverse impacts on wildlife during implementation.

- **Alternative B (Preferred).** Impacts described under alternative A also apply to this alternative.

  Obliterating a short segment of paved road would result in the eventual restoration of a small amount of forested habitat. This would have a negligible long-term impact on wildlife, given the small area affected and the proximity of adjacent development.

  Constructing new guest cabins and a new motel would have minor to moderate long-term, adverse impacts on wildlife because some forested habitat would be removed. Constructing new parking lots would likewise result in a minor loss of forested habitat. Most of the other proposed ground-disturbing activities would occur in a relatively small area that has been previously disturbed by human activities. As a result of the currently disturbed nature of the site and existing adjacent development, long-term impacts would be negligible. Short-term impacts would occur because of construction activities. For all proposed actions, these impacts would likely be negligible to minor if work occurs in summer. If construction is scheduled during spring, fall, or winter, short-term impacts would be of moderate intensity in spring/fall and moderate to major intensity in winter. Winter work would require the park to plow the Many Glacier Road so that construction crews could access the site at a time of year when this road is normally closed. The Many Glacier Valley contains year-round range for bighorn sheep and other ungulates. Increased human-caused disturbance to wildlife in early spring could result in displacement, greater energy expenditure, decreased productivity, and increased mortality. Impacts on ungulate populations would likewise impact carnivores that rely on these prey species (mountain lions, gray wolves, coyotes, grizzly bears, black bears, and wolverine). Maintaining access into these areas during these seasons would also increase the likelihood of poaching and illegal collection of wildlife.

  Extending the operating dates of the visitor accommodations and Restaurant/Store three weeks (two weeks earlier and one week later) would displace wildlife species from habitat within and adjacent to the developed area during the sensitive spring and fall seasons. To open the motel and related facilities, the staff is usually present in the valley 5-6 weeks prior to opening. Increased activity during this time could affect energy expenditure and productivity, and increase mortality. Overnight visitors might affect wildlife in other nearby areas since the duration and time of their stay would be different than for day users. The effects would be more pronounced by extending operation dates of both the Many Glacier and Swiftcurrent facilities, since they are in the same valley. The effects would be negative, minor and long-term.

- **Alternative C.** Impacts for this alternative would be the same as described under alternative B.

- **Conclusion.** Overall, alternative A would have minor to negligible sort-term, localized, adverse impacts on wildlife from repairs and improvements. Alternatives B and C would result in roughly the same amount of impact on wildlife. Both alternatives would have an overall minor to moderate long-term, localized, adverse impact on wildlife habitat due to habitat loss and wildlife displacement. Extending the operating season for both alternatives B and C would have minor negative, long-term impacts.

  There would be no significant adverse impacts on wildlife whose conservation is 1) necessary to fulfill specific purposes identified in the establishing legislation of Glacier National Park; 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 General Management Plan (NPS 1999) or other relevant National Park Service planning documents. Consequently, there would be no impairment of wildlife as a result of the implementation of any of the alternatives.

Cumulative Impacts

During the history of Glacier National Park, development to accommodate visitors and steady growth in park visitation have affected wildlife through loss of habitat and disturbance from increased human presence. Impacts on wildlife extend beyond physical boundaries because some species are less likely to use habitats near heavily used areas such as roads, trails, campgrounds and other developments.

In areas throughout and adjacent to the park, past actions such as development have affected wildlife. Present ongoing services within the park disturb wildlife habitat in developed areas, along roads and trails, and near lakes and rivers, contributing to habitat displacement. Reasonably foreseeable projects outside the park such as constructing additional employee housing, improving roads and bridges, and U.S. Forest Service timber salvaging and trail construction would have localized adverse impacts. Future development projects inside the park, including the Going-to-the-Sun Road rehabilitation project that could include the loss of habitat in areas with little or no existing disturbance, would have moderate site-specific, adverse impacts. The combined impact of all actions both inside and outside the park, and any of the alternatives would have an overall minor to moderate long-term, regional, adverse cumulative impact on wildlife.

THREATENED AND ENDANGERED / STATE LISTED SENSITIVE SPECIES

USNPS Photo

Wildlife

Methodology

Methodology for threatened and endangered species, and state listed sensitive species was consistent with the methodology described previously for wildlife, including aquatic species.

Thresholds of impact are defined in Table 4.1.

- *Negligible*: The alternative would affect an individual of a listed species or its critical habitat, but the change would be so small that it would not be of