

# **SUMMARY**

## **INTRODUCTION**

On November 2, 2007, the Kawishiwi Ranger District of the Superior National Forest filed a Notice of Intent to prepare the Glacier Project Environmental Impact Statement (Federal Register: Vol. 72, No. 212, pp 62205 - 62206). The proposed management activities within the Glacier Project Area include vegetation management activities to create young forest and improve stand conditions through timber harvest, removal of unwanted vegetation, planting desired species, and prescribed burning. Additional actions include managing the road system and gravel pits, improving watersheds, maintaining wildlife habitat, and developing recreational opportunities.

The Draft Environmental Impact Statement (EIS) was prepared by an interdisciplinary planning team of resource specialists to inform the decision-maker (the Kawishiwi District Ranger) and the public about the various levels of management activities, called alternatives, which could be implemented within the project area. Three alternatives were considered in detail and 11 alternatives were considered but not analyzed in detail. The draft EIS disclosed the direct, indirect, and cumulative environmental effects, as well as any irreversible or irretrievable commitment of resources, which would result from implementing each alternative.

The public and other government agencies were invited to provide comments on the alternatives and analyses included in the draft EIS. Twenty-five individuals and organizations submitted comments during the 45-day comment period. Because of comments received on the Draft EIS, the district ranger directed the planning team to make some modifications to Alternative 2 and to develop a fourth alternative that would be analyzed in detail. The development of a new alternative warranted the Supplement to the Draft EIS and a 45-day comment period so interested publics and other government agencies have time to review the supplement and submit comments. Twenty-three groups and individuals submitted comments on the Supplement. Comments received on the draft and the supplement EIS were used to develop this final EIS. The comments are addressed and included with the Record of Decision. The decision will be based on the final EIS and will be documented in the Record of Decision.

## **SUMMARY OF CHAPTER 1**

### **PURPOSE AND NEED**

The purpose and need for a project is arrived at by examining the differences between the existing condition and the desired condition. The desired condition is determined using guidance from the Forest Plan, federal and state laws and regulations, and from the issues and concerns expressed by the public through the scoping process.

The purpose of the Glacier Project is to maintain and promote native vegetation communities that are diverse, productive, healthy, and resilient by moving the vegetation component toward landscape ecosystem objectives described in the 2004 Superior National Forest Land and Resource Management Plan (Forest Plan p. 2-23, O-VG-1). There is a need to manage the amount, distribution and characteristics of vegetation so that it is more representative of the historical range of natural variability. (Forest Plan, D-VG-3, page 2-22) The associated transportation system (including gravel pits) needed for long-term vegetation management in the project area is also addressed.

While developing the proposed action, the interdisciplinary team collaborated with and reviewed data from the State of Minnesota, Lake and St. Louis Counties, and tribal representatives. The primary reasons for collaboration were to try to design similar forest management activities that would occur across ownership boundaries. The interdisciplinary team also proposed road management activities that would meet the multiple needs of land owners and forest visitors.

### **A. Purpose and Need for Managing Vegetation**

The interdisciplinary team of resource specialists identified a need to move the project area's vegetation towards the Forest Plan's desired conditions for soil, wildlife habitat, scenery, fuels reduction, and aquatic habitat enhancement. This section provides a brief description of these resources along with vegetation management opportunities in the Glacier Project Area. The interdisciplinary team of resource specialists integrated the opportunities to develop a proposed action that contributes to the overall need to manage vegetation.

The current vegetation component in the Glacier Project Area does not meet the Forest Plan desired conditions for species composition, age class, tree species diversity, and management indicator habitats for landscape ecosystems. The differences between the existing and desired conditions were used to develop the purpose and need for this Project. The interdisciplinary team of resource specialists addressed the following opportunities while developing the proposed action.

In particular, this project would:

- Maintain existing patches of mature forest greater than 300 acres that would not lose interior forest qualities during the next ten years.
- Create one 300-plus-acre patch of young of forest by harvesting a mature patch that does not maintain interior forest characteristics in ten years.
- Reduce fragmentation by proposing regeneration harvests adjacent to existing young stands, including those proposed to be harvested on other ownership.
- Maintain and improve habitat needed for threatened, endangered, and sensitive species. The project would defer management action in some stands to maintain habitat for some species such as boreal owl, goshawk, and rare plants. And proposes management action in other areas to create or enhance habitat, such as riparian management and planting of white pine for future bald eagle nesting habitat, enhancing wolf and lynx habitat by limiting new roads open for public use and creating young forest for prey species such as deer and snowshoe hare.

- Maintain nesting and foraging habitat within the known goshawk territory.
- Create and maintain conifer habitat for three-toed woodpecker and olive-sided flycatcher.
- Maintain stands that currently provide thermal cover, and increases the amount of conifer in other stands in the Garden Lake Deer Yard.

## **PROPOSED ACTION**

The interdisciplinary team developed a proposed action that was included in the Glacier Project Scoping Report. This proposed action follows the Forest Plan objectives for landscape ecosystem and management area goals and objectives and incorporates the Forest Plan standards and guidelines. Forest Plan direction provides a framework with which to manage vegetation by considering multiple-use and other resource desired conditions. In developing the original proposed action for the Scoping Report, the team considered the existing condition for age class, species composition, and Management Indicator Habitats in each of the landscape ecosystems, both in the project area and across the forest. This forest-wide vegetation information showed there was an opportunity to create conditions that would move the vegetation towards the desired conditions outlined in the Forest Plan. The Team identified possible management actions that would move the area towards the desired conditions. In addition, the team considered Forest Plan direction for other resources in developing the proposed action, such as protecting and, where appropriate, enhancing wildlife habitat, watershed health, soil resources, scenic integrity, riparian habitat, and heritage resources.

Proposed activities include:

- Creating young forest with regeneration harvests
- Improving stand structure and within-stand diversity with intermediate harvests
- Restoring stand conditions without harvest, such as:
  - Planting long-lived tree species to enhance scenery and aquatic habitat
  - Conducting prescribed burns to reduce the future risk of wildfire

Managing the minimum road system needed for long-term vegetation management

## **SIGNIFICANT ISSUES**

An issue is a point of debate, dispute, or disagreement with the anticipated effects of a proposed action. Significant issues are those that are used to develop alternative methods of meeting the project's purpose and need. The following are the significant issues and indicators the district ranger decided will be used to develop alternatives for this project. These significant issues are based on the

comments the public submitted on the Glacier Project Scoping Report Proposed Action. The indicators that will be used to disclose the effects of each significant issue are also included. Additional information on each of these issues can be found in Chapter 3.

### **Vegetation management adjacent to the BWCAW**

The public raised a concern that vegetation management and associated roads would negatively affect wilderness qualities, the visitor's experience, and the ecological integrity of the BWCAW.

### **Lynx**

The public expressed concern that harvest and associated road activities have the potential to affect lynx and lynx habitat. In particular, the Glacier Project would create unsuitable habitat and would fragment the connectivity between suitable lynx habitat in the BWCAW, which is considered a lynx refugia. In addition, the new roads and new winter trails would result in compacted travel surfaces, and could result in illegal use of closed roads and increased competition

### **Non-Native Invasive Species**

The public expressed a concern that harvest and related road activities have the potential to increase the risk and the spread of non-native invasive species, in particular, into the BWCAW and on some rock outcrop sites.

### **Forest Plan Inventoried Roadless Areas**

Harvest and associated road activities have the potential to impact Forest Plan inventoried Roadless areas, which could adversely impact the Roadless characteristics of the areas.

### **Amount of young forest and mature and over-mature forest**

Disagreement exists over the amount of harvest that is proposed and how much should be included at this time to meet Forest Plan decade one objectives. Some commenters expressed a concern that the Forest Service should increase the amount of young forest and decrease the amount of mature and over-mature forest in order to more quickly move the vegetation toward the first decade Forest Plan landscape ecosystem objectives and to provide wood products and support local economies. There is also a concern that if the over-mature aspen and jack pine are not harvested now these forest communities may be lost to mortality and would convert to less desirable forest types.

## **SUMMARY OF CHAPTER 2**

### **ALTERNATIVES CONSIDERED IN DETAIL**

This section describes the No Action Alternative and the two action alternatives to be analyzed in detail in the EIS. Each alternative description provides a brief summary of the management emphasis for the alternative and a more detailed description of the activities that would be implemented under the alternative.

**Alternative 1 (No-Action Alternative)**

Alternative 1 would result in no timber management, planting, fuel reductions, or road projects in the Project Area at this time. No changes would occur in roads that are open or closed. Gravel pit use would continue on a case-by-case basis. New requests for access across federal land from private landowners would not be granted at this time, although they may be analyzed separately in the future. Alternative 1 is the baseline for comparison of the action alternatives.

**Alternative 2, Modified Proposed Action**

The modified proposed action was developed based on the proposed action that was included in the Scoping Report and incorporates comments from the public and additional field information. The modified proposed action would implement the Forest Plan, including moving the vegetation conditions towards the desired landscape ecosystem objectives for age class, species composition and management indicator habitats and follows all of the standards and guidelines. See Alternative 2, Map 1 and 2 for locations of activities included in this alternative.

**Alternative 3**

Alternative 3 was developed to address the significant issues raised by the public during the scoping comment period. The responsible official directed the interdisciplinary team to develop an alternative that would not harvest or build roads directly adjacent to the BWCAW and would not harvest in an area perceived to be at higher risk from non-native invasive species. Therefore, harvest units in these areas were dropped. The team also identified an opportunity to harvest other units that were included in the Scoping Report Proposed Action and are not adjacent to the BWCAW. These units are included in Alternative 3 because they offer an opportunity to meet objectives for increasing the amount of jack pine in the project area. See Alternative 3, Maps 3 and 4 for locations of activities included in this alternative.

**Alternative 4**

Alternative 4 was developed to address a significant issue raised during the 45-day comment period on the draft EIS. A concern was raised about the 5,500 acres that were dropped between the Scoping Report and the draft EIS. The comments expressed a concern that this project was missing an opportunity to move the project area towards the landscape ecosystem (LE) objectives more quickly, by creating additional young forest. The LE objectives show there is a forest-wide need to increase young forest and decrease the amount of mature and over-mature forest. Based on those comments and the discovery of an error in the data we used to conduct the effects analyses in the draft EIS, the district ranger concluded that it was reasonable to consider additional vegetation management.

## SUMMARY OF CHAPTER 3

### ENVIRONMENTAL CONSEQUENCES

The following section includes the summary of the effects the project would have on each of the relevant resources.

#### **3.3 Summary of Effects to the Boundary Waters Canoe Area Wilderness**

Alternative 1, the no action alternative, would not generate additional noise impacts because there would be no vegetation management activities with this alternative. Alternatives 4 and 2 would result in more harvest noise that could be heard in the BWCAW than would Alternative 3. Most of the harvest noise would occur during the winter when recreation use is low. The amount of noise would be small in scope, often not noticeable above ambient noises present at a given wilderness location within hearing distance of harvest activity, although at some locations it would likely be discernible as noise generated by mechanized equipment.

#### **3.4 Summary of Effects to Canada Lynx**

Maintaining or improving habitat for the lynx was one of the drivers in the development of the Glacier Project and its proposed action. Alternative 3 was developed in an effort to further address the concerns raised by the public in regards to lynx.

The Biological Assessment found that all alternatives may affect the lynx to varying degrees however; these effects would be either insignificant related to the size of the impact or extremely unlikely to occur (no adverse effects). All action alternatives would maintain adequate amounts of habitat for important prey species, and lynx denning habitat. Alternative 4 would result in the greatest change to lynx habitat and Alternative 3 the least. Although the amount of unsuitable habitat would increase with the action alternatives, the amount would remain below accepted thresholds; therefore, the lynx would not be adversely impacted. As a result of the tens of thousands of acres not harvested with this project, adequate amounts of habitat for lynx movement throughout the area (connectivity), and between the project area and refugia habitat in the BWCAW would be maintained with all alternatives. The impact of road related activities from this project would be minimal. This is because few roads would be added to the system and few would be decommissioned. Also, all temporary roads would be closed to public use and would be decommissioned upon completion of work. This project would not adversely impact proposed critical habitat because the physical and biological features that are essential to the conservation of the species would be maintained with all alternatives.

#### **3.5 Summary of Effect to Non-Native Invasive Plants**

Alternative 4 poses the greatest risk of impacts resulting from the spread of invasive plants followed by Alternative 2, then 3, and then 1. Alternative 4 poses the greatest threat because there would be more ground disturbance associated with vegetation management and associated road use. The risk of spread would be minimized under all action alternatives through design criteria such as winter harvest, treating known locations of invasive plants prior to management activities, continuing to implement the Non-native Invasive Plant Management EA throughout the Superior National Forest, and

continuing to monitor past and proposed activities to ensure effectiveness of limiting the spread of invasive plants.

### **3.6 Summary of Effects to Forest Plan Inventoried Roadless Areas**

Alternative 1 does not propose any vegetation or road construction activities within the inventoried roadless areas considered in the 2004 Forest Plan FEIS. Alternative 1 would not have any direct or indirect effects to the criteria listed in Table 3.6-2 qualifying areas as inventoried roadless.

Alternative 2 includes 148 acres of even-aged harvest and 432 acres of non-harvest restoration activities in the Greenstone Lake West Inventoried Roadless Area. Eight percent of the Greenstone Lake West Inventoried Roadless Area would be managed with a clearcut with reserves harvest method. This amount of harvest is well below the inventory criteria of no more than 20 percent of an area harvested per decade. Therefore, the area would still meet that inventory criteria. The purpose of the clearcut harvest method is to create conditions suitable for converting part of the area to jack pine and encouraging the natural regeneration of white pine. No red or white pine would be harvested. Diversity planting of red and white pine would follow the harvest and non-harvest treatments. The non-harvest restoration activities (approximately 177 acres of under-burning with no mechanical removal of vegetation and 255 acres of under-burning after mechanical crushing and or removal of balsam fir and other fuel hazards) would help minimize the fuel concentrations. The 148 acres of proposed treatments would help address Forest Plan objectives for increasing the jack pine forest type and for increasing tree species diversity. This area would not be a large mature patch following these treatments.

Under Alternative 3, timber harvest would not occur, but mechanical crushing of hazardous fuels and burning would occur. The area would not be converted to jack pine, however, the underplanting of long-lived conifer would follow the underburn and this would address Forest Plan objectives for increasing the within stand species diversity. The area would remain part of a large mature patch.

Alternative 4 is the same as Alternative 2.

Alternatives 2, 3, and 4 would also conduct non-harvest restoration activities in the Greenstone Lake East Inventoried Roadless Area. This is approximately 3 percent of the total area. The purpose of the proposed treatment is to restore long-lived species within the riparian area around Kamimela Lake.

Management activities are not proposed in the South Kawishiwi River or Wood Lake roadless areas.

### **3.7 Summary of Effects to Regional Forester Sensitive Species (RFSS) and Management Indicator Species (MIS)**

The following briefly summarizes the effects determinations for each group of species. The Glacier Project Biological Evaluation provides a more detailed summary of the analysis including information on the basis for the effects determination for each species. See Appendix F for the Biological Evaluation.

#### **Determination of Direct, Indirect, and Cumulative Effects**

Determinations of effect was based on analysis of direct, indirect, and past, present, and reasonably foreseeable future cumulative effects of the Glacier Project with consideration of and tiering to the analysis of effects of overall Forest Plan implementation that was conducted at the programmatic level

in the Forest Plan Final EIS (Section 3.3.5) and Forest Plan Biological Evaluation (USDA Forest Service 2004a, Forest Plan record #20725)

### **Terrestrial Wildlife**

Alternative 1 may impact individuals of olive-sided flycatcher, three-toed woodpecker and tiger beetle but is not likely to result in a trend toward federal listing or a loss of viability. No impacts to all other terrestrial species are expected.

Alternatives 2, 3 and 4 may impact individuals of heather vole, gray wolf, northern goshawk, boreal owl, olive-sided flycatcher, black-throated blue warbler, bay-breasted warbler, bald eagle, Connecticut warbler, three-toed warbler, great gray owl, tiger beetle, mancinus alpine butterfly, Nabokov's blue butterfly, jutta arctic butterfly, and Freija's grizzled skipper, but are not likely to result in a trend towards federal listing or a loss of viability. No impacts to all other terrestrial species are expected.

### **Vascular Plants, Lichens, and Bryophytes**

Alternative 1 would have no direct, indirect, or cumulative effects to alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, northern bur-reed, awlwort, lance-leaved violet, *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, *Pseudocyphellaria crocata*, *Frullania selwyniana*, western Jacob's ladder, New England sedge, Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venosa*.

The proposed activities in Alternatives 1 (due to succession), 2, 3 and 4 may impact individuals of pointed moonwort, common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort but are not likely to cause a trend to federal listing or loss of viability.

The proposed activities in Alternatives 2, 3 and 4 may impact individuals of alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, northern bur-reed, awlwort, lance-leaved violet, *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, *Pseudocyphellaria crocata*, *Frullania selwyniana*, western Jacob's ladder, Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venos* but are not likely to cause a trend to federal listing or loss of viability.

### **Aquatic Wildlife**

Alternative 1 would have no direct, indirect, or cumulative effects to northern brook lamprey, creek heelsplitter, black sandshell mussels, and Quebec emerald dragonfly. Due to the potential habitat in the area and the presence of some vegetation management activities in the project area, all action alternatives may impact (direct, indirect or cumulative effects) individuals of northern brook lamprey,

black sandshell and creek heelsplitter mussels and Quebec emerald dragonfly, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

### **3.8 Summary of Effects to Management Indicator Habitats**

Providing for the desired quality and quantity of management indicator habitats (MIH) is one of the objectives of the Forest Plan. The current composition and spatial arrangement of MIH forest-wide does not meet Forest Plan objectives for indicator habitats. The interdisciplinary team considered this imbalance in the development of the Glacier Project and its alternatives.

Under Alternative 1, changes in vegetation would occur through forest succession, and there would be changes to management indicator habitats. This would result in positive effects on some species and negative effects on others. In particular, there would be less young jack pine and aspen and this would negatively affect species that utilize young upland forest: deer and moose (foraging), ruffed grouse, woodcock, gray wolf, lynx (foraging), and various songbirds. The existing young forest would grow out of the young age class and no additional young forest would be created. This alternative would favor species which utilize mature and older forest such as spruce grouse, goshawk, pine marten and pileated woodpeckers. There would be no increase in the acres of jack pine and this species would continue to be under-represented on the landscape and would negatively affect species who utilize jack pine forest such as Nabokov's blue butterfly, tiger beetle, spruce grouse, three-toed woodpecker and Connecticut warbler.

The amount of management-induced edge would decrease slightly, interior forest would increase slightly, and the acres and number of mature upland forest patches would increase. The effect of this would be more habitat for wildlife species such as black-throated blue warbler, goshawk, boreal owl, three-toed woodpecker, and Connecticut warbler. However, large mature upland forest patches are currently well-represented and distributed in the area. Thus, the beneficial impacts of this alternative to species that need this type of spatial arrangement of habitat would be minimal.

Young forest patches would become rare on federal lands and patch sizes would remain small. This reduction in, and poor distribution of, young forest patches would have minor negative effects on species that use edge, including most game species.

The project was designed to move the vegetation toward desired conditions identified by the Forest Plan. Alternatives 2, 3 and 4 show the vegetation trending toward desired conditions. All three action alternatives would benefit species needing young forest and would have some negative effect on species needing mature forest habitat. However, the decrease in the amount of mature forest does not exceed what is needed to maintain adequate habitat for species needing mature forest.

Alternative 4 would create the largest increase in young forest, thus contributing more toward Forest Plan objectives and would most benefit species that need young forest. Alternative 4 also restores more acres from aspen/birch to jack pine than Alternatives 2 and 3, contributing more to jack pine objectives and favoring species that use this habitat type. All action alternatives would slightly increase red and white pine in the project area.

All action alternatives would decrease upland edge density and would slightly reduce interior forest habitat. A reduction in edge density could have negative impacts on those species that use edge, including most game species. However, all action alternatives would create considerable amounts of

young forest and edge habitat so negative impacts to these species would likely be minimal. The decrease in interior habitat would be minor because the decrease would be small.

### **3.9 Summary of Effects to Vegetation**

Alternative 1 would not result in new management of the vegetation. Natural processes would continue and would not move the forest towards landscape ecosystem (LE) objectives for young forest or for increasing jack pine or white pine. However, this alternative would move the forest towards the LE objectives for increasing spruce-fir and decreasing aspen through natural succession of forest ecosystems.

Alternative 2 would move the forest toward meeting LE objectives for species composition, age class distribution, and for tree species diversity within individual stands. Within the Jack Pine/Black Spruce LE this alternative would provide more jack pine and white pine than Alternative 3, and the least amount of spruce-fir than in Alternative 3. However, this alternative provides less jack pine in the Dry-Mesic Red and White Pine LE. These regeneration harvests with the associated reforestation actions provide more opportunities for increasing the age class and diversity of species composition in this corridor.

Alternative 3 was developed to address the significant issues raised during the scoping report comment period. Alternative 3 would conduct less harvest adjacent to the Boundary Waters Canoe Area Wilderness and would not harvest in areas perceived to be at higher risk from non-native invasive species. Within the Jack Pine/Black Spruce LE this alternative would provide less young forest and fewer jack pine acres, and more spruce-fir than Alternative 2. However, this alternative provides more jack pine, and fewer aspen and spruce-fir acres in the Dry-Mesic Red and White Pine LE. This alternative would impact the fewest acres of vegetation adjacent to the wilderness boundary. This alternative would also provide the fewest opportunities for diversifying this corridor.

Alternative 4 was developed to address a significant issue raised during the 45-day comment period on the Draft EIS. Alternative 4 would treat the most acres and would move the condition of the vegetation toward the desired Landscape ecosystems for age class and species composition more quickly than Alternatives 2 or 3. Just like in alternative 2, within the Jack Pine/Black Spruce LE this alternative would provide more jack pine and white pine than Alternative 3, and the least amount of spruce-fir than Alternative 3. However, this alternative provides for the most jack pine in the Dry-Mesic Red and White Pine LE (approximately 600 acres more). This alternative harvests 100 acres more vegetation adjacent to the wilderness boundary than the other two action alternatives (regeneration harvests). These regeneration harvests with the associated reforestation actions address more opportunities for increasing the age class and diversity of species composition in this corridor.

### **3.10 Summary of Effects to Recreation**

Alternative 1 would not have any impacts on the recreation resource. Alternatives 2, 3 and 4 would result in short-term impacts, such as seeing and hearing machinery adjacent to recreation sites and dual use of trails by harvest machinery and recreation visitors. Operational standards and guidelines would be followed to mitigate impacts to recreation sites. The project area is characterized by a wide array of human activity occurring in a forested setting including the sights and sounds of vehicles, people recreating, timber harvest operations, motorboat use, and construction and development. Any

additional impacts from the Glacier Project would be minimal and of short duration, and would not result in impacts that are different from those already occurring in the area.

### **3.11 Summary of effects to Soil**

Implementation of Alternative 1 (no-action) would result in no vegetation management activities and therefore would not result in impacts to the soil. Alternatives 2, 3 and 4 would result in vegetation management activities that could lead to impacts to the soil; however, these impacts would be minimal because Forest Plan standards and guidelines would be followed.

### **3.12 Summary of Effects to Scenic Quality**

Implementation of Alternative 1 (no action) proposes no new management activities in the Glacier Project Area and therefore does not have any short-term impact on the existing condition of the scenery resource within High SIO areas. However, Alternative 1 would not proactively move the forest toward the long-term Forest Plan desired conditions for the scenery resource.

Alternatives 2, 3, and 4 propose treatments in the High SIO areas that would enhance scenery in the short-term (non-harvest release and underplanting) as well as long-term (even-aged treatments with conifer conversion or diversity planting). Alternative 4 has more acres proposed for conversion to conifer species, underplanting and/or releasing conifer species outside harvest areas, and even aged management with and without diversity planting. Alternatives 2 and 3 include the same number acres of release and underplanting outside proposed harvest areas. Alternative 3 includes slightly more acres (about fifty-five) proposed for conversion to conifer than in Alternative 2. Alternative 4 would have more short-term and slightly more long-term beneficial effects to scenery because more acres are proposed in Alternatives 2 and 3.

The cumulative effects of past, present, and reasonably foreseeable future projects represent minimal change in impacts to the scenery resource.

### **3.13 Summary of Effects to Heritage Resources**

The alternatives would not differ from each other in effects to heritage resources. None of the alternatives would result in adverse effects on known historic properties.

### **3.14 Summary of Effects to Water Quality**

All action alternatives have the potential to directly benefit water quality and watershed health within the Analysis Area through stream crossing improvements on existing crossings. There are no new stream crossings proposed within 1 mile of the BWCAW boundary and thus no potential negative effects would occur in the BWCAW related to new stream crossings. The one new stream crossing would follow Forest Plan direction for providing stream simulation through the crossing as well as aquatic organism passage. The three stream crossing improvements will provide benefits to aquatic organism passage and water quality by reducing the potential for passage barriers and impacts to aquatic habitat.

There may be some direct or indirect negative effects to water quality and watershed health in the Analysis Area including potential effects to downstream areas and stream reaches that occur within the BWCAW as a result of implementing any of the action alternatives. Potential short term negative effects associated with new temporary roads and stream crossings including point source erosion, run

off, and stream flow and flood plain manipulation are expected to be minimal, especially in stream reaches and downstream areas that are not immediately adjacent to or near proposed temporary road and stream crossing sites. These effects are expected to be minimal because all operational standards and guidelines would be followed during project implementation. Alternative 4 requires the most temporary roads followed by Alternative 2 and then 3.

Estimated positive direct effects to aquatic resources include the management of riparian areas for extended rotation, long-lived conifer species, and/or increased basal area. Direct and indirect effects from planting and harvesting in these areas include providing shade and cover for aquatic organisms and increasing in-stream habitat complexity with future large woody debris recruitment. Vegetation management activities in individual watersheds do not result in reaching the sixty percent threshold for open and young forest and therefore would not adversely impact watershed health either inside or outside the BWCAW. The largest increase in open and young forest occurs in the South Kawishiwi River (Upper) watershed; from an existing seven percent to a proposed 17 percent open and young forest. The largest open and young percentage of any watershed analyzed is 38 percent (Madden Creek).

### **3.15 Summary of Fire Risk and Fuels**

All of the action alternatives would reduce large wildland fire risk and maintain a higher level of safety for life and property than the no action alternative. Alternative 4 reduces wildland fire risk the most and would treat 1,146 acres more than Alternative 2 and 6,131 more acres than Alternative 3. Alternative 1 would not treat any acres and therefore would not reduce wildland fire risk or the amount of fuel.

### **3.16 Summary of Effects to Transportation System**

The purpose of this section is to provide additional information on the proposed changes to the transportation system in the Glacier Project, including system roads and trails, temporary roads, and stream crossings. Most of the proposed treatment units can be accessed via existing system roads or temporary roads. Therefore, in the Glacier Project, there is a minimal need for new roads to be added to the system. Alternative 1 would not add any additional roads to the system and Alternatives 2, 3, and 4 would add 0.8 miles of new road and 0.6 miles of existing road to the managed road system. The 0.8 miles of new road and 0.2 miles of existing road would not be open for public use. The remaining 0.4 miles of existing road would remain open to public use.

### **3.17 Summary of Effects to Gravel Pits**

Implementation of Alternative 1 (no action) would result in no additional vegetation management activities and associated road building. Gravel would still be in demand across the project area for maintenance of the current transportation system and other Forest Service facilities such as campgrounds and parking lots. Maintenance and construction of roads for other governmental agencies would also likely call for use of existing sources. Gravel would also be needed for site development and maintenance and construction of roads within private parcels of land. None of the gravel pits included in this analysis would be available to meet the need for gravel resources.

Implementation of Alternatives 2, 3 or 4 (action alternatives) would result in vegetation management activities that could require the use of gravel for the associated management of the transportation

system. The five gravel pits included in this analysis would be available to meet the needs of this project and the need for gravel for other public and private developments. The difference in the amount of material that would be extracted between the action alternatives would be minimal if any.

Implementation of Alternatives 2, 3 or 4 would also result in the reclamation of the Fall Lake Gravel Pit. This pit is located near the Fall Lake Campground and the Stub Lake Hiking Trail passes through it. Rehabilitation would enhance visual quality for the trail and potentially improve floral and faunal habitat within the pit area.

### **3.18 Summary of Economic Effects**

The economic effects resulting from each action alternative would be almost identical; the benefit/cost ratios resulting from each action alternatives span between 0.22 and 0.26. These ratios reflect high costs of plantings associated with the non-harvest restoration units proposed under each action alternative. Revenue figures do not include the benefits that are difficult to quantify, such as recreational opportunities, wildlife habitat, visual quality, and the value of old-growth. Because Alternative 1 (the no-action alternative) proposes that no management activities be implemented, there would be no resulting economic benefit or cost, except for the expenses of project development and documentation.

### **3.19 Summary of Effects to Air Quality**

Prescribed burning can affect air quality through the release of particulates and pollutant gases. Prescribed burning is a temporary source of air pollution. The effects of human interruption of the historical frequent, low-intensity fire regimes through systematic, organized fire suppression on all ownerships in the project area has led to an increase in the amounts of fuel, both living and dead, that are available to burn should a wildfire occur. Under Alternative 1, there would be no direct contribution of additional particulates, although the fuel buildup would continue and some areas would be at greater risk of wildfire and consequently could generate greater amounts of particulates. Alternatives 2 through 4 would contribute a minor amount of particulates through prescribed fire but not enough to adversely affect the overall air quality. In addition, there would be a reduction in the amount of fuel which could limit the amount of particulates when compared to wildfire.

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