Forest Management (Timber)

Timber sales are used to achieve vegetation management objectives, including providing a sustainable yield of forest products to meet the nation's demands for wood fiber and restoring, improving, and maintaining forest ecosystem health. Timber sales are often used as a least-cost method to manage vegetation for improving wildlife habitats, reduce fuels that may increase fire risk, recover value from natural disasters, combat insect and disease infestations, and improve tree growth.

Roads are generally required for timber harvest, although some timber sales can be harvested using helicopters or cable-yarding systems from existing roads. Each timber sale contract specifies the yarding method and any permanent or temporary road construction and reconstruction required. The timber industry pays the construction cost for all logging roads and, if requested by the Forest Service, for the cost of road obliteration or decommissioning after a timber harvest is completed. Timber purchasers are also required to complete needed road reconstruction to ensure public safety and to protect the environment from logging traffic. Roads that the Forest Service determines are needed for future use are constructed to meet road specification and retained for future use after the timber sale. Temporary roads are constructed only for the duration of the timber harvest and are intended to be eliminated after their use.

Each fiscal year, the Forest Service estimates the amount of timber to be offered for sale at a given budget level. A timber sale generally requires several years of preparation, beginning with identification of the need until final sale offering. All decisions that include timber sales must meet all legal requirements, including those mandated by the National Forest Management Act (16 U.S.C. 1600 *et seq.*) and NEPA.

Timber volumes offered for sale have decreased from annual volumes of approximately 12 billion board feet in 1987 to less than 4 billion board feet in 1998. The volume of timber harvested follows the trend of volume sold but generally lags one to two years behind the sale volume. Most of the timber harvested in a particular year is from timber sales that were sold in previous years. Usually 2 to 3 years is required from the time the timber is sold until all the timber is harvested. The volume harvested is based on inventory needs and market conditions. The estimated volume of timber offered for sale and timber sold was used to determine effects on jobs and revenue in the Economic and Social Effects section.

No Action Alternative

Under the no action alternative, approximately 2,101 miles of roads would be decommissioned annually (*see* Table 2). None of these roads would be needed to access timber sales under existing contracts. Road decommissioning is not expected to affect timber sales or harvesting.

Approximately 2,436 miles of classified roads used for forest management purposes would be reconstructed annually, with an estimated 31 miles of those roads located within inventoried roadless or other unroaded areas (*see* Table 3). Reconstruction of existing roads could improve roads used for this purpose.

Approximately 1,534 miles of classified and temporary roads would be constructed annually to facilitate timber harvesting on NFS lands (*see* Table 3). Of these, an estimated 213 miles would be in inventoried roadless or other unroaded areas. The Forest Service estimates that approximately 3.6 billion board feet of timber would be offered for sale annually on all NFS lands; of that, approximately 250 million board feet would be from timber in inventoried roadless or other unroaded areas.[5] In the long term, the Forest Service anticipates that a portion of the remaining 8 million acres of inventoried roadless areas that have been identified as suitable for timber harvesting could be harvested, but no updated volumes have been identified with these acres.

Old Growth. While data is unavailable regarding the amount of road activity in old growth forests that would occur under the no action alternative, it is assumed that some timber sales and harvesting would occur in those areas.

Special Forest Products. Special forest products include house logs, posts, poles, Christmas trees, mushrooms, beargrass, pinyon nuts, berries, and ferns. There is a continuing public demand for these products for cottage industries and personal use. Generally, roads are not constructed or reconstructed for the removal of special forest products. Current access is adequate to meet current demand for special forest products, and implementation of the no action alternative would not affect current access to these resources.

Proposed Action

As with the no action alternative, decommissioning of unneeded roads is not expected to affect timber sales or harvesting. Although a larger number of roads would be decommissioned under the proposed action than under the no action alternative, none of these roads would be needed to access timber sales under existing contracts.

Reconstruction of existing roads could improve roads used for this purpose. Approximately 32 fewer miles of roads would be reconstructed in inventoried roadless and other unroaded areas

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[5] In the *Interim Rule EA*, the Forest Service estimated that 5.44 billion board feet of timber would be offered for sale in a typical 18-month period. Annualized, this figure is 3.63 billion board feet of timber. The Forest Service also estimated that 375 million board feet of timber from inventoried roadless or other unroaded areas would be offered for sale over an 18-month period under the current program (Alternative 1); annualized, this figure is 250 million board feet of timber.

under the proposed action than under the no action alternative, although the Forest Service expects that on all NFS lands more roads will be reconstructed under the proposed action.

Under the proposed action, new road construction would be expected to be reduced, as compared to the no action alternative. Further, during the transition period, new road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights. Under the proposed action, approximately 1,313 miles of classified and temporary roads could be constructed for forest management purposes on all NFS lands, 221 fewer miles than under the current program (*see* Table 5). This would be an anticipated maximum decrease of approximately 14 percent.

Timber harvesting requiring construction of roads in inventoried roadless or other unroaded areas that was proposed during the transition period would require a showing that the harvesting was needed for a compelling reason such as to reduce fire risk, combat insect or disease infestation, or improve wildlife habitat or tree growth. Although timber sales and timber harvesting could still occur in these areas using alternative harvesting methods, the amount of timber sold would be expected to decrease by up to a maximum of 351 million board feet annually (a 10 percent decrease)[4] and the cost of harvesting would be expected to increase. Overall, access to approximately 8 million acres of inventoried roadless areas that have been identified as suitable for timber harvesting could be reduced substantially.

A reduction in National Forest timber volume available could be offset by increases in Canadian imports and private land harvesting. In the eastern United States, there would be ample opportunity to substitute timber from other lands to replace most of the reduction in National Forest timber sales. In the west, substitution opportunity is limited, and any volume that could not be substituted from other lands could probably be met by Canadian imports. Specifically, non-national forest substitution factors range from 0 percent in Regions 3 (Southwestern), 5 Pacific Southwest), 6 (Pacific Northwest), and 10 (Alaska) to 90 percent in Regions 8 (Southern) and 9 (Eastern).

Although U.S. demand for timber could be met by timber harvesting on other U.S. (Federal or non-Federal) or Canadian lands, the environmental impacts of timber harvesting would not be reduced but rather would be moved to those other lands. The economic benefits of timber harvesting, including jobs, would also be moved to the communities near to those other lands, either in the United States or in Canada.

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[4] *See* the Cost-Benefit Analysis in Appendix E.

Old Growth. To the extent that old growth forests are located within inventoried roadless and other unroaded areas, the proposed action would provide additional protection from road construction and timber harvesting as compared to the no action alternative.

Special Forest Products. A decrease in the number of roads, due to either increased decommissioning or decreased road construction, could reduce existing and future opportunities to access special forest products.

Land Uses (non-recreational)

Non-recreational land use refers to use of NFS land for communication sites, public and private roads, and energy-related transmission rights-of-way (*i.e.*, linear special uses such as pipelines and electric transmission lines). More than 47,000 active, non-recreational special use authorizations exist on NFS lands. These authorizations involve nearly 150 different types of uses on 26 million acres of land (almost 14 percent of NFS lands) and result in $7 million in fees to the U.S. Treasury. The Forest Service estimates that 8,000 applications for new non-recreational special use permits or renewals of existing permits will be filed in 1998 and 1999.

No Action Alternative

Under the no action alternative, approximately 2,101 miles of roads would be decommissioned annually by the Forest Service, permitees, or others (*see* Table 2). None of these roads would be needed to access existing special forest uses such as private access, transportation or utility corridors, rights-of-way, and easements. Road decommissioning is not expected to affect existing non-recreational land uses.

Approximately 225 miles of classified roads used to facilitate non-recreational uses of NFS lands would be reconstructed annually, with an estimated 5 miles of roads located within inventoried roadless or other unroaded areas (*see* Table 3). Reconstruction of existing roads could improve roads used for this purpose.

Approximately 107 miles of classified and temporary roads would be constructed annually to facilitate special land uses on National Forests (*see* Table 3). Of these, an estimated 24 miles would be in inventoried roadless or other unroaded areas.

Proposed Action

As with the no action alternative, decommissioning of unneeded roads is not expected to affect non-recreational land uses on NFS lands. Although a greater number of roads could be decommissioned under the proposed action than under the no action alternative, only unneeded

roads would be decommissioned, and none would be needed to accommodate existing private access, transportation or utility corridors, rights-of-way, and easements.

Reconstruction of existing roads could improve roads involved in special land uses. There would be little difference in the miles of roads reconstructed under the proposed action and under the no action alternative (*see* Table 5).

Under the proposed action, new road construction could be reduced as compared to the no action alternative. During the transition to the proposed road management policy, new road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights.

In particular, while new roads could be constructed in inventoried roadless and other unroaded areas to allow access to private property (including rights-of-way under the Alaska National Interest Lands Conservation Act), new roads to facilitate new communications sites, transmission lines, pipelines, or other commercial enterprises might not be approved for construction in inventoried roadless or other unroaded areas during the transition period. Approximately 105 miles of roads would be expected to be constructed for non-recreational land uses on all NFS lands under the proposed action, 2 fewer miles than under the no action alternative. Possible long-term effects to land uses caused by the elimination of road construction and reconstruction in roadless and unroaded areas are being addressed under the proposed Roadless Area Protection Rule.

Options for implementation of the proposed action include requiring a showing of compelling circumstances only in inventoried roadless areas or in both inventoried roadless and other unroaded areas. If the latter option were selected, the fewest number of additional road miles would be constructed.

Law Enforcement

Roads provide access for law enforcement patrols to control criminal activity. The proposed action would not impact law enforcement activities. Road construction and reconstruction needed for the immediate protection of public safety would be conducted under both the no action alternative and the proposed action.

Minerals

The Forest Service must permit reasonable access to privately owned minerals located on Forest Service administered land, access to explore or file claims in accordance with the mining laws, and access to existing mining claims, leases, licenses, permits, and contracts on NFS lands. As with the timber industry, the minerals industry pays the construction cost for all mineral activity and, if required by the Forest Service, for the cost of road obliteration or decommissioning after energy and mineral exploration or development is completed.

No Action Alternative

Under the no action alternative, an estimated 2,101 miles of roads would be decommissioned annually (*see* Table 2). Because only unnecessary roads would be decommissioned, none of these roads would be needed to access privately owned minerals under NFS lands, to explore or file claims in accordance with the mining laws, or to access existing mining claims, leases, licenses, permits, or contracts. Road decommissioning is not expected to affect existing mineral exploration or development and would not have an economic impact on the mineral industry since reasonable access would continue.

Approximately 61 miles of classified roads used to facilitate mining on NFS lands would be reconstructed annually, 7 miles of roads located within inventoried roadless or other unroaded areas (*see* Table 3). Reconstruction of existing roads could improve roads used for minerals exploration and development.

Approximately 109 miles of classified and temporary roads would be constructed annually to facilitate mining on National Forests (*see* Table 3). Of these, an estimated 31 miles would be in inventoried roadless or other unroaded areas.

Proposed Action

As with the no action alternative, decommissioning of unneeded roads is not expected to affect mining on NFS lands. Although a larger number of roads could be decommissioned under the proposed action than under the no action alternative, only unnecessary roads would be decommissioned, and none of these roads would be needed to accommodate mining claims, leases, licenses, permits, or contracts.

Reconstruction of existing roads could improve roads used for mining. Slightly fewer miles of roads would be reconstructed in inventoried roadless and other unroaded areas under the proposed action than under the no action alternative (*see* Table 5), although the Forest Service expects that on all NFS lands more road reconstruction will occur under the proposed action than under the no action alternative.

Under the proposed action, new road construction could be reduced as compared to the no action alternative. During the transition to a science-based roads analysis, new road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights. Approximately 102 miles of roads could be expected to be constructed for mineral exploration and development on all NFS lands, 7 fewer miles than under the no action alternative (a 6 percent decrease) (*see* Table 5).

Although mineral exploration and development could still occur in these areas using methods that did not require motorized access, the number of minerals exploration or development projects and the amount of materials extracted would be expected to decrease, and the cost of extraction would be expected to increase. Figures are not available regarding the type, amount, or value of materials that could not be extracted as a result of the proposed policy to limit road construction in inventoried roadless or other unroaded areas.

Options for implementation of the proposed action include requiring a showing of compelling circumstances only in inventoried roadless areas or in both inventoried roadless and other unroaded areas. If the policy were applied in both inventoried roadless areas and other unroaded areas, a larger number of potential mining projects would be affected.

Noxious Weeds and Nonnative Invasive Plants

Road construction and reconstruction present the greatest opportunity for infestations of noxious weeds and invasive plants to spread. Because road construction and reconstruction and maintenance are ground-disturbing activities, they are easy points of entry and infestation. Other ground-disturbing activities such as timber harvesting, mining, trail building, grazing, and recreational activities also contribute to infestation.

On the other hand, roads are used to access weed infestations quickly and easily and to access infestations in unroaded or roadless areas of NFS lands. Lack of vehicle access could increase the cost of treatment by requiring aerial or hand spraying. Generally, the greatest possibility for infestation is in roaded areas.

No Action Alternative

Under the no action alternative, the Forest Service would decommission approximately 2,101 miles of classified and unclassified roads each year (*see* Table 2). Decommissioning these roads would decrease the likelihood of noxious weed and nonnative plant introduction, although to a lesser extent than the proposed action.

The Forest Service would reconstruct approximately 4,140 miles of classified roads (*see* Table 3). Road reconstruction is a ground-disturbing activity and can increase points of entry and infestation and the risk of noxious weed and nonnative plant introduction.

The Forest Service would construct approximately 1,827 miles of classified and temporary roads annually (*see* Table 3). Because of the larger amount of road construction (as compared to the proposed action), this alternative would provide for the greater possibility of noxious weed and nonnative plant introduction. The potential, although not necessarily the actual, amount of infestation would be equal to the total amount of land that would be disturbed under this alternative.

Proposed Action

Under the proposed action, more roads are likely to be decommissioned than under the no action alternative. For this reason, it is likely that NFS lands, particularly inventoried roadless and unroaded areas, would face a reduced risk of noxious weed and nonnative plant introduction. A larger number of miles decommissioned would result in a larger reduction in risk. A smaller number of roads available for motorized access, however, could also reduce the Forest Service's ability to respond to outbreaks in the future.

Fewer roads are likely to be reconstructed in inventoried roadless and other unroaded areas under the proposed action than under the no action alternative, although overall the miles of roads to be reconstructed are expected to be greater under the proposed action than under the no action alternative. Because of this larger amount of ground-disturbing activity, the risk of noxious weed and nonnative plant introduction could be increased as a result of this component of the proposed action. However, it is also likely that fewer roads would be constructed. This would reduce the risk of infestation, although it would also reduce the Forest Service's ability to respond to outbreaks using motorized vehicles. In general, the proposed action would tend to reduce the ability of weeds and nonnative invasive plants to spread and reduce infestations, as compared to the no action alternative.

Recreation, Heritage, and Wilderness Resources

Roads provide opportunities to view scenic vistas; use motorized vehicles; access campgrounds, picnic areas, marinas, resorts, ski areas, and other facilities; and access less-developed settings over roads to a trailhead. Few roads have been built on NFS lands for the sole purpose of recreation, but all are available for recreational use. In fact, driving for pleasure is the single largest recreational use of NFS lands, constituting almost 36 percent of all recreation in 1996. While roads provide access for recreationists, they can decrease the quality of recreation experiences if not well managed. Increased access can provide people with opportunities to enjoy unique and sensitive areas, but it can also make protection of these areas difficult.

The following activities could be affected by changes in road access:

1. Government-owned developed recreation facilities

2. Scenic quality (the visual combination of natural and cultural attributes that provide landscape identity, sense of place, and scenic integrity)

3. Winter sports sites and other recreation resort developments primarily owned and operated by private, commercial entities under special use permits

4. Recreation settings (primitive, semi-primitive, non-motorized, semi-primitive motorized, roaded natural, rural, and urban) and dispersed recreation such as backpacking and hiking

5. Cultural resources (sites of cultural and historic value)

No Action Alternative

Under the no action alternative, the Forest Service would decommission approximately 2,101 miles of classified and unclassified roads each year (*see* Table 2). Because only unnecessary roads would be decommissioned, access to the 12,600 recreational sites developed by the Forest Service, commercial winter sports and other resort developments, and cultural and historic sites would not be affected. Decommissioning unneeded roads can increase both scenic quality and the quality of the experience in dispersed recreation settings. Decommissioning roads can, however, also affect access to dispersed recreation and decrease off-road vehicle recreational use.

Approximately 249 miles of classified roads used for recreation purposes would be reconstructed annually, with an estimated 3 miles of roads located within inventoried roadless or other unroaded areas (*see* Table 3). Reconstruction of existing roads could improve roads used for recreation.

Approximately 30 miles of classified and temporary roads would be constructed annually to facilitate recreation on NFS lands (*see* Table 3). Of these, an estimated 15 miles would be in inventoried roadless or other unroaded areas. As noted above, these roads would facilitate access to recreational facilities, but the existence of such roads could adversely affect scenic quality and dispersed recreation. The effects on cultural resources could range from increased site protection and enhanced interpretation to degradation due to increased access by looters and vandals.

The no action alternative would also result in the construction of an estimated 626 miles of classified roads and 1,201 miles of temporary roads for all purposes on NFS lands annually, with

an estimated 288 miles in inventoried roadless or other unroaded areas (*see* Table 3). These roads would have an effect on scenic quality and solitude, but they could also increase access to Forest Service and commercial recreational facilities and increase opportunities for off-road vehicle recreation.

Proposed Action

A larger number of roads would be decommissioned under the proposed action than under the no action alternative, although only unnecessary roads would be decommissioned, and none of these roads would be needed to access developed recreational facilities. Additional road decommissioning, as compared to the no action alternative, could result in a reduction in off-road vehicle use on NFS lands and access for dispersed recreation activities. These impacts would increase as the number of decommissioned road miles increased.

More roads would be reconstructed on all NFS lands under the proposed action than under the no action alternative. Reconstruction of existing roads could improve roads used for recreational access. However, improved access could also increase use, making management of recreational facilities and protection of cultural resources more difficult.

Under the proposed action, new road construction could be reduced as compared to the no action alternative. During the transition, new road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights. Approximately 18 miles of roads could be expected to be constructed for recreation purposes on all NFS lands, 12 fewer miles than under the no action alternative (a decrease of 40 percent) (*see* Table 5).

The inability to construct new roads in these areas during the transition period would reduce the ability to travel through NFS lands by motorized vehicle and could prevent the development of new Forest Service recreational facilities and commercial winter sports sites and other resort developments. As compared to the no action alternative, reduced road construction in inventoried roadless and other unroaded areas could enhance scenic quality and dispersed recreational opportunities.

Options for implementation of the proposed action include requiring a showing of compelling circumstances only in inventoried roadless areas or in both inventoried roadless and other unroaded areas. Impacts to additional recreational facilities, commercial recreational enterprises, scenic quality, and dispersed recreation would vary depending on the size of the acreage affected by the road construction limitation.

Overall, the proposed action would result in the construction of up to 246 fewer miles of roads for all purposes each year as compared to the no action alternative, primarily in inventoried

roadless and other unroaded areas (*see* Table 5). The absence of the roads that would be constructed under the no action alternative would have a beneficial impact on scenic quality and some forms of dispersed recreation. Fewer roads overall could also decrease access to Forest Service and commercial recreational facilities and decrease opportunities for off-road vehicle recreation.

Watershed and Air

Many land management activities affect water, soil, and air resources to varying degrees and intensity. The most common direct and indirect effects of road construction and reconstruction on watershed and air resources are loss of ground cover vegetation; soil compaction; reduced transpiration (the passage of water vapor from a living body through a membrane or pores); loss of productive soils; and increased water runoff, soil erosion, and dust levels. Proper design, construction, and maintenance can minimize these effects but cannot completely eliminate them.

Most impacts occur during initial road construction, followed by decreasing impacts as roadside vegetation and surfacing mature. Periodic maintenance activities usually cause brief, temporary increases in impacts, particularly on the road surface and associated ditches. Temporary road construction has many of the same effects as permanent road construction, but it generally occurs for a shorter duration and to a lesser extent physically. Long-term effects can occur if temporary roads receive extended use and are not decommissioned as planned.

Sedimentation. Roads affect surface erosion, landslides, and sedimentation. General surface erosion produces mostly fine sediment, while landslides produce sediment of all sizes. Classified and temporary road construction and reconstruction causes some increased surface erosion and landslide risk, but this varies widely and depends on local site characteristics.

Hydrology. Roads affect hydrology by intercepting, concentrating, and diverting runoff. They also increase the density of streams on the landscape. For example, a road can intercept rainfall and groundwater and promote the concentration and movement of runoff to the stream channel. Interception of groundwater by a road can reduce the flow of a spring or may cause a spring to become a flowing stream. Roads also indirectly affect hydrology because they replace trees that use water through evapotranspiration (loss of water from the soil through evaporation and from plants through transpiration). Water otherwise used by trees becomes available for runoff rather than returned to the atmosphere, which may increase streamflow and possibly flood peaks. Some increased flood frequency and higher flood levels occur due to existing roads.

Water quality. Roads cause some measurable reduction in water quality. Most water quality concerns, other than sediment, relate to the possible introduction of toxic chemicals or nutrients such as nitrogen and phosphorous from timber harvest activities. These pollutants may result from road construction and maintenance equipment or be brought into the watershed through

public road use. Roads can also cause water temperature to change where groundwater is intercepted and brought to the surface or where loss of tree cover in riparian areas reduces shading.

Site productivity. Classified and temporary road construction and reconstruction causes a direct loss of site productivity on the acres occupied by the road. This is more important with roads near or encroaching on wetland or riparian areas, although Forest Service policy is to avoid or minimize the effects to these areas. Although not irreversible, land occupied by roads is essentially lost to long-term productive vegetative use.

Air quality. Classified and temporary road construction and reconstruction causes dust and increased exhaust emissions. Although this increased level of exhaust is usually insignificant in dispersed rural areas, it can affect visibility. Dust and visibility are problems when National Parks and National Forest Wilderness Areas are classified as, or are near, Class I and II areas (as designated under the Clean Air Act).

The number of classified and temporary road miles constructed and reconstructed provides the best estimate of effects from sedimentation and impacts to hydrology, water quality, site productivity, and air quality.

No Action Alternative

Under the no action alternative, the Forest Service would decommission approximately 2,101 miles of classified and unclassified roads each year (*see* Table 2). Decommissioning involves blocking the entrance to a road, revegetating, water barring, removing fills and culverts, reestablishing drainage-ways, removing unstable road shoulders, or full obliteration by recontouring and restoring natural slopes. Such activities can increase sedimentation and dust and vehicle exhaust emissions. These impacts are of a short duration, lasting only as long as the decommissioning activity. Over the long term, decommissioning roads can return an area to its more natural hydrologic condition, improve water quality, and promote site productivity. Based on past experience, Regions 1 (Northern) and 6 (Pacific Northwest) would decommission the most miles of classified and unclassified roads, and Region 10 (Alaska) would decommission the fewest miles (*see* Table 2).

The Forest Service would also construct approximately 1,827 miles of classified roads and reconstruct approximately 4,140 miles of classified roads annually (*see* Table 3). As described above, roads can cause increased sedimentation during both construction or reconstruction and operation. Air quality and visibility can also be affected during construction or reconstruction, although such impacts are generally short-term. Operation and maintenance of native surfaced roads may also have both short- and long-term effects. The existence of roads alters natural hydrology and can increase streamflow (causing more erosion and sedimentation) and possibly

peak floods. Roads also affect water quality through deposition of pollutants on roads that wash into streams or groundwater and through temperature changes.

In addition, the Forest Service would expect to construct an estimated 6 miles and reconstruct an estimated 527 miles of roads annually for the purpose of protecting watersheds (*see* Table 3). Of those reconstructed, an estimated 7 miles would be located in inventoried roadless or other unroaded areas.

Proposed Action

Under the proposed action, a larger number of road miles would be decommissioned than under the no action alternative. As compared to the no action alternative, short-term water quality impacts due to temporary increases in sedimentation and air quality impacts would be greater. Long-term benefits of improved hydrologic conditions, water quality, and site productivity would also be greater than under the no action alternative, and they would increase as the number of road miles decommissioned increased.

Miles of road reconstruction in inventoried roadless and other unroaded areas would be less under the proposed action than under the no action alternative, although overall the Forest Service anticipates that more miles of road would be reconstructed under the proposed action than under the no action alternative. Road reconstruction of needed roads could cause short-term water quality (sedimentation) and air quality (dust and construction vehicle emissions) impacts. However, road reconstruction could also reduce the amount of environmental damage caused by a substandard road. Reconstructed roads could also reduce erosion and landslides, protect riparian and wetland habitat, and enhance fish and wildlife passages.

Implementation of the proposed policy would be expected to reduce the number of roads constructed, as compared to the no action alternative. Fewer miles of roads would avoid sedimentation, hydrologic changes, and impacts to air and water quality, and would promote site productivity.

During the transition period or until the Roadless area Protection Rule is issued, road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights. Approximately 1,581 miles of roads could be expected to be constructed on all NFS lands for all purposes, 246 fewer miles than under the current program (an anticipated maximum decrease of 13 percent) (*see* Table 5).

The Forest Service would expect to construct an estimated 5 miles and reconstruct an estimated 520 miles of roads annually for the purpose of protecting watersheds (*see* Table 5).

Wildlife, Fish, and Threatened, Endangered, and Sensitive Species

Wildlife. Roads and associated access activities cause a wide variety of impacts on wildlife populations, including migration disruption, increased physical stress, direct habitat loss, and habitat fragmentation. Roads into forest interiors can create corridors for predator introduction and human access that can affect wildlife populations by increasing opportunities for illegal harvesting of wildlife species.

Because most National Forest roads are not designed for high-speed travel, direct mortality of wildlife species on these roads is not usually an important factor for large mammals. Direct mortality may be of greater consequence to small, slow-moving species such as amphibians that have highly restricted home ranges and engage in persistent migratory behavior.

Fish. Road design, location, maintenance, and use are also important factors affecting the health of aquatic ecosystems. The effects of roads on aquatic habitats include physical alterations in stream channel morphology and substrate composition, increased sediment loading, stream bank destabilization, changes in riparian conditions, woody debris recruitment, modification of streamflow and temperature regimes, alteration of watershed hydrologic response, isolation of streams and floodplains, and habitat fragmentation. Increased fishing access from roads may also provide greater opportunity for illegal harvest of fish or aquatic species.

Construction and use of roads can potentially affect fish during all life stages. For example, roads can impede migration of adults to spawning areas and cause mortality of eggs and fry through increased sedimentation in stream gravels. Although inventoried roadless and other unroaded areas are more likely to support strong fish populations than roaded areas, strong fish populations are not excluded from watersheds with roads. However, road entry into inventoried roadless or other unroaded areas presents short- and long-term risks to aquatic ecosystems.
Threatened, endangered, and sensitive species. Roads can affect threatened, endangered, and sensitive (TES) species[5] through fragmentation, degradation, or loss of habitat; introduction of exotic species; interspecific interactions such as disease, predation, and competition; increased human disturbance; and illegal hunting. Roads in riparian areas, major wildlife corridors, areas with unique habitat, or habitats with rare species have greater effects than roads in other areas.

A species endangerment study showed that habitat loss associated with land use intensification was the most important factor. Interspecific interactions, human overuse, grazing, predation, forest management, and environmental contaminants and pollutants were other factors affecting

[5] Threatened or endangered species are those that have been placed on the threatened or endangered species lists by the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act (16 U.S.C. 1321 *et seq.*). Sensitive species are those that have been proposed for listing.

species endangerment. Many of these factors are directly linked to roads and activities associated with road access.

Because of the high occurrence of TES species in inventoried roadless and other unroaded areas, Forest Service management practices in these areas of NFS lands and their subsequent effects on aquatic and terrestrial ecosystems are of greater consequence to TES species than non-TES species. Table 6 shows the number of Federally threatened, endangered, or proposed threatened or endangered species on NFS lands by species and by region. Regions 5 (Pacific Southwest) and 8 (Southern) have the largest number of TES species on NFS lands; Region 6 (Pacific Northwest) has the largest percentage of TES species on inventoried roadless land in the National Forest System.

TABLE 6: Federally Threatened, Endangered, or Proposed Threatened or Endangered Species on National Forest System Lands (by species and by region)

	Birds	Mammals	Reptiles/ Amphibians	Fish	Invertebrates	Insects	Plants	Total	Percent in RARE II Areas
Region 1	5 (3)	5 (5)	0 (0)	5 (5)	0 (0)	0 (0)	3 (2)	18 (15)	83%
Region 2	9 (6)	6 (5)	2 (1)	10 (2)	0 (0)	2 (2)	9 (3)	38 (19)	50%
Region 3	15 (7)	10 (9)	5 (3)	18 (6)	0 (0)	0 (0)	5 (5)	53 (30)	57%
Region 4	5 (4)	6 (3)	1 (0)	12 (5)	0 (0)	0 (0)	9 (6)	33 (18)	55%
Region 5	12 (9)	8 (3)	5 (4)	22 (3)	6 (1)	5 (2)	42 (16)	100 (30)	30%
Region 6	7 (4)	3 (3)	0 (0)	28 (28)	0 (0)	1 (1)	3 (3)	42 (39)	93%
Region 8	15 (4)	11 (2)	9 (4)	22 (1)	45 (11)	0 (0)	60 (12)	162 (34)	21%
Region 9	5 (5)	6 (6)	2 (2)	2 (1)	7 (6)	2 (2)	16 (7)	40 (29)	73%
Region 10	2 (2)	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (2)	50%

Number of species in inventoried roadless areas is shown in parentheses

Region 1 (Northern) includes National Forests in Idaho, Montana, North Dakota, and South Dakota.
Region 2 (Rocky Mountain) includes National Forests in Colorado, Wyoming, South Dakota, Kansas, and Nebraska.
Region 3 (Southwestern) includes National Forests in Arizona, New Mexico, Texas, and Oklahoma.
Region 4 (Intermountain) includes National Forests in Idaho, Nevada, Utah, and Wyoming.
Region 5 (Pacific Southwest) includes National Forests in California.
Region 6 (Pacific Northwest) includes National Forests in Washington and Oregon.
Region 8 (Southern) includes National Forests in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico, South Carolina, Texas, and Virginia.
Region 9 (Eastern) includes National Forests in Minnesota, Wisconsin, Missouri, Illinois, Michigan, Indiana, Ohio, West Virginia, Pennsylvania, New York, Vermont, and New Hampshire.
Region 10 (Alaska) includes National Forests in Alaska.

Region 7 no longer exists, having been incorporated into Regions 8 and 9 in 1965.

Source: *Environmental Assessment for the Interim Rule Suspending Road Construction in Unroaded Areas of National Forest System Land*, March 1999, page 32.

Roads affect wildlife, fish, and TES species both adversely and beneficially. Adverse impacts are those associated with road construction and reconstruction (*e.g.*, sedimentation) and operation (*e.g.*, habitat fragmentation, roadkill). Beneficial impacts are those associated with access to projects with a primary wildlife, fish, or TES species protection purpose. Inventoried roadless and other unroaded areas are particularly important for species such as grizzly bears, which require large home ranges and are sensitive to human disturbance. Further, these areas are often located in headwater areas that provide habitat for TES fish species such as steelhead and bull trout.

No Action Alternative

Under the no action alternative, the Forest Service would decommission approximately 2,101 miles of classified and unclassified roads each year (*see* Table 2). Roads needed for wildlife, fish, or TES species protection would not be decommissioned. Although decommissioning can cause short-term impacts to wildlife, fish, and TES species through human presence, habitat disturbance, and sedimentation, long-term impacts of road decommissioning would be beneficial. Elimination of unneeded roads would protect habitat and avoid migration disruption, habitat fragmentation, introduction of exotic species, interspecific interactions, illegal hunting, erosion and associated sedimentation in streams, and pollutants deposited on roads. Based on past experience, Regions 1 (Northern) and 6 (Pacific Northwest) would decommission the most miles of road, and Region 10 (Alaska) would decommission the fewest miles (*see* Table 2).

The Forest Service would also reconstruct approximately 4,140 miles of classified roads and construct approximately 1,827 miles of classified and temporary roads annually (*see* Table 3). As described above, roads can cause habitat loss, fragmentation, migration disruption, sedimentation, and direct mortality of wildlife species. Road reconstruction of needed roads could cause short-term impacts due to human activity, habitat disturbance, and sedimentation. However, such road reconstruction could also reduce the amount of environmental damage caused by a substandard road. Reconstructed roads could reduce erosion and landslides, protect riparian and wetland habitat, and enhance fish and wildlife passages. Road reconstruction could also improve human access, which can put additional stresses on wildlife, fish, and TES species.

In addition, the Forest Service would expect to reconstruct an estimated 46 miles of roads and construct an estimated 9 miles annually for the purpose of protecting fish and wildlife resources (*see* Table 3). Of those, an estimated 11 miles would be located in inventoried roadless or other unroaded areas.

Proposed Action

Under the proposed action, a larger number of road miles would be decommissioned than under the no action alternative. As compared to the no action alternative, short-term impacts due to temporary human activity and habitat disruption and increases in sedimentation would be greater. Long-term benefits of improved wildlife habitat and aquatic ecosystem conditions

would also be greater than under the no action alternative, and they would increase as the number of road miles decommissioned increased.

Miles of road reconstruction would less in inventoried roadless and other unroaded areas under the proposed action than under the no action alternative, although on all NFS lands road reconstruction is expected to be greater under the proposed action than under the no action alternative. Road reconstruction of needed roads could cause short-term impacts due to human activity, habitat disturbance, and sedimentation. However, such road reconstruction could also reduce the amount of environmental damage caused by a substandard road.

Implementation of the proposed road management policy would be expected to reduce the number of roads constructed. Fewer miles of roads would protect habitat and avoid migration disruption, habitat fragmentation, introduction of exotic species, interspecific interactions, and illegal hunting associated with roads on NFS lands. In addition, fewer miles of roads would provide the greatest assurance that rare habitats, large natural patches of vegetation, riparian areas, and major wildlife dispersion corridors would be retained.

During the transition period before a roads analysis is incorporated into forest plans and until the issuance of the Roadless Area Protection Rule, road construction in inventoried roadless and other unroaded areas would be permitted only upon a showing of compelling circumstances such as critical resource restoration and protection, public safety, and access provided by statute, treaty, or pursuant to reserved or outstanding rights. Approximately 1,581 miles of roads could be expected to be constructed on all NFS lands for all purposes, 246 fewer miles than under the current program (an anticipated maximum decrease of 13 percent) (*see* Table 5).

Economic and Social Effects

Economic impacts refer to the effects on the economic values related to forest outputs and services and on jobs and revenues. Social impacts refer to the effects on the environmental and cultural values ascribed to natural areas such as environmental protection, solitude, clean water, diversity of wildlife and fish, scenic quality, and availability of forest products for human use.

Demand for natural resources such as recreational opportunities, wood products, and special forest products has steadily increased. Forest development roads are used to provide access to these resources and for movement and distribution of people. Concurrent with the demand for more natural resource products is the growing public recognition that NFS lands contain unique resources and opportunities that may be adversely affected by roads.

Community capacity is a community's ability to sustain itself over time based primarily on the community's economic health measures and the quality of social interactions and institutions. The more diverse a community's economy, the more resilient and adaptable it is to changing circumstances.

Economic effects. Road decommissioning, reconstruction, and construction can affect both the economic values that focus on the changes in forest outputs and services valued by society and jobs and revenue. Some economic values are enhanced by increasing access (*e.g.*, timber harvesting), while others are enhanced by limiting access (*e.g.*, primitive non-motorized recreation experiences). Jobs and revenue can also be affected by timber harvests and by tourism, both of which require access to roads. The Forest Service considered both economic efficiency (the potential change in the flow of goods and services valued by society) and the effect of the no action alternative and the proposed action on economic activity (jobs and payments to states) in a Cost-Benefit Analysis. The Cost-Benefit Analysis is contained in Appendix E.

Social effects. Environmental values may be heightened or reduced by perceived scenic quality, place attachment, and social well-being that people derive from a site. These perceptions are affected by the presence or absence of roads. Roads allow human access to many types of scenic areas. However, if roads interfere with a view or permit a level of human density that reduces the quality of the view, they diminish the scenic quality. As noted above, social costs and benefits are addressed in the Cost-Benefit Analysis in Appendix E.

Community capacity. In towns adjacent to NFS lands, community well-being may be affected by economic and social factors related to NFS land management. Road construction and reconstruction contribute to the health of a community by providing expanded employment, trade, and communication opportunities. Market goods such as timber, special forest products, livestock grazing, mineral leases, and commercial recreation generate income for local economies. However, unique ecosystems and habitats, outdoor recreation, scenic quality, and a sense of place are attributes and activities valued primarily for their social, psychological, and cultural significance. These less tangible values are often adversely affected by roads.

The Forest Service contributes to community capacity as a community member, government-to-government partner, and neighbor. Interactions between the Forest Service and communities are maintained through formal and informal contact primarily surrounding natural resource interests (*i.e.*, planning processes), exchange of goods and services (*e.g.*, permits, contracts, payment-in-lieu of taxes, law enforcement, fire protection, *etc.*), and other trust-building activities. To the extent that the proposed action responds to demands for change, relationships and trust levels with community interests that oppose road construction may be improved. To the extent that the proposed action limits access to NFS lands, relationships and trust levels with community interests that support forest development and road construction may be reduced.

No Action Alternative

Under the no action alternative, the Forest Service would decommission approximately 2,101 miles of classified and unclassified roads each year (*see* Table 2). Only roads that were not needed for forest resource management objectives would be decommissioned. Road

decommissioning would not be expected to adversely affect timber sales or harvesting, or minerals exploration and development, and would be expected to increase scenic values and wildlife, fish, and TES species protection. For this reason, road decommissioning would not impose economic or social impacts and would not affect community capacity under the no action alternative.

The Forest Service would also reconstruct approximately 4,140 miles of classified roads and construct approximately 1,827 miles of classified and temporary roads annually (*see* Table 3). As described above, roads provide access to forest resources but can also impose adverse environmental impacts to water quality and wildlife, fish, and TES species.

The Forest Service expects that, under the current transportation policy, approximately 3.6 billion board feet of timber would be derived from timber sales on all NFS lands annually. Of that, approximately 351 million board feet annually would be derived from timber sales in inventoried roadless or other unroaded areas. The economic value of timber sales on all NFS lands annually, based on data derived for the *Interim Rule EA*, is contained in Table 7. As shown in that table, a timber volume of 3.6 billion board feet of timber from all NFS lands could result annually in receipts of $518 million and 29,413 direct jobs. Regions 6 (Pacific Northwest) and 8 (Southern) have the highest planned annual yield and, correspondingly, the highest total projected receipts and highest number of total direct jobs. Regions 3 (Southwestern) and 10 (Alaska) have the lowest total projected receipts and number of direct jobs.

In addition, payments to states are estimated to be 25 percent of total receipts. Under the no action alternative, such payments could equal $129 million.