associated with increased spending in the economy from the salaries created by the direct and indirect effects.

The TSPIRS report was also used as a source of data for estimating job effects. Estimates of total employment impacts (the sum of direct, indirect, and induced) were based on TSPIRS data (Table 3). As with the data for the efficiency analysis, data from 1996 and 1997 were averaged to calculate total jobs per million board feet for each region. Direct jobs per million board feet harvested are not reported separately in TSPIRS. Regional estimates of direct jobs per million board feet of harvest were based on querying Forest Service economists, based on their experience with input-output analyses related to timber harvest.

The proposed action alternative would result in a maximum annual reduction of 2,681 direct jobs and 5,937 total jobs (Table E7). The effects would be greatest in Regions 1, 8 and 10, the regions with the greatest harvest reduction. When the effects of harvest substitution are considered, the impacts are reduced to 1,630 direct and 3,738 total jobs (Table E8). Since the harvest substitution occurs within the same region, the jobs created by substitution would directly offset jobs lost from reduced NFS harvest, although the same individuals may not be employed. The substitution effect is most important in offsetting effects in Region 8, where almost all jobs can be substituted from other lands. Region 1 has a minor substitution effect, while Region 10 has none.

Direct job effects are the most obvious effect of reduced timber harvest. Indirect and induced effects are distributed over a wide range of economic sectors. The impact of reduced harvest on these jobs varies widely by community. Communities with diverse economies that have strong overall job growth are likely to have alternative job opportunities to replace harvest-related indirect and induced effects. Local communities with a strong timber sector and less economic diversity will be most impacted through indirect and induced effects. Substitution opportunities for induced and indirect effects seem likely in today's economic environment of tight job markets, but these effects vary greatly by location and type of employment.

Payments to States. Receipts generated from sales of products and services on the NFS are partially returned to the U.S. Treasury. States receive a portion of some Forest Service receipts based on congressionally determined formulas. Payments to States are one measure of distributional effects from timber harvest. Receipts from timber sales have historically been the largest source of Payments to States from the NFS. A history of these payments to each county in the U.S. since 1986 can by found at the USDA Forest Service website http://www.fs.fed.us/institute/.

Estimated timber receipts by region are based on Fiscal Year 1997 timber sold values (Table E9). Annual receipts under the no action alternative are estimated to be almost

$518 million. Under the proposed action alternative, receipts would be reduced by $41 million. Payments to States were estimated as 25% of total receipts (Table E10). Under the no action alternative, total annual Payments to States were estimated to be about $129 million. The proposed action alternative would reduce annual payments by a maximum of $10.4 million. The largest reductions occur in Regions 1 and 8. Region 10 would experience the greatest percent decline. Although revenue would be lost from the proposed action alternative, these losses will be mitigated by requirements of the 1998 Supplemental Appropriations and Rescissions Act.

As previously mentioned there is a great degree of uncertainty with the estimated timber receipts. Consequently the same uncertainty would be found with payments to counties that are based on these receipts. For this reason the above values should be viewed as an upper limit. Associated with 25% fund payments to counties are "payments in lieu of taxes" (PILT) funds. Generally, decreases in 25% funds are accompanied with increases in PILT funds. However, the formula is complicated and the payments can only be calculated on a county-by-county basis. There can be a total offset, or no offset at all, depending on a number of variables. However, it is reasonable to say that the estimated reductions shown above, in total 25% funds, will be accompanied by a significant increase in total PILT funds.

Additional uncertainty arises from current legislation designed to add stability to 25% fund payments (HR 2389). An explanation of the payments discussed above can be found in Revenue Sharing and Resource Management in Western States, Ervin Schuster, 1996 and PILT, Its Purpose and Performance, Ervin Schuster, 1995. Copies are included in the EA Project File.

The sum of these economic effects over the 15-year transition phase is difficult to estimate. Timber sold is generally harvested over 2 to 3 years from the selling date. Therefore, in the first year of the transition phase, only one-third to one-half of the maximum effect could occur. In the second year, two-thirds to the full maximum effect could occur. A more complicating factor is the effect of land and resource management plan revisions. As plans are revised, the plans will include new harvest schedules that will replace the potential harvest effects of the proposed policy. The revised plans will reflect the direction in the proposed policy, and therefore may have similar effects. But those effects will be analyzed in the revision process, and cannot be attributed to the proposed policy. For purposes of this analysis, the effects of the proposed policy will decline over the transition phase and be zero by year 15.

Land Uses (non-recreational)

Non-recreational special use authorizations on NFS lands include communication sites, public and private roads, and transmission rights-of way (e.g., pipelines). More than 47,000 active special use authorizations currently exist. These authorizations involve nearly 150 different types of uses on 26 million acres of land and result in $7 million in

fees to the U.S. Treasury.

Roads needed to accommodate private access, transportation or utility corridors, rights-of-ways and easements will not be affected by the proposed strategy, except possibly in a positive way through maintenance and reconstruction to maintain standards.

Under the proposed action alternative, new road construction could be reduced as compared to the no action alternative. All private interest access projects needed to satisfy the Alaska National Interest Lands Conservation Act or other statutory right-of-access and reserved or outstanding rights would be observed under the proposed action. However, applications for authorization that are not required by law (such as applications for new communications sites, pipelines, or other commercial enterprises) will have to demonstrate a compelling need during the transition phase if roads would be required in inventoried roadless or other unroaded areas.

Law Enforcement
There would be no net effect from the proposed action, since road activities needed for public safety would be undertaken under both alternatives.

Minerals
Reasonable access to privately owned minerals, mineral claims, leases, permits, and contracts will be unaffected by the proposed action alternative, including reconstruction of existing roads. However, under the proposed action, any proposed new road construction in inventoried roadless or other unroaded areas would require demonstration of a compelling need during the transition process. Mineral exploration and development could still occur in these areas using non-motorized access methods. The effect is difficult to estimate, since mineral development varies according to market prices. The likely effect is a reduction in mineral exploration and extraction.

Noxious weeds and nonnative invasive plants
Roads provide easy points of entry and infestation for noxious weeds and nonnative invasive plants. Roads are also needed to provide access to treat noxious weeds and nonnative invasive plants. In the no action alternative, the greater miles of planned new road construction will contribute to the spread of these species to a greater extent than the proposed strategy alternative. The proposed strategy places a greater emphasis on reconstruction and decommissioning, which also allows opportunities for entry and infestation. The long-run effect of increased decommissioning would be to reduce the threat of infestation through roaded access. The combination of less new road construction and increased decommissioning under the proposed action alternative is likely to result in a net benefit from reduced infestation on roaded, unroaded, and roadless areas.

Recreation, Heritage, and Wilderness Resources
Few roads have been built on NFS lands for the sole purpose of recreation, but all roads are available for recreational use. Roads are necessary for driving for pleasure, the largest recreational use of NFS lands. Roads also provide access to developed facilities such as campgrounds, marinas, ski resorts, and visitor centers, as well as access to trailheads.

Road development generally has a negative effect on scenic quality, depending on road design and the purpose of road construction. To the extent that road development leads to activities such as mining and timber harvest, scenic quality is likely to decline from road development. However, roads also bring people into contact with scenery that was previously unavailable through vehicular access and provide benefits to new users.

Unroaded and roadless areas are most important for providing primitive and semi-primitive settings for dispersed recreation activities such as backpacking and hiking. Although roads provide access to these types of areas, roads within these areas generally have a negative impact on these recreation experiences. Solitude is a key characteristic of these types of recreation settings. Increases in user density, which are likely from increased access, would have negative effects on users seeking a wilderness-type experience.

The comparison of available recreation opportunities between the no action alternative and proposed action alternative will vary by type of recreation activity. On existing roaded areas, the differences between the two alternatives are likely to be minimal. No decommissioning is proposed for roads that carry passenger vehicles, which are important to users driving for pleasure. Decommissioning of other roads is likely to negatively impact off-road vehicle users, although the impact should be negligible where decommissioning is undertaken because of lack of use. Decommissioning to protect ecological values may reduce use or transfer use to other areas. To the extent that more decommissioning would occur under the proposed action alternative, these negative effects will be greater. Increased reconstruction under the proposed strategy may result in greater benefits from improvements of existing roads, making them accessible to a broader range of vehicles.

The planned construction activities under the no action alternative would increase access for recreational purposes in inventoried roadless and other unroaded areas. The positive effects of this access would include increased recreation use in newly roaded areas, including access to areas of high scenic quality and to cultural sites. Access to cultural sites for interpretation would also be enhanced.

Under the proposed action alternative, this access is unlikely to occur, particularly in the transition phase. The proposed action alternative will provide more protection for scenic quality, by reducing new road construction and by increasing the number of miles of roads

decommissioned and reconstructed. Less access will also reduce the potential for resource degradation from increased use and access by looters and vandals to cultural sites. The reduced road construction will also maintain recreation opportunities in backcountry settings during the transition phase.

The demand for recreation on NFS lands is expected to continue to increase, so managers will increasingly have to make decisions to accommodate additional use without ecological degradation. No spatial data exists to demonstrate current patterns of use on NFS lands. Therefore, it is impossible to estimate the net effect of the proposed action alternative on recreation benefits.

Watershed and Air

Road development activities have numerous negative impacts on air and water quality, including loss of ground cover, soil compaction, reduced transpiration, increased water runoff, increased soil erosion, loss of productive soils, and increased levels of dust. These effects are most evident during the construction/reconstruction phase. Employment of best management practices minimizes these effects, but cannot eliminate them. More permanent effects result from traffic pollution and from the permanent disruption of watershed hydrology.

On existing roaded areas, the proposed action alternative is likely to create greater short-term environmental degradation because of increased reconstruction and decommissioning activity. New road construction is likely to be similar under the no action alternative and the proposed action alternative. However, in the long-term the environmental benefits will be greater under the proposed action, since more roads that are causing ecological degradation will be decommissioned, and reconstruction will reduce environmental damage from those roads being maintained below standards.

The greatest difference between the no action alternative and the proposed action alternative will occur on inventoried roadless and other unroaded areas. Fewer roads will be constructed under the proposed action, particularly during the transition phase. Some short-term negative effects may occur as a result of decommissioning unclassified roads in these areas. Those effects will be greater for the proposed action alternative because more roads should be decommissioned than under the no action alternative. The long-term effects will be more beneficial under the proposed action alternative. Overall, the effect of reduced road construction in the transition phase, more decommissioning, and the use of the new analysis in the future is likely to result in better water and air quality.

Wildlife, Fish and Threatened, Endangered, and Sensitive Species
Roads and associated access activities cause a wide variety of impacts on wildlife and fish populations, including migration disruption, direct habitat loss, habitat fragmentation, alteration of stream channels, increased sediment loading in aquatic habitats, change in streamflow and water temperature, introduction of exotic species, and increased access for human disturbance. Although roads also provide access for management, the negative impacts tend to greatly outweigh the advantages of roads.

In existing roaded areas, the increased emphasis on decommissioning and reconstruction in the proposed action alternative would likely have greater short-term negative impacts on wildlife and fish habitat through increased disturbance activities. However, the long-term effects of those activities would be unambiguously positive compared to the fewer miles of planned reconstruction and decommissioning under the no action alternative. New road construction activities are likely to be similar under both alternatives.

On inventoried roadless and other unroaded areas, there may also be short-term negative impacts from increased decommissioning of roads compared to the no action alternative. During the transition phase, the reduction in new road construction will provide positive benefits for wildlife and fish habitat from reduced disturbance.

Passive Use Values
Passive use values (non-use values) were not addressed under any of the individual resource effects because they are applicable to several of the resource categories. Passive use values are derived from human motivations to protect environmental values either for personal satisfaction or for future generations. These values are neither traded in markets nor subject to fees. These values are often linked to protection of ecological values, threatened and endangered species, and biological diversity.

Passive use values are likely to be greater under the proposed action alternative. On roaded areas, the new analysis procedure will result in a road system that creates less ecological damage. On inventoried roadless and other unroaded areas, the reduced road development and increased decommissioning will protect existing ecological values. The only possible negative effect from the proposed action alternative is reduced access to initiate management actions, but that effect is likely to be far outweighed by the benefits.

Conclusions

The Road Management Strategy is focused on evaluating transportation needs on the NFS to provide reasonable access and protect ecological values. Rather than emphasizing road development, the emphasis switches to decommissioning unneeded roads, reconstructing roads to safety and environmental standards, and building new roads only where needed to meet management objectives.

The proposed strategy provides guidance for transportation planning, but does not result in any land management decision by itself. Therefore, the effects described in this analysis illustrate the potential range of effects from implementing this strategy through the transition phase. Agency costs are not expected to vary significantly as a result of implementing the proposed strategy. Available resources would be allocated according to the priorities set by the proposed strategy, which would affect the distribution of resources across road management activities.

The differences between the no action alternative and the proposed action alternative tend to be minor on roaded areas. No difference is expected for access and public safety, law enforcement, timber harvest, heritage, or wilderness resources. Potential positive effects are expected for fire, insects, and disease, noxious weeds, watershed and air, wildlife and fish, and passive use. These positive effects are tied primarily to increased decommissioning of existing classified and unclassified roads that would reduce ecological damage and human access. Effects on recreation use are more ambiguous. Higher rates of decommissioning would reduce some types of access compared to the no action alternative, particularly for high clearance vehicles. But increased reconstruction could result in improving access. Both decommissioning and reconstruction would be likely to improve the environmental quality of the recreation setting, providing benefits to users.

The expected differences between the no action alternative and the proposed action alternative are greatest on inventoried roadless and other unroaded areas during the transition phase. No differences are expected for access and public safety and law enforcement. Negative effects are expected from reduced timber harvest and reduced mineral exploration and extraction. Positive effects are expected for fire, insects, and disease, noxious weeds and nonnative invasive plants, watershed and air, wildlife, fish, threatened, endangered, and sensitive species, wilderness, and passive use values. These positive effects are associated with lack of new road development that limits human access and protects existing environmental quality. The effects on recreation and heritage resources are ambiguous. Less access reduces the number of recreation opportunities and limits access to heritage sites. At the same time, the quality of wilderness-type recreation use is protected and vandalism of heritage sites is lessened. The net effect is uncertain.

The proposed action protects the values of inventoried roadless and other unroaded areas until an analysis is undertaken that accounts for the full range of effects of entering these areas with new roads. This approach prevents any irreversible commitment of resources during the transition phase. The emphasis on decommissioning and reconstruction, and designing a transportation system that can be maintained within existing budget constraints result in a comprehensive approach that should lead to an overall increase in net public benefits.

Table E1. Summary of Effects: Expected Direction of Change in Net Benefits from the Proposed Action Alternative

	Roaded Areas	Inventoried Roadless and Other Unroaded Areas
Access and Public Safety	0	0
Fire, Insects and Disease	+	+
Forest Management (Timber)	0	-
Land Uses	0	-
Law Enforcement	0	0
Minerals	0	-
Noxious weeds and nonnative invasive plants	+	+
Recreation	+/-	+/-
Heritage	0	+/-
Wilderness	+	+
Watershed and Air	+	+
Wildlife and Fish Species	+	+
Passive Use Values	+	+

0: no change expected from implementing the proposed strategy
+: net effect of implementing the proposed strategy is positive
-: net effect of implementing the proposed strategy is negative
+/-: net effect is ambiguous from implementing the proposed strategy

Table E2. Trends in NFS road construction, reconstruction, and decommissioning, 1993-1998 (mile of road)

Year	Construction	Reconstruction	Decommissioning
1993	816	2,625	2,132
1994	520	1,933	2,289
1995	468	2,400	2,126
1996	463	2,853	1,442
1997	400	3,593	1.787
1998	215	2,732	2,101

Source: USDA Report of the Forest Service for Fiscal Years 1993-1998

Table E3. Road Development Planned under the No Action and Proposed Action Alternatives (miles of road)

	Construction	Reconstruction	Temporary
No action alternative:			
Total roads	626	4,140	1,201
Miles in inventoried roadless and other unroaded areas	168	68	120
Proposed Action Alternative:			
Total Roads	483	4,079	1,098

Table E4. Forest Roads Program Funding, FY 1998, 1999, and Estimated FY 2000 (thousand dollars)

	FY 1998 Final	FY 1999 Enacted	FY 2000 Estimate
Roads (Forest Roads Program)			
Capital Investments in New Roads			
Forest Access	2,756	1,818	6,226
Timber Access	150	0	0
Capital Investments on Existing Roads			
Forest Access	35,821	58,791	52,842
Timber Access	1,937	0	0
Subtotal Capital Investments	**40,664**	**60,609**	**59,068**
Engineering Support for Timber	**47,400**	**37,400**	**37,400**
Road Maintenance	**84,974**	**99,884**	**122,484**
TOTAL (Construction/Reconstruction/Maintenance)	**173,038**	**197,893**	**218,952**

Source: FY 2000 Explanatory Notes

Table E5. Comparison of planned timber harvest under the no action and proposed action alternatives (thousand board feet)

FS Region	Annual Harvest No Action Alternative	Annual Harvest Proposed Action Alternative	Maximum Potential Annual Harvest Loss
R1	317	269	48
R2	166	116	50
R3	101	101	0
R4	211	197	20
R5	453	424	29
R6	976	947	29
R8	675	602	73
R9	537	515	22
R10	189	108	81
National	3,626	3,275	351

Source: Data derived from Interim Rule Suspending Road Construction in Unroaded Areas of National Forest System Land Environmental Assessment, USDA Forest Service, March 1999.

Table E6. Comparison of annual net benefits of timber harvest effects under the No Action and Proposed Action Alternatives (thousand dollars--1997 dollars)

FS Region	Net Benefits No Action Alternative (1)	Net Benefits Proposed Action Alternative (2)	Difference in Net Benefits (1)-(2)
R1	$ 27,852	$ 23,639	$ 4,213
R2	15,247	10,655	4,593
R3	41,353	41,353	0
R4	18,918	17,122	1,796
R5	16,379	15,343	1,036
R6	173,123	168,038	5,085
R8	83,072	74,042	9,030
R9	41,869	40,155	1,714
R10	-32,105	-18,427	-13,679

National	385,708	371,921	13,787

Table E7. Comparison of direct and total job effects under the No Action and Proposed Action Alternatives

FS Region	Direct Jobs No Action Alternative	Direct Jobs Proposed Action Alternative	Total Jobs No Action Alternative	Total Jobs Proposed Action Alternative
R1	3,173	2,693	12,693	10,773
R2	996	696	2,324	1,624
R3	912	912	1,824	1,824
R4	1,896	1,716	3,371	3,051
R5	3,173	2,973	4,987	4,671
R6	7,808	7,579	13,664	13,263
R8	6,747	6,013	12,819	11,425
R9	3,761	3,607	5,911	5,669
R10	947	543	1,515	869
National	29,413	26,733	59,107	53,169

Table E8. Comparison of direct and total job effects with harvest substitution on non-NFS lands under the No Action and Proposed Action Alternatives

FS Region	Direct Jobs No Action Alternative	Direct Jobs Proposed Action Alternative	Total Jobs No Action Alternative	Total Jobs Proposed Action Alternative
R1	3,173	2,789	12,693	11,157
R2	996	816	2,324	1,904
R3	912	912	1,824	1,824
R4	1,896	1,752	3,371	3,115
R5	3,173	2,973	4,987	4,671
R6	7,808	7,579	13,664	13,263
R8	6,747	6,673	12,819	12,679
R9	3,761	3,746	5,911	5,886
R10	947	543	1,515	869
National	**29,413**	**27,783**	**59,107**	**55,369**

Table E9. Comparison of timber receipts under the No Action and Proposed Action Alternatives

FS Region	Estimated Receipts per thousand board feet ($)	Total Receipts No Action Alternative (thousand $)	Total Receipts Proposed Strategy Alternative (thousand $)	Difference (million $)
R1	$152	$48,235	40,939	7,296
R2	143	23,738	16,588	7,150
R3	79	8,005	8,005	0
R4	131	27,597	24,977	2,620
R5	121	54.853	51,385	3,469
R6	198	193,248	187,572	5,676
R8	154	103,899	92,605	11,293
R9	100	53,733	51,533	2,200
R10	23	4,355	2,499	1,855
National		517,663	476,104	41,559

Table E10. Comparison of payments to states under the No Action and Proposed Action Alternatives (thousand dollars)

FS Region	Payments to States No Action Alternative	Payments to States Proposed Strategy Alternative	Difference
R1	$12,059	$10,235	$ 1,824
R2	5,935	4,147	1,788
R3	2,001	2,001	0
R4	6,899	6,244	655
R5	13,713	12,846	867
R6	48,312	46,893	1,419
R8	25,975	23,152	2,823
R9	13,433	12,883	550
R10	1,089	625	464
National	129,416	119,026	10,390

Appendix F

Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (Summary) (Misc. Report FS-643, August 1999)