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**Regulatory Impact Analysis for the Roadless Area Conservation Rule**

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## Regulatory Impact Analysis for the Roadless Area Conservation Rule

### PROPOSED ACTION

The Forest Service plans to publish a final Roadless Area Conservation Rule (Roadless Rule) to protect inventoried roadless areas within the National Forest System. This rule would prohibit road construction and reconstruction, including temporary road construction, upon implementation of the final rule. Timber harvest within inventoried roadless areas would be prohibited except for clearly defined, limited purposes.

Timber harvest (cutting, sale, or removal) could only occur if the Responsible Official determined that one of the following circumstances exists:

- (1) The cutting, sales, or removal of generally small diameter timber is needed for one of the following purposes and will maintain or improve one or more of the roadless characteristics:
  - a) To improve threatened, endangered, proposed, or sensitive species habitat;
  - b) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, but within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period;
- (2) The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited by this rule;
- (3) The cutting, sale of removal of timber is needed and appropriate for personal or administrative use; or
- (4) Roadless characteristics have been substantially altered in a portion of an inventoried roadless area due to the construction of a classified road and subsequent timber harvest. Both the road construction and timber harvest must have occurred after the area was designated an inventoried roadless area and prior to the publication date of the Roadless Rule. Timber may be cut, soil, or removed only in the substantially altered portion of the inventoried roadless area.

Personal use harvest includes cutting of firewood and Christmas trees. Tree cutting can occur incidental to other management activities such as trail construction or maintenance, removal of hazard trees adjacent to classified roads for public health and safety reasons, fire line construction for wildland fire suppression or control of prescribed fire, or for survey and maintenance of property boundaries. Mechanical fuel treatments such as crushing, piling, or limbing would be permitted.

These restrictions would apply upon implementation of the final rule to 58.5 million acres of National Forest System lands. The final rule applies prohibitions immediately to the Tongass National Forest, but adopts a mitigation measure that the prohibitions do not apply to road construction, reconstruction, or the cutting, sale, or removal of timber in inventoried roadless

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areas on the Tongass where a notice of availability for a draft environmental impact statement for such activities has been published in the Federal Register prior to the publication date of the rule.

Several exceptions have been included in the Rule to meet legal obligations and to mitigate some economic and social effects. The responsible official may authorize road construction and reconstruction in any inventoried roadless areas for the following reasons:

- 1) A road is needed to protect public health and safety in cases of an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property;
- 2) A road is needed to conduct a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to conduct a natural resource restoration action under CERCLA, section 311 of the Clean Water Act, or the Oil Pollution Act;
- 3) A road is needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty;
- 4) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a classified road and that cannot be mitigated by road maintenance. Road realignment may occur only if the road is deemed essential for public or private access, natural resource management, or public health and safety;
- 5) Road reconstruction is needed to implement a road safety improvement project on a classified road determined to be hazardous on the basis of accident experience or accident potential; or
- 6) The Secretary of Agriculture determines that a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code, is in the public interest or consistent with the purposes for which the land was reserved or acquired, and no other feasible alternative exists; and
- 7) A road is needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease by the Secretary of Interior as of the publication date of the Roadless Rule, or for new leases issued immediately upon expiration of an existing lease.

Finally, in conjunction with, but independent of this rule, the Chief of the Forest Service would pursue funds to assist communities undergoing economic transition resulting from implementation of the Roadless Rule. The Agency's success in securing appropriations for these purposes would have a direct bearing on its ability to implement these programs. Such assistance could include the following:

- Provide financial assistance to stimulate community-led transition programs and projects in communities most affected by changes in roadless area management;
- Through financial support and action plans, attract public and private interest, both financial and technical, to aid in successfully implementing local transition projects and plans by coordinating with other Federal and State agencies; or
- Assist local, State, Tribal and Federal partners to work with those communities most affected by the final roadless area decision.

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## STATEMENT OF PURPOSE AND NEED

The purpose of the Roadless Rule is to conserve and protect the increasingly important values and benefits of roadless areas by: 1) prohibiting activities that have the greatest likelihood of degrading desirable characteristics of inventoried roadless areas, and 2) ensuring that the ecological and social characteristics of inventoried roadless areas are identified and considered through local land management planning efforts<sup>1</sup>.

On October 13, 1999, President Clinton provided direction to the Forest Service stating:

*I have determined that is in the best interests of our Nation...to provide strong and lasting protection for these forests... Specifically, I direct the Forest Service to develop, and propose for public comment, regulations to provide appropriate long-term protection for most or all of these currently inventoried "roadless" areas, and to determine whether such protection is warranted for any smaller "roadless" areas not yet inventoried.*

Land management decisions on the national forests and grasslands attempt to achieve a balance between competing interests and values. Local land management planning efforts may not always recognize the cumulative national significance of inventoried roadless areas and the values they represent, especially given the increasing development of the nation's landscape. Urbanization, reduction in the size of forest tracts, habitat fragmentation, and other forest ecosystem health issues are concerns at local, regional, national, and global levels. When managing inventoried roadless areas, it is important to recognize that decisions made at finer scales (e.g. project, watershed, or national forest level), must be considered in a broader context. While individual decisions to build roads may achieve local management objectives, collectively they may result in a continued net loss of the quality and quantity of inventoried roadless areas nationally.

Regardless of how well informed individual decisions may be at the local level, any new road building in inventoried roadless areas still results in a loss of roadless characteristics. When local officials evaluate the impacts of their decision to build a road into an inventoried roadless area, the incremental effect of the decision is considered. However, when these individual decisions are aggregated over time, the ecological and social outcomes resulting from the loss of roadless areas may become substantial.

Even though 24.2 million acres (41%) of inventoried roadless areas are currently managed under land management plan prescriptions that prohibit road construction, these prescriptions could change at the next plan revision. The final rule would elevate the certainty of long-term protection to all inventoried roadless areas.

Given the history of controversy surrounding the management of inventoried roadless areas and the level of interest expressed by the public, the Agency has determined that there is a need for national-level direction for roadless area management. The action is needed because:

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<sup>1</sup> The Draft Environmental Impact Statement for Roadless Area Conservation included alternatives to develop procedures to evaluate and conserve roadless characteristics during land management planning revisions. The Forest Service determined that the procedures should be an explicit part of the plan revision process and addressed them at 36 CFR 29.9(b)(8) of the final Planning Regulations.

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- Road construction, reconstruction, and timber harvest activities in inventoried roadless areas can directly threaten the fundamental characteristics of these areas by altering natural landscapes, including habitat fragmentation and changes in native plant and animal communities;
- Budget constraints permit only a small portion of the Agency road system to be effectively managed; and
- National concern over roadless area management continues to generate controversy, including costly and time-consuming appeals and litigation.

## **IMPLICATIONS OF RELATED PLANNING EFFORTS**

The Forest Service recently published the final Planning Regulation (36 CFR Parts 217 and 219). While the Roadless Rule would immediately protect inventoried roadless areas, and the increasingly important values and benefits they provide, the Planning Regulations will guide the long-term conservation and management of inventoried roadless areas and unroaded areas. In addition to the Roadless Rule and Planning Regulations, the Forest Service has one other directly related ongoing rulemaking effort: *National Forest System Road Management and Transportation System; 36 CFR Parts 212, 261, and 295, and Associated Forest Service Manual 7700 Revisions; 65 Federal Register 11676* (collectively known as the Roads Policy).

The Planning Regulations implement the National Forest Management Act to address ecological, economic, and social sustainability. Specifically, the Planning Regulations:

- Base land management planning on the principles of the interrelated ecological, economic, and social elements of sustainability;
- Require the Forest Service to actively engage the public and other Federal, State, local, and Tribal partners in the management of National Forest System lands;
- More effectively integrate science into the planning process and require the Agency to manage ecosystems rather than single outputs or outcomes;
- Integrate planning and management activities more closely so that the Forest Service can respond to new information and opportunities in a timely manner; and
- Identify and evaluate roadless areas based on sustainability requirements of the Planning Regulations, and consider protection for inventoried roadless areas and unroaded areas in addition to those protections required by the Roadless Rule, Roads Policy, and other applicable laws and policy.

The Roads Policy for the Forest Transportation System addresses management of existing roads. The policy is intended to:

- Make the existing forest road system safe, responsive to public needs, environmentally sound, affordable, and efficient to manage;
- Be implemented through public involvement and analysis at the local level;
- Implement a scientific analysis procedure to help land managers and the public identify heavily used roads that need to be maintained or upgraded, and roads that are unused or environmentally damaging that can be decommissioned or converted to other uses;
- Place a new emphasis on maintaining and reconstructing existing roads rather than building new roads, given the extensive road system that is already in place in most national forests, and to carefully consider any proposals for new roads; and

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- Provide interim protection for inventoried roadless and some defined unroaded areas.

All three rules seek to provide long-term environmental sustainability, ensure collaboration with the public, integrate science into planning and management of National Forest System lands, and incorporate new information and opportunities.

### *OVERLAP OF ANALYSIS BETWEEN ROADLESS RULE AND RELATED PLANNING EFFORTS*

Ideally, the impacts of the Roadless Rule would estimate those incremental effects that would occur independent of other agency rules and policies. The economic impacts of the Roadless Rule described in this analysis should be mostly independent of the effects of the Planning Regulations. The Roads Policy provides short-term protection for inventoried roadless areas and defined unroaded areas. Since the Roadless Rule provides stronger and more lasting protection for inventoried roadless areas than the Roads Policy, it is appropriate to attribute the economic effects within inventoried roadless areas to this Rule, while economic effects associated with the other unroaded areas protected in the Roads Policy are attributed to that Policy. A more complete discussion of the relationship between these policies can be found in the Forest Service Roadless Areas Conservation Final Environmental Impact Statement (FEIS) (USDA Forest Service 2000b).

### **SUMMARY OF RESULTS OF THE REGULATORY IMPACT ANALYSIS**

Many of the benefits and costs associated with the final rule were not quantifiable. Therefore, many of the costs and benefits are described qualitatively. Although the analysis does not provide a quantitative measure of net benefits, the Agency believes the benefits of the rule outweigh the costs.

Local-level analysis cannot easily incorporate the economic effects associated with nationally significant issues. Therefore, the Agency believes the aggregate transactions costs (costs associated with the time and effort needed to make decisions) of local level decisions would be much higher than the transactions costs of a national policy, because of the controversy surrounding roadless area management.

National Forest System lands provide a variety of goods and services to the American public. Use of the national forests and grasslands for both commodities and amenity services varies over time, in response to changing market conditions, consumer preferences, and other factors. For the purpose of this analysis, the baseline describes the likely mix of goods and services from the national forests and grasslands in the near future in the absence of the Roadless Rule. The Roadless Rule is likely to affect some goods and services, while having no effect on others. Details on the environmental effects of the final rule can be found in the Forest Service Roadless Area Conservation Final Environmental Impact Statement (FEIS).

Most of the benefits of the rule result from maintaining roadless areas in their current state, and therefore maintaining the current stream of benefits from these areas. The costs are primarily associated with lost opportunities, since the final rule would limit some types of development activities that might have occurred in the future without this rule. Table 1 summarizes the potential benefits and costs of the rule.

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## *POTENTIAL BENEFITS OF THE ROADLESS RULE*

Undisturbed landscapes provide a variety of monetary and non-monetary benefits to the public. Many of these benefits are associated with the protection of ecological, social, and economic values in inventoried roadless areas.

Air and water quality would be maintained at a higher level than under the baseline. Higher water quality provides a higher level of protection for drinking water sources, reduces treatment costs for irrigation, reservoirs, and other downstream facilities and maintains the value of water-based recreation activities. Higher air quality protects not only values associated with human health, but also improves visibility and benefits recreation and adjacent private property values.

A greater degree of protection of biological diversity and threatened and endangered species would occur if roads and commodity timber harvest were prohibited in inventoried roadless areas as opposed to the baseline. As a result, ecological values would be maintained. Passive use values related to the existence of biological diversity and threatened and endangered species would be maintained, as well as values associated with protecting these areas for future generations.

A number of other benefits are associated with maintaining healthy wildlife and fish populations at a level higher than under the baseline. Some game species are likely to benefit from this protection, which would maintain quality hunting and fishing experiences both within inventoried roadless areas and beyond. Other types of recreation experiences, such as wildlife viewing, also would benefit.

Inventoried roadless areas are important in providing remote recreation opportunities. A greater number of acres in these recreation settings would be maintained than under the baseline. Remote areas are also important settings for many outfitter and guide services. Maintaining these areas increases the ability of the agency to accommodate additional demand for these types of recreation special use authorizations.

Inventoried roadless areas provide a remote recreation experience without the activity restrictions of Wilderness (for example, off-highway vehicle use and mountain biking). Maintaining roadless areas would likely lessen visitation pressure on Wilderness compared to the baseline.

The risk of introducing non-native invasive species would be reduced if road access were not available. This is beneficial to grazing permittees with allotments in inventoried roadless areas, and to collectors of non-timber forest products by maintaining forage quality and quantity, and forest products that cannot compete with invasive species. The reduced probability of introduction would also benefit forest health in inventoried roadless areas and would contribute to the maintenance of biological diversity.

Some planned timber sales in inventoried roadless areas are likely to cost more to prepare and sell than they realize in revenues received. To the extent that these sales will not take place, a financial efficiency savings would be realized. Implementing the rule could result in agency cost savings. First, local appeals and litigation about some management activities in roadless areas could be reduced, which would avoid future costs. Secondly, the reduction in new miles of roads constructed would reduce the number of miles the agency is responsible for maintaining in the future, resulting in avoiding up to an additional \$219,000 per year of costs.

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## *POTENTIAL COSTS OF THE ROADLESS RULE*

The prohibition on road construction, reconstruction and timber harvest except for clearly defined, limited purposes would reduce development of roaded access to resources within inventoried roadless areas compared to the baseline. Roads are required for most timber sales to be economically feasible. For those sales that are financially profitable, the rule would reduce net revenues. In addition to lost revenue, there would be an estimated immediate impact of 461 fewer timber jobs and 841 total jobs, with an associated annual loss of \$20.7 million in direct income and \$36.2 million in total income. In the longer term, an additional 269 timber jobs and 431 total jobs could be affected from harvest reductions on the Tongass National Forest. The longer-term income effect was estimated at \$12.4 million in direct income and \$20.2 million in total income. A reduction in the timber program could also affect about 160 Forest Service jobs, with an additional 100 jobs affected on the Tongass in the longer term.

Jobs associated with road construction and reconstruction for timber harvest and other activities would also be fewer than under the baseline. Initially, between 43 and 51 direct jobs and between 88 and 104 total jobs could be affected by reduced road construction and reconstruction. An additional 39 direct jobs and 78 total jobs could be affected by harvest reductions on the Tongass in the longer term.

The impact on mineral resources will vary, depending on factors such as prices, technology change, and substitutes. Reasonable access to conduct exploration and development activities for locatable minerals (metallic and nonmetallic minerals subject to appropriation under the General Mining Law of 1872) would continue. Such access often involves some level of road construction that, depending on the stage of exploration or development, could range from temporary, unimproved roads to more permanent, improved roads.

Exploration for and development of leasable minerals (such as oil, gas, coal, and geothermal) on areas not already under lease would likely be limited because roads are often needed for these activities. In the short-term, up to 546 direct and 3,095 total jobs could be affected, with direct income effects of \$36 million and total income effects of \$128 million. Payments to states could be reduced by about \$3.2 million per year. Between 308 and 1,371 million tons of coal resources on the Grand Mesa, Uncompaghre, and Gunnison and Manti-LaSal National Forests could be unavailable for development as a result of this rule. About 873 million tons of phosphate resources on the Caribou National Forest may also be unavailable. Other inventoried roadless areas may contain additional coal and phosphate resources. An estimated 11.3 trillion cubic feet of undiscovered natural gas and 550 million barrels of undiscovered oil resources could also be affected. Effects on saleable minerals (such as sand, gravel, stone, and pumice) are expected to be negligible.

New roads have the potential to reduce current operating costs for other users, for example, grazing permittees and collectors of non-timber forest products, by allowing faster and easier access. These potential cost reductions would not be realized if road construction is prohibited. However, the agency builds few roads for recreation, grazing, or collection of non-timber forest products, and this pattern is unlikely to change. New roads built for other purposes may provide additional access for recreationists, including hunters and anglers. Prohibiting construction of new roads would have minimal impacts on these groups, since all temporary roads and many of the other planned roads would be closed once the intended activity is concluded. Therefore, the number of additional road miles that would be available for recreational or other uses would be small.

Opportunities for some types of recreation special uses may be limited in the future. Developed recreation use and road-based recreation uses in general are more likely to occur at higher densities outside of inventoried roadless areas than under the baseline, since expansion into inventoried roadless areas would not occur. However, roads are rarely constructed into inventoried roadless areas for recreation purposes. The development of new ski areas within inventoried roadless areas would be unlikely. Other, new non-recreation special uses may be limited in the future as well. Such special uses include communication sites and energy-related transmission uses (such as ditches and pipelines, and electric transmission lines).

There could be a slight increase in the risk from uncharacteristic wildland fire or insect and disease as a result of reduced opportunities for forest health treatments. However, the Forest Service would likely treat few acres of inventoried roadless areas, regardless of the issuance of the Roadless Rule, since most moderate and high risk forests in inventoried roadless areas would be given a low priority for treatment unless there was an imminent threat to public safety, private property, water quality, or threatened and endangered species. While overall fire hazard can still be reduced without roads, restricted road access would likely increase the cost of treatments, which would result in fewer acres treated. Some fuel treatment techniques available under the baseline would not be economically or logistically feasible. Of the 14 million acres in inventoried roadless areas identified as potentially requiring fuel treatment, 6.5 million could still be treated with prescribed fire without mechanical pretreatment. The use of timber harvest for fuel management would be limited to those activities that reduce uncharacteristic wildfire effects through the cutting, sale, or removal of small diameter timber that maintains or improves one or more of the roadless characteristics. For the next 5 years, about 22,000 acres could be treated by the limited timber harvest allowed under the final rule. Although this is a significant decline in treatment acres compared to acres that would have been harvested under the baseline, the total acreage affected is still less than 1% of all inventoried roadless areas that potentially require mechanical pretreatment.

Agency costs could increase compared to the baseline for some types of activities. Fuel treatment and other ecological restoration treatment costs in inventoried roadless areas would likely increase, but the impact on agency costs is likely to be negligible since treatment in most inventoried roadless areas is a lower priority.

The goods and services that could not be produced from inventoried roadless areas without road construction are likely to be produced either on other parts of National Forest System land or on other lands. Substitute production could result in adverse environmental effects on these other lands.

**Table 1. Summary of Costs and Benefits of the Roadless Area Conservation Rule Compared to the Baseline.**

<i>Category</i>	<i>Baseline</i>	<i>Final Rule</i>
Air quality <sup>1</sup>	Potential increase in dust, vehicle emissions associated with road use and management activities in inventoried roadless areas.	Air quality is maintained in inventoried roadless areas.
Water quality <sup>1</sup>	Potential increase in sediment associated with roads and management activities in inventoried roadless areas.	Water quality is maintained in inventoried roadless areas.
Land base available for dispersed recreation activities <sup>1</sup>	Decrease in remote settings, increase in developed settings on National Forest System lands.	Current land base for remote and developed settings is maintained on National Forest System lands.

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Quality of fishing and hunting for recreation, commercial, and subsistence users <sup>1</sup> .	Potential habitat degradation, increase in roaded access, and decrease in remote hunting and fishing opportunities.	Existing hunting and fishing quality and access in inventoried roadless areas maintained. Opportunities for remote experiences are maintained.
Forage quality for livestock grazing <sup>1</sup>	Increased risk of non-palatable invasive species.	Existing forage quality is maintained.
Non-timber forest products <sup>1</sup>	Increased risk of invasive species displacing desired products.	Non-timber forest products maintained at current levels.
Existence and bequest values <sup>1</sup>	Potential decrease due to loss of biological diversity and increased risks to threatened and endangered species habitat in inventoried roadless areas.	Values maintained at existing levels due to conservation of biological diversity and habitat for threatened and endangered species in inventoried roadless areas.
Agency costs associated with planning activities <sup>1</sup>	No change in current costs associated with appeals and litigation on roadless area management.	Savings in costs associated with appeals and litigation on roadless area management.
Agency cost associated with road maintenance <sup>2</sup>	Increase up to \$219,000 per year in maintenance cost associated with new roads in inventoried roadless areas.	No increase in road maintenance costs in inventoried roadless areas.
Projected timber harvest (average annual) from inventoried roadless areas <sup>3</sup>	146.7 million board feet	74.3 million board feet
Timber related jobs <sup>4</sup>	No change to current estimates of future timber associated direct and total jobs.	Estimated job loss of 461 direct jobs and 841 total jobs. An additional 269 direct and 431 total jobs could be affected in Alaska over the longer term.
Timber related income <sup>4</sup>	No change to current estimates of future timber associated direct and total income.	Estimated annual income loss of about \$20.7 million direct income and \$36.2 million total income. An additional \$12.4 million direct income and \$20.2 total income could be affected in Alaska over the longer term.
Road construction jobs <sup>5</sup>	No change to current estimates of future road construction direct jobs.	Projected annual job loss ranging from 43 to 51 direct jobs and between 88 and 104 total jobs. An additional 39 direct and 78 total jobs could be affected in Alaska over the longer term.
Exploration and development for locatable minerals (gold, silver, lead, etc.) <sup>1</sup>	Existing mineral availability continues subject to General Mining Law of 1872.	Access continues subject to General Mining Law of 1872.
Exploration and development for leasable minerals (e.g. oil, gas, coal) <sup>1</sup>	Existing mineral availability continues along with current exploration and development costs.	Exploration and development requiring roads would be precluded, except in areas under lease as of the effective date of the Roadless Rule.

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Leasable minerals related jobs <sup>6</sup>	No change to current estimates of future mineral associated direct and indirect jobs.	Potential annual effect on mining related employment is a decrease of 546 direct and 3,095 total jobs.
Leasable minerals related income <sup>6</sup>	No change to current estimates of future minerals associated direct and total income.	Potential effect on mining related income is \$36.2 million less direct and \$127.8 million less total income.
Payments to states for leasable minerals	Payments will continue to vary as extraction varies over time.	Payments associated with coal and phosphate could be reduced by \$3.2 million per year.
Leasable mineral resources	No change to current estimates of available leasable resources	About 873 million tons of phosphate and 308 to 1,371 tons of coal would likely be unavailable for development. About 11.3 trillion cubic feet of undiscovered gas and 550 million barrels of undiscovered oil resources could be affected.
Exploration and development for saleable minerals (sand, stone, gravel, pumice, etc.) <sup>1</sup>	Existing mineral availability continues along with current exploration and development costs.	In a few isolated cases, development requiring roads may be precluded or costs may increase.
Operating costs for grazing permittees <sup>1</sup>	Increased access can potentially decrease cost	No change in operating costs
Operating costs for collectors of non-timber products <sup>1</sup>	Increased access can potentially decrease cost	No change in operating costs
Special-use authorizations (such as communications sites, electric transmission lines, pipelines) <sup>1</sup>	Current use and occupancies	Current use and occupancies not affected, future developments requiring roads excluded in inventoried roadless areas unless one of the exceptions applies
Forest health <sup>1</sup>	Potential lower cost of treatments due to increased access	Slightly increased risk because of fewer treatment opportunities. Cost of current treatments remain unchanged.

1 Analysis based on qualitative discussion.

2 Analysis based on historic Agency data on expenditures .

3 Analysis based on forest-level data on projected timber volumes in inventoried roadless areas.

4 Analysis based on Agency data from Timber Sales Program Information System Reporting System (TSPIRS) and IMPLAN model multipliers.

5 Analysis based on Agency estimates of historic expenditures and IMPLAN model multipliers.

6 Analysis based on Agency production estimates and IMPLAN model multipliers.

## SCOPE OF ANALYSIS

A total of 58.5 million acres of inventoried roadless areas currently exist on National Forest System lands. About 24.2 million acres of the inventoried roadless areas are currently in land management prescriptions that do not allow road construction and reconstruction, while the remaining 34.3 million acres were designated for general forest use. About 8 percent of that area contains classified roads.

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The Roadless Rule would apply a prohibition on road construction and reconstruction and limit timber harvest to harvest only for clearly defined, limited purposes within inventoried roadless areas. The total area affected upon implementation of the final rule is about 58.5 million acres, which is about 30 percent of the total National Forest System. Some activities will be allowed on the Tongass National Forest for which a notice of availability for a draft environmental impact statement was published by the publication date of the final rule. Most of the effects of the rule would occur on the 34 million acres that currently allow road construction and reconstruction.

### *TIME FRAME OF ANALYSIS*

The benefit-cost analysis focuses on effects in the 5 years after the final rule is promulgated on all national forests and grasslands. Longer-term effects are addressed primarily through a description of expected future trends.

### **BASELINE FOR ANALYSIS**

National Forest System lands provide a variety of goods and services to the American public. Use of the national forests and grasslands for both commodities and amenity services varies over time, in response to changing market conditions, consumer preferences, and other factors. For the purpose of this analysis, the baseline describes the likely mix of goods and services from the national forests and grasslands in the near future in the absence of the Roadless Rule. The Roadless Rule is likely to affect some goods and services, while having no effect on others. Details on the environmental effects of the final rule can be found in the FEIS (USDA Forest Service 2000b).

The Roadless Rule does not suspend or modify any existing permit, contract, or other legal instrument authorizing the occupancy and use of National Forest System lands. The rule may affect future opportunities for both personal use and commercial use of these resources.

Data were not available to quantify many of the costs and benefits because of the lack of data specific to inventoried roadless areas. Both commercial and recreational activities occur across the national forests and grasslands. Even in cases where data for the entire National Forest System exists, data on activities within inventoried areas are often unavailable, particularly at the regional or national level. For example, recreation use data are not available by inventoried roadless areas. Many uses, such as outfitter and guide permits, occur on both roaded and roadless areas.

Some data were collected in support of the analysis. Inventoried roadless areas were mapped on each national forest and grassland. Data were collected from the national forests and grasslands about planned timber offer and any other planned road-dependent activities in inventoried roadless areas from 2000 through 2004, including information about whether any of the planned activities in inventoried roadless areas would be operating under an existing permit, contract, or other legal instrument authorizing the occupancy and use of National Forest System lands. The miles of road construction and reconstruction associated with planned timber offer volumes and other planned activities were also estimated. Since fiscal year 2000 (the first year of the collected data) has already passed, the data were interpreted to be indicative of effects in the next five years.

## ALTERNATIVES TO THE ROADLESS RULE

Federal agencies are obligated to consider other alternatives to the regulatory process, including options such as judicial review, subsidies or taxes, legislative measures, or modification of existing regulations. The judicial review process tends to focus on individual, site-specific cases that do not address the protection of inventoried roadless areas nationwide. The Forest Service does not have the authority to create new taxes or subsidies, and neither of these options would directly address the purpose and need of the action. To date, Congress has not chosen to address inventoried roadless areas outside of their role in designating Wilderness, and therefore the Forest Service chose the regulatory process to provide national protection for these areas. On June 18, 1999, 166 Members of Congress requested that the President “take decisive action to protect the remaining roadless areas in our national forests.” The Agency has adequate statutory authority to undertake this initiative without additional legislation. Other Forest Service regulations are in place providing procedural guidance on the evaluation of roadless areas as candidates for the National Wilderness Preservation System. However, existing regulations do not provide long-term protection for inventoried roadless areas in their current state.

Agencies are also required to explore a range of alternatives for meeting the purpose of the proposed action. The Forest Service considered a range of alternatives that are fully described in Chapter 2 of the FEIS (USDA Forest Service 2000b). A subset of the range of alternatives that were considered most appropriate for meeting the purpose and need of the proposed action were then analyzed in more detail.

Two groups of alternatives were addressed in the FEIS: 1) alternatives for prohibiting activities in inventoried roadless areas, and 2) alternatives for implementing prohibitions on the Tongass National Forest. The Roadless Rule is a combination of alternatives and mitigation measures analyzed in the FEIS.

Prohibitions refer to the activities or uses that would not be allowed to occur within the boundaries of inventoried roadless areas. Four prohibition alternatives were considered:

- 1) No Action, No Prohibitions;
- 2) Prohibit road construction and reconstruction within inventoried roadless areas;
- 3) Prohibit road construction, reconstruction, and timber harvest except for stewardship purposes<sup>2</sup> within inventoried roadless areas; and
- 4) Prohibit road construction, reconstruction, and all timber cutting within inventoried roadless areas.

Three social and economic mitigation measures were considered that could be applied to any of the prohibition alternatives. The responsible official may authorize road construction or reconstruction in any inventoried roadless areas when:

- Reconstruction is needed to implement road safety improvement projects on roads determined to be hazardous on the basis of accident experience or accident potential;
- The Secretary of Agriculture determines that a Federal Aid Highway project authorized pursuant to Title 23 of the United States Code is in the public interest or is consistent

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<sup>2</sup> Concerns over the potential confusion of the interpretation of “stewardship” led the agency to clearly define the limited circumstances where timber harvest would be permitted. Therefore, the term “stewardship” does not appear in the final rule.

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with the purposes for which the land was reserved or acquired, and no other feasible alternative exists; or

- A road is needed for prospective mineral leasing activities in inventoried roadless areas.

Four alternatives were considered specifically for the Tongass National Forest:

- 1) Alternative selected for the rest of National Forest System lands would apply to the Tongass National Forest (Tongass Not Exempt);
- 2) Alternative selected for the rest of National Forest System lands would not apply to the Tongass (Tongass Exempt);
- 3) No alternative selected at this time; determine whether road construction should be prohibited in inventoried roadless areas on the Tongass part of the 5-year plan review (Tongass Deferred);
- 4) Prohibit road construction and reconstruction in Old Growth, Semi-Remote Recreation, Remote Recreation, and LUD II Prescriptions within inventoried roadless areas on the Tongass (Tongass Selected Areas).

In addition, a potential mitigation was considered in conjunction with the Tongass Not Exempt alternative, in which the selected prohibition alternative would be applied to the Tongass in April 2004.

## **ECONOMIC EFFECTS OF THE ROADLESS RULE**

The economic effects are described by resource area, including air and water quality, passive use, recreation, hunting and fishing, timber, energy and non-energy minerals, grazing, special uses, non-timber forest products, and roads. Separate sections discuss effects on forest-dependent communities, forest health, and agency costs. The baseline for each resource area describes the flow of goods and services in the absence of the Roadless Rule, while the economic effects of the Roadless Rule describe the effects associated with prohibiting roads and allowing timber harvest only for limited purposes in inventoried roadless areas.

In many cases, the effects are linked to the number of road miles that would be built in the absence of the Roadless Rule. Since it is unlikely that all planned projects would be implemented, total road miles would be less than projected miles. It was not possible to predict which of the projects are likely to proceed. Therefore, the miles associated with most effects are based on total planned miles (Appendix A1). The only exception is the analysis of road construction effects associated with timber harvest, in which case the road miles associated with planned timber offer were adjusted to be consistent with estimated harvest volumes.

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## *AIR AND WATER QUALITY*

People have many reasons for believing it is important to protect air and water quality. The most recent EPA water quality inventory found that non-point source pollution still accounts for the majority of water-quality impaired stream miles and lake acres (U.S. EPA 1998). Although agriculture is still the largest non-point source of water pollution, forestry and other activities are important contributors in some areas of the U.S. Roads have long been recognized as the primary human-caused source of soil and water disturbances in forested environments (Patric 1976, Egan and others 1996). The costs of water quality control in the U.S. are substantial and rising. A recent EPA survey indicates that community water systems in the U.S. will need to invest \$138 billion over the next 20 years to continue to provide safe drinking water (Hertzler and Davies 1997).

Water quality also affects the value of water-based recreation activities. The impact of sedimentation and other water quality impairments have a negative effect on recreation user benefits. For example, one national study (Russell and Vaughan 1982) estimated that the total benefits to anglers of improving the water quality of lakes and streams ranged from \$300 to \$966 million nationwide (in 1982 dollars), while another national study estimated that the total damages to all recreational water uses from all types of pollution ranged from \$1.8 to \$8.7 billion (in 1978 dollars, per year) (Freeman 1982).

Air quality affects human health; it also affects visibility that can adversely impact scenic quality and the ability to enjoy outdoor recreation in natural areas. Several studies have documented peoples' willingness to pay to protect or enhance air quality and corresponding visibility. A study of the benefits of preserving visibility in National Parks of the southwestern U.S. determined that the benefits outweighed the treatment and regulatory costs (Schulze and others 1983). A study conducted in Utah County, Utah estimated that respondents were willing to pay an average of \$37 per household per month to improve air quality to a level found in nearby areas in Utah and Idaho (Pope and Miner 1988).

### **Air and Water Quality Baseline**

Water flowing from the national forests and grasslands is important to downstream users, such as municipalities, irrigators, and industrial users. In-stream uses for hydroelectric generation and recreation are also highly valued uses of water flowing from National Forest System lands. The EPA estimated in 1999 that 3,400 public drinking water systems are located in watersheds containing National Forest System lands. About 60 million people live in those 3,400 communities (Sedell and others 2000).

Of the more than 2,000 major watersheds in the United States and Puerto Rico, 914 contain some National Forest System lands, and 661 contain inventoried roadless areas (U.S. EPA 1997). More than 50% of the watersheds containing inventoried roadless areas are source areas that provide water to treatment facilities that provide drinking water to the public. While parts of these areas are specifically designated as municipal watersheds, and have elaborate use restrictions, many others contain a wide range of multiple uses.

There are 163 designated Class I areas for air quality protection in the nation. The Forest Service manages 88 of these areas. Roding introduces dust and vehicle emissions that can affect air quality in these airsheds or in other areas. Over the long term, incremental entry will add to these problems. However, these effects are likely to be small, given the number of road miles that would be added to the system.

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At total of 1,160 miles of road construction and reconstruction were planned in inventoried roadless areas in the next 5 years. New road construction into inventoried roadless areas, and timber harvest, can reduce water quality by introducing sediment and nutrients, and causing abnormal temperature fluctuations. Roads and logging may also cause or accelerate surface erosion, and initiate mass wasting events such as landslides and mudflows. The parts of inventoried roadless areas most likely to be impacted by these activities are those with high precipitation, steep slopes, and erodible soils.

### **Summary of Public Comments**

Comments were received on the importance of managing inventoried roadless areas to protect municipal watershed and maintain watershed stability. Other commentators believed that requirements for best management practices and other environmental safeguards were sufficient to minimize damage from road construction and reconstruction and timber harvest on air and water quality.

### **Air and Water Quality Economic Effects**

The Roadless Rule will remove a major cause of possible adverse watershed effects in inventoried roadless areas. Although some timber harvest would still be allowed, harvest requiring road construction is more likely to impair water quality. Water quantity, timing, and magnitude would remain near natural background levels. Soil loss and sediment from erosion and mass wasting would be reduced, except in those high-risk areas where timber harvest could occur without roads. However, it is unlikely that timber harvest would occur in such areas.

Air quality would be maintained in inventoried roadless areas. However, to the extent that vehicle use increases on already roaded areas, there could be additional deterioration in those areas. However, these effects are likely to be negligible compared to the baseline.

The prohibitions of the Roadless Rule would likely maintain higher water quality in comparison to activities that would take place under the baseline. As a result, water from National Forest System lands used for municipal drinking supplies will not require increased treatment. Also, the benefits of water-based recreation will not be adversely impacted in these areas. Air quality and associated visibility should be maintained, thereby preventing any adverse impacts on human health and on visibility-related recreation benefits. These positive impacts may be partially offset by increased deterioration in air quality in roaded areas because of the lack of opportunity to distribute use into new areas. However, the miles of planned road construction are small relative to the entire road system within the National Forest System, so these consequences should be relatively minor.

### ***PASSIVE USE VALUES***

Passive use or “non-use” values are independent of any active or consumptive use of a natural area. Passive use values include existence and bequest values. Existence values are associated with things, places, or conditions that people value simply because they exist, without any intent or expectation of using them (Peterson and Sorg 1987, Randall 1992). Bequest value is the desire to allow others, such as future generations, to benefit from a resource.

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Passive use values are often associated with threatened and endangered species, unique ecosystems, and biological diversity. Passive use values differ among individuals, groups, and landscape conditions. Under special conditions, the passive use value of an area can exceed the active use value served (or potentially served) by road access to that area (Walsh and others 1984, Driver and others 1987, Walsh and others 1990, Payne and others 1991, Brown 1993, Driver and others 1996, Bengston and Fan 1999). Walsh and others (1984) found that passive use values accounted for 38% to 54% of the value of protecting areas as Wilderness. Walsh and others (1996) focused on what proportion of natural areas should be protected and the willingness of residents to pay for protection. Residents of all regions preferred protection for most natural areas in the eastern United States, while the proportion preferred in the West ranged from 83% to 92% of the natural areas. Willingness to pay for protection of natural areas averaged \$263 per person for all natural areas in the United States (including both use and passive use value). Most residents were willing to pay more for protection of areas within their own region, with the exception of a willingness to pay more for protecting natural areas in Alaska, indicating a significant passive use value for natural areas in Alaska. Loomis and Richardson (2000) estimated the total annual value of protecting roadless areas to be \$274 million in the West, and \$6.2 million in the East.

### **Passive Use Baseline**

Continuation of current management direction would result in continued road building and some timber harvest in inventoried roadless areas, which would have detrimental impacts on ecosystem integrity, including watershed health, forest health, and biodiversity. Currently undisturbed landscapes would be increasingly fragmented, which would reduce habitat connectivity. A number of threatened and endangered species depend on habitat found within inventoried roadless areas. Although mitigation measures would be required for planned activities that adversely impact these species, the cumulative effect of roaded entry would be a decline in habitat quality and a higher probability of harassment, disruption, and illegal harvest of some species. Increased entry into these areas will increase the likelihood of non-native invasive species being introduced. Non-native invasive species have the ability to severely impact native biological diversity.

### **Summary of Public Comment**

Respondents mentioned the importance of protecting inventoried roadless areas for their intrinsic value, as well as maintaining options for future generations. Some respondents did not believe passive use values should be included in the analysis.

### **Passive Use Economic Effects**

The final rule would protect inventoried roadless areas from some forms of development and disturbance, including some timber harvest. The current roadless characteristics of inventoried roadless areas would be maintained and protected to a greater extent than under the baseline. For example, water, soil, and air quality, and intact aquatic ecosystems would be maintained. Land-based ecosystems would be protected from additional habitat degradation, loss, and fragmentation; and species viability and biodiversity would more likely be maintained.

The quantity and quality of the ecological characteristics of National Forest System lands would be maintained relative to the baseline. Maintaining these characteristics is likely to maintain passive use values compared to the baseline. Since inventoried roadless areas provide

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important habitat for rare plant and animal species and conserve biological diversity, people's valuation of these characteristics will be maintained.

## RECREATION

Nationally, the demand for most recreation activities continues to grow (Cordell and others 1999). The 1994-95 National Survey on Recreation and the Environment found that 95% of the American population 16 years and older participated at least once in outdoor recreation during the year. This survey included recreation participation across the entire range of recreation settings on all ownerships, from urban parks and playgrounds to the most remote wilderness. The National Forest System provides recreation opportunities across a narrower range of settings, as described by the Recreation Opportunity Spectrum (ROS) (USDA Forest Service 2000b).

Recreation activities associated with more developed portions of the ROS (e.g., developed camping, driving for pleasure, and visiting nature centers) tend to be more popular in terms of total participants and days of participation (Cordell and others 1999). A smaller percent of the population engages in activities that are associated with more remote landscapes, such as backpacking, primitive camping, and semi-primitive motorized uses such as off-highway driving and snowmobiling. However, a variety of recreation activities occur in all of the ROS settings, including picnicking, hiking, wildlife viewing, off-highway driving, fishing and hunting.

Table 2 shows changes in national participation levels for outdoor recreation activities that are also available on National Forest System lands between 1982-1983 and 1994-1995. Participation has increased in all activities except horseback riding.

**Table 2. Number of Americans (16 years and older) Participating in Outdoor Recreation Activities Available on National Forest System Lands, 1982-1983, and 1994-1995.**

Activity	1982-1983 (millions)	1994-1995 (millions)
Visiting an historic or pre-historic site	No data available	123.3
Picnicking	84.8	98.3
Biking	56.5	57.4
Bird Watching	21.2	54.1
Hiking	24.7	47.8
Motor Boating	33.6	47.0
Developed Camping	30.0	41.5
Primitive Camping	17.7	28.0
Off-Road Driving	19.4	27.0
Skiing (Downhill + Cross-Country)	15.9	23.3
Backpacking	8.8	15.2
Horseback Riding	15.9	14.3
Snowmobiling	5.3	7.1

(Cordell and others 1999)

There are several reasons for the upward trend in outdoor recreation participation. Because 80% of the American population now resides in urban areas, recreation has become one of the

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few avenues people have for experiencing the outdoors. Moreover, people have become increasingly aware that outdoor recreation contributes to the quality of their lives (Driver and others 1999). One survey (The Recreation Roundtable 1994) found that participation in outdoor recreation, especially as a child, leads to a more satisfying and fulfilling life. People are also more aware of the numerous benefits that result from engaging in outdoor recreation (Driver and others 1999). These include:

- *Spiritual and Psychological Benefits:* better mental health, personal development and growth, personal appreciation and satisfaction, spiritual renewal, stress release, experiencing the natural world;
- *Physical Health Benefits:* exercise, spending time in relatively unpolluted environments;
- *Social and Cultural Benefits:* spending quality time with family and friends, learning about cultural and historical heritage resources, reinforcing cultural identity, improving environmental awareness, conflict resolution; and
- *Economic Benefits:* reduced health care costs, better job performance.

Federal lands are often the only source of remote recreation opportunities, such as those found in unroaded areas. For example, in the southern Appalachian region, federal lands provide two-thirds of remote settings. Attributes that are highly demanded include scenic landscapes, wild rivers, high quality trout habitat and historic sites (Southern Appalachian Man and the Biosphere 1996). The scarcity of federal lands in the East results in more limited opportunities to recreate in large, undeveloped areas relative to the population base. The concentration of federal lands in the West provides residents with much greater access to remote recreation experiences than in the eastern U.S.

Access to private land for public recreation is expected to decrease in the future; so public lands are likely to be the destination of choice for increasing numbers of people looking for high-quality recreation experiences in natural settings (Cordell and others 1999). Increasing demand is likely to lead to more congestion and user conflicts and less user satisfaction across all ROS settings. Urban residents have fewer outdoor recreation opportunities than rural dwellers, leading to increased pressures on, and demand for, recreation opportunities closer to metropolitan areas (Tarrant and others 1999). Recreation use patterns show a trend for more trips closer to home (Cordell and others 1999), which is most likely to impact public lands in close proximity to urban populations.

Recreation is an important component of the travel and tourism industry. Travel and tourism is America's largest retail export industry, and is the third largest domestic retail sales industry, with sales in excess of \$500 billion and direct employment of 7.6 million people. Approximately one out of every 17 U.S. residents was employed by direct travel spending in the U.S. during 1999 (Travel Industry Association of America 2000). Tourism has been one of the three most important generators of outside income in Idaho, Oregon, and Washington, while Montana's economy has been driven largely by the tourism sector and an influx of new residents (Quigley and Arbelvide 1997).

In the Columbia River Basin, recreation supported nearly 78,000 direct jobs (Crone and Haynes 1999). A study by English and Marcoullier (1999) estimated that 767,000 jobs and \$11.8 billion of labor income are associated with expenditures by non-resident recreation visitors in all non-metropolitan counties in the U.S. In the southern Appalachian region, outdoor recreation tourism was estimated to contribute almost \$6 billion in business sales and create employment for over 100,000 workers in the region (Southern Appalachian Man and the Biosphere 1996). In southeast Alaska, recreation and tourism levels more than doubled between the mid-1980s and

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the mid-1990s, accounting for an estimated 2,941 direct jobs in the region in 1995 (representing 7% of total employment in southeast Alaska) (USDA Forest Service 1997).

As a result of the high level of outdoor recreation use on the national forests and grasslands, the Forest Service has been shifting the focus of multiple use land management away from commodity production and toward recreation and related amenity uses (Driver and others 1999). Recreation use on the national forests generates considerable economic benefits for businesses in local communities. Use by non-residents is particularly important, since non-residents bring "outside" dollars into communities. Based on recreation expenditure profiles developed for Forest Service impact analysis, developed uses (such as winter sports) generate more jobs per recreation visit than more dispersed activities such as camping, picnicking, and hiking. For example, winter sports are estimated to generate 1,322 direct jobs per million visits, while wildlife viewing generates about 645 direct jobs. Hunting and fishing visits tend to generate smaller numbers of jobs per million visits (281 direct jobs for fishing and 480 direct jobs for hunting). However, more developed activities also impose higher infrastructure costs on communities, such as law enforcement, road maintenance, and sanitation facilities.

Landowners with property adjacent to public lands benefit from enhanced property values, and adjacent communities benefit because the amenity values of national forests attract businesses and residents. High population growth is occurring in areas with high recreation use (Johnson and Beale 1994). Counties with a high level of recreation use tend to be diversifying more rapidly than other counties, which is at least partly attributable to the presence of public lands that attract both tourists and permanent residents (Ashton and Pickens 1995).

### **Recreation Baseline**

Most of the 192 million acres of National Forest System lands are available for recreation. In addition to 58.5 million acres of inventoried roadless areas, the Forest Service manages about 35 million acres of the National Wilderness Preservation System.

Recreation use accounts for 90% of daily traffic on system roads. However, most recreation traffic occurs on 20% of the road system designed for passenger cars. In addition to the 363,000 miles of Forest Service roads, recreationists also use the 54,600 miles of public roads maintained by states and counties within the National Forest System.

Data are not available on the amount of recreation use in roaded versus unroaded areas. While many types of recreation activities can occur in the undeveloped settings of inventoried roadless areas, some activities are more strongly associated with these areas than others. These activities, including backpacking, hiking, orienteering, horseback riding, off-road driving, primitive camping, mountain climbing, caving, and rock climbing, were described by Cordell and others (1999) as "Outdoor Adventure." Hiking is the only activity in this group that is among the 10 most popular recreation activities in the U.S. Among the 10 most popular activities not classified as Outdoor Adventure, but that do take place in inventoried roadless areas, are mountain biking and wildlife viewing.

While Outdoor Adventure participants engage in recreation activities on other lands, and while other recreation activities do occur in inventoried roadless areas, the Outdoor Adventure category offers a reasonable indicator of recreation demand for the undeveloped setting offered in inventoried roadless areas. Depending on the region of the country, from a third to a half of the U.S. population participates in Outdoor Adventure activities (Winter and Chavez 1999). Although the percentage of the population that participates in these activities is higher in the

western U.S, the total number of participants is greater in the eastern U.S. (Table 3). Outdoor Adventure activities are projected to grow between 10% and 49% by 2040. The lower growth rates are projected for off-road driving, while hiking is projected to grow about 45%. Generally, Outdoor Adventure activities will be among the slowest to grow over the next 40 years (Bowker and others 1999).

Although demand for other recreation activities will increase more rapidly in the future, the availability of remote recreation opportunities may be a limiting factor in meeting future demand. Inventoried roadless areas provide important settings for remote recreation activities. Some of these activities can also take place in Wilderness, with the main exceptions of off-road driving, biking, and snowmobiling. One indicator of the availability of recreation opportunities to meet future demand is to examine the acres of land available per participant. Table 3 displays the number of acres of Wilderness on all federal ownerships and inventoried roadless areas on National Forest Service lands per recreation participant by RPA Assessment region. The eastern U.S. (North and South regions) has the least Wilderness and inventoried roadless acres per recreation participant. For activities that cannot take place in Wilderness, the limited opportunities are even more pronounced. While the Pacific Region has more land per capita than the eastern U.S., participants in the Rocky Mountain Region have an abundance of land suitable for Outdoor Adventure Activities. In Alaska, there are about 120 acres of Wilderness and inventoried roadless area per capita (participant numbers for Alaska were not available). Additional roadless areas may exist on other federal ownerships, but only data on Wilderness were available for other federal agencies.

**Table 3. Acres of Wilderness and Inventoried Roadless Areas Available for Outdoor Adventure Activities, by RPA Assessment Region**

	Outdoor Adventure Participants			Designated Wilderness		Inventoried Roadless Areas	
	Millions of participants	Percent of Population	Distribution of Participants by Region	Distribution of Acres by Region	Acres per Regional participant	Distribution of Acres by Region	Acres per Regional Participant
<b>North</b>	32.0	34.8%	43.4%	3.3%	0.05	1.1%	0.02
<b>South</b>	20.5	32.9%	27.8%	4.9%	0.10	1.6%	0.05
<b>Rocky Mountain</b>	7.1	47.5%	9.6%	45.9%	2.86	58.0%	4.78
<b>Pacific</b>	14.1	45.1%	19.1%	46.0%	1.44	14.0%	0.58
<b>Total</b>	73.7	36.8%	100.0%	100.0%	0.60	74.7%	0.79

Notes: Number of participants includes individuals 16 years or older  
 Wilderness includes acres administered by FS, NPS, BLM in lower 48 states  
 Alaska acres are not included in the Wilderness or IRA acres

The availability of remote activities can be compared to total recreation opportunities per capita (Table 4). In addition to federal lands, state parks and state forests provide recreation opportunities that are similar to some types of National Forest System opportunities. The total acres in state forests, state parks, and all federal land management agencies were summed by RPA Assessment region. It was not possible to calculate the number of acres available per participant in recreation, since no estimate of overall recreation participation was available for the regions. Total acres were compared to the total population 16 years of age and older, which underestimates acres available per recreation participant. Acres in the National Wilderness Preservation System were not included in Table 4, since recreation opportunities within

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Wilderness are more restrictive. Acres available per person are shown both with and without acres in inventoried roadless areas.

The per capita availability of recreation opportunities by region is similar to the availability of Wilderness and inventoried roadless areas shown in Table 3. The North and South regions have the least acres per person, while the Rocky Mountain Region and Alaska have much more abundant resources.

Entry into inventoried roadless areas will occur in the future, increasing roaded access for motor vehicles and decreasing the supply of roadless areas. Road entry into inventoried roadless areas will occur primarily from road development for timber harvest, mineral development, and other special uses. However, a high percentage of those roads would likely be closed when no longer needed for the development activity, except in Region 10, where the majority of roads built would be maintained for future use.

**Table 4. Acres Available for Recreation on State and Federal Lands, by RPA Assessment Region.**

Region	Population 16 years and older (millions)	Acres of land per person (including IRAs)	Acres of land per person (not including IRAs)
North	92.0	0.4	0.4
South	62.3	0.5	0.5
Rocky Mountain	14.9	17.0	14.8
Pacific	31.0	3.2	1.8
Alaska	.5	308.4	283.7
<b>Total U.S.</b>	200.7	3.0	2.6

On balance, opportunities for recreation activities in more developed settings will increase at the expense of opportunities in undeveloped recreation settings. This will benefit people who prefer more developed outdoor recreational experiences, but will be detrimental to those who value dispersed primitive and semi-primitive recreational opportunities. Additional roaded access into inventoried roadless areas will provide new opportunities to view scenic vistas, and develop new recreation sites, which will respond to increasing demands for road-dependent recreation. Increased access can also provide people with the opportunity to enjoy unique and sensitive areas, but it can make protection of these areas difficult.

There will be a decline in the land base available for recreation opportunities in relatively undisturbed landscapes outside of Wilderness. Development, such as road building, is likely to negatively affect scenic quality on affected areas. Since inventoried roadless areas tend to have high scenic integrity, some management actions are likely to reduce scenic integrity, which will negatively affect recreation values and property values of adjacent properties.

Within the remaining roadless areas, there is likely to be increasing congestion, which negatively affects the quality of the recreation experience. Increased access and use in areas adjacent to Wilderness increases the potential for illegal uses and quality deterioration in Wilderness. In addition, some users may transfer use to Wilderness as a substitute for the loss of acres of inventoried roadless areas for those activities that are allowed. This substitution could increase congestion in Wilderness.

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A decline in the acres of inventoried roadless area is likely to affect the agency's ability to accommodate increasing demand for recreation special use permits that are based on remote recreation experiences, such as outfitter and guide permits. This could have a negative economic impact on outfitters and guides. New recreation developments in inventoried roadless areas, such as campgrounds, resorts, and ski area expansions, will be allowed.

The net effect of the changes in opportunities will vary by national forest, depending on existing use patterns, density of use, and preferences of users. Overall increases in use are most likely to occur on national forests and grasslands close to urban populations (e.g. Atlanta, Boston, Denver, Los Angeles, Phoenix, Salt Lake City, and Seattle). However, recreationists often use roads built for other purposes to gain access. If all of the proposed projects that required roads were implemented, about 258 miles (miles that will not be closed) of timber roads would be available for recreational use over the next five years. Almost 48% of those timber roads would be on the Tongass. Of the 537 miles of roads associated with other projects, data are not available on what proportion would remain open for other use in the long term. However, most of those roads would be single purpose roads that would not be available to recreationists.

### **Summary of Public Comment**

The majority of public comment related to recreation focused on the issue of whether or not motorized vehicles should be allowed in roadless areas. Many of the people commenting incorrectly believed existing roads and OHV (off-highway vehicle) trails would be closed by the proposed rule.

Comments were also received about the growing demand for recreation. Some believe increasing demand for developed uses would degrade the experience and environment in roaded areas if no future development is allowed in inventoried roadless areas. These people generally believe that certain places within inventoried roadless areas should be roaded to accommodate this demand. Others were concerned about maintaining existing roadless areas to meet demands for recreationists seeking solitude.

The potential effect on local economies was also a concern to many respondents. Some believe the prohibitions could have negative impacts on local communities by limiting opportunities for developed recreation, while others believe roadless areas are essential to maintaining the resource base for recreation-related economic activities.

### **Recreation Economic Effects**

The final rule will not affect current access into inventoried roadless areas for motorized or non-motorized uses. Opportunities for remote recreation would be maintained under the final rule, compared to the baseline scenario. In areas where remote opportunities are scarce, particularly in the eastern U.S., maintaining these opportunities would be particularly valuable. Although recreation use is likely to increase in these areas, maintaining the land base will result in smaller increases in density in inventoried roadless areas. The effects of the prohibitions would be positive for people who engage in activities such as backpacking, mountaineering, cross-country skiing, off-highway driving, horseback riding, hiking, mountain biking, wildlife viewing, hunting, and fishing in an undeveloped environment.

Maintaining inventoried roadless areas in their current state will reduce the need for recreationists in search of remote experiences to move to Wilderness areas. This will lessen

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the visitation pressure on Wilderness areas and help maintain the quality of Wilderness experiences. Lack of roading will maintain scenic quality in inventoried roadless areas.

The road prohibition will limit roaded recreation access in inventoried roadless areas, which may cause increased congestion in existing roaded areas of the forest. This could have negative effects for people who prefer roaded recreation activities, such as pleasure driving, visiting heritage sites or interpretive nature centers, developed camping, and picnicking in developed picnic areas. The prohibition on road construction and reconstruction would affect 33 miles of roads planned for recreation projects in the next five years, as well as a maximum of 258 miles of road associated with planned timber offer over the next 5 years, which might have been used for recreation access. An additional 244 road miles that might be prohibited for other planned projects over the next 5 years could also be affected. These impacts will be greatest in those forests with current high densities of roaded recreation use. In some national forests and grasslands, recreation use density is far below capacity across all recreation settings, while congestion is a problem in other parts of the system. Therefore, the net effect will vary widely by location.

As with recreation use, there are likely to be tradeoffs between businesses that benefit from and those that are constrained by reduced development opportunities. Maintenance of inventoried roadless acreage will be beneficial to meeting increasing demand for outfitter/guide permits. Non-resident recreationists may be more likely to use these services, so increases in use could generate external revenue for local communities. Special uses that require roading will not occur in inventoried roadless areas. However, developments such as campgrounds are likely to have substitute sites available.

### *HUNTING AND FISHING*

Recreational and subsistence hunting and fishing and commercial fishing all take place on and around National Forest System lands. As human populations increase and habitat conversion continues to take place on private lands surrounding national forests and grasslands, with negative consequences for many fish and wildlife populations, public lands will become increasingly important as places that provide quality hunting and fishing opportunities. In addition, fishing and hunting activities on national forests and grasslands provide national, State, and household economies with important sources of jobs, income, food, and other benefits. Because inventoried roadless areas provide important habitat for some fish and game species, their management affects the quality of the habitat, which in turn affects the quality of hunting and fishing experiences.

The number of people participating in cold-water recreational fishing increased consistently throughout the 1970s and 1980s (Flather and Hoekstra 1989). Recent projections indicate that this trend will continue, with the number of fishing participants increasing 36% by 2050, and participation days of fishing increasing 27%. The largest increases are expected to occur in the Rocky Mountain region (Bowker and others 1999).

Hunting trends appear to be mixed. Recent trends reflect an overall increase in hunting participation (USDI Fish and Wildlife Service and USDC Bureau of the Census 1997). Big game hunting has been on the rise since the 1960s, and is predicted to increase on national forests and grasslands through the year 2040 (Flather and Hoekstra 1989). Migratory bird hunting had been declining, but increased slightly between 1991 and 1996 (U. S. Department of the Interior Fish and Wildlife Service and U. S. Department of Commerce Bureau of the Census 1997),

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possibly in response to increases in waterfowl populations. Small game participation has continued to decline, and is predicted to continue to do so through 2040 (Flather and Hoekstra 1989). Most big game populations have generally been stable or on the rise, and are predicted to continue this trend. The overall number of hunters is projected to decline about 11% by 2050, although the number of days of hunting should remain stable (Bowker and others 1999).

## **Hunting and Fishing Baseline**

### *Recreational Hunting and Fishing*

Recreational hunting and fishing take place on national forests and grasslands throughout the United States. Approximately 9% (47 million) of the total U.S. freshwater fishing participation days in 1996 occurred on National Forest System lands. Fishing on National Forest System lands generated about 12% (\$2.9 billion) of the total national expenditures on recreational fishing in 1996. Recreational hunting participation days on National Forest System lands represented 11% (28 million) of the national total in 1996. Expenditures on recreational hunting on National Forest System lands represented 10% (\$2.1 billion) of the national total in 1996 (Maharaj and Carpenter 1999).

Recreational hunting and fishing are expected to increase on National Forest System lands in the future. The share of hunting on National Forest System lands could increase in the future as opportunities on private lands decline. Under current policy, continued entry into inventoried roadless areas for timber harvest and other purposes could degrade aquatic habitat, fragment terrestrial habitat, and increase human disturbance to species. The impact on some game species could be detrimental, affecting species populations in both roaded and roadless areas. Declines in fish and game populations can reduce encounters and success rates, which negatively affects the quality of recreation experiences.

New roads into inventoried roadless areas would increase access to hunting and fishing sites that were not previously available to some anglers and hunters. This could result in more crowded conditions, with negative effects on existing users. However, it could reduce congestion on other parts of the forest. Road access can also increase the probability of illegal hunting and fishing.

### *Subsistence Hunting and Fishing*

The majority of subsistence hunting and fishing on National Forest System lands occurs in Alaska. Localized activity occurs in the contiguous 48 states where American Indian populations are concentrated, such as the Pacific Northwest, California, the Southwest, and the Rocky Mountains.<sup>3</sup> In the lower 48 states, treaties between the Federal government and federally recognized American Indian Tribes guarantee subsistence rights that allow Tribes to harvest fish and game on Federal lands. In Alaska, Native Alaskans and other rural Alaska residents are guaranteed subsistence rights on Federal lands by Federal law (Alaska National Interest Lands Conservation Act; Public Law 96-487) and by Alaska State law (AS16.05.258).

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<sup>3</sup> Subsistence is defined here as the customary and traditional uses of wild renewable resources for personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for making and selling handicraft articles out of the nonedible byproducts of fish and wildlife resources; for barter or sharing for personal or family consumption; and for customary trade (USDA Forest Service 2000b).

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Subsistence hunting and fishing can be important to the economy, culture, and health of rural families and communities. In Alaska, for example, the annual subsistence harvest of wild foods is estimated at 43.7 million pounds of usable weight annually (Alaska Department of Fish and Game 1998). This total represents 375 pounds per person per year for rural residents and 22 pounds per person per year for urban residents. Sixty-two percent of this total is comprised of fish, 36% of game, and the remaining 2% comes from plant material.

These harvests represent a substantial portion of the caloric and protein requirements of rural Alaskans. They also have significant economic importance, with a replacement value of \$131.1 to \$218.6 million annually.<sup>4</sup> In addition, subsistence hunting and fishing play a central role in the customs, traditions, and social fabric of many cultural groups in Alaska.

Habitat degradation associated with road building and other activities in inventoried roadless areas in the future could negatively affect subsistence users. It could cause lower per capita subsistence harvests of fish and game species, which could have a negative impact on the health, economy, and culture of American Indian and Alaska Native populations in particular.

Increases in roaded access to inventoried roadless areas can improve opportunities for subsistence hunting and fishing. This is important primarily in areas where roaded access is extremely limited, such as in Alaska. In the lower 48 states, existing access opportunities may be adequate.

### *Commercial Fishing*

National Forest System lands support commercial anadromous fisheries based on fish species that spawn in rivers and streams. The most important commercial fish species supported by National Forest System lands are salmon and steelhead trout, which occur primarily in Alaska and the Pacific Northwest (including northern California). In 1998, almost 19 million pounds of salmon were landed offshore of the Pacific Coast states (Washington, Oregon, and California), having a value of \$15.3 million dollars (National Marine Fisheries Service 2000). Federal lands in these three states support 259 of the 314 anadromous fish stocks at risk (FEMAT 1993). In 1994, 284 million pounds of salmon were harvested in Alaska, for an estimated value of \$121 million. Approximately 80% of the salmon harvested in Southeast Alaska originate on the Tongass National Forest (USDA Forest Service 1997).

Demand for edible fish has been on the rise since the 1960s, resulting in an upward trend in commercial fishing activity. The number of commercial fishing vessels in the United States has remained stable over the last decade (Loftus and Flather 2000).

New roads built into inventoried roadless areas may degrade aquatic habitat, which in turn affects anadromous species with commercial value. Declines in anadromous fish populations dependent on National Forest System lands would reduce the potential supply for commercial harvest, with negative economic consequences for fishermen. These impacts are of most concern in the Pacific Northwest, California, Idaho, and Alaska, where the river systems on National Forest System lands provide important anadromous habitat. The impacts of planned timber harvest on anadromous species' habitat are likely to be greatest in Alaska and Idaho.

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<sup>4</sup> Replacement value = the amount of money that would have to be spent to buy food substitutes.

## **Summary of Public Comment**

Many members of the public who commented on hunting and fishing supported a prohibition on road construction and reconstruction in inventoried roadless areas. Reasons for supporting the prohibition included perceptions that hunting success decreases with additional roads, that the quality of the hunting or fishing experience is greater in roadless areas, and that roadless areas provide habitat having a high level of ecological integrity, and should be protected to conserve and enhance species populations. Many responses noted the importance of maintaining healthy ecosystems in order to support the commercial fishing industry, and tourism based on recreational hunting and fishing, which have great economic importance.

Others were more supportive of the need for timber harvest to create forage for some game species, and to provide clearings. There was also concern that reduced access and poor game habitat would result in declining revenue and wildlife conservation dollars.

In some locations there are Tribes who do not support a prohibition on road construction and reconstruction. They desire improved access to hunting and fishing locations, where they believe current roaded access is extremely limited. In other locations, there are Tribal members who view road construction as being a major cause of ecological degradation, and therefore support a prohibition on road construction, believing it would protect subsistence resources.

## **Hunting and Fishing Economic Effects**

The Roadless Rule would prohibit road construction and reconstruction in inventoried roadless areas, and limit timber harvest activity. As a result, potential for degradation of terrestrial and aquatic habitat quality, quantity, and distribution would be reduced relative to the baseline scenario. Opportunities for engaging in recreational and subsistence hunting and fishing in more remote settings are maintained. Many complex variables influence fish and wildlife species populations. However, management under the Roadless Rule is more likely to protect commercial fisheries, maintain quality recreational hunting and fishing experiences, and support subsistence hunting and fishing activities than management under the baseline.

Since current road access is limited in Alaska, the lack of opportunity to build additional roads in inventoried roadless areas may be detrimental to some subsistence users. However, roads could continue to be built on the Tongass in association with timber sales for which a notice of availability for a draft environmental impact statement has been published in the Federal Register by the publication date of the rule.

Additional road building and timber harvest on the Tongass may have negative effects on some fish and game species in the near term, with corresponding negative effects on recreational and subsistence hunting and fishing, as well as commercial fishing. The majority of subsistence and recreational game species are integrally linked to the habitat qualities provided by roadless areas on the Tongass, including the ecological integrity of old-growth and riparian habitats. Continued road construction and reconstruction and timber harvest is likely to result in habitat loss and fragmentation; and, increased mortality rates for fish and game species due to increased human disturbance. These effects could have a negative impact on the supply of fish and game species for recreational hunting and fishing. These effects would be reduced after the allowed activities are completed.

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Any reduction in deer and salmon populations caused by road building and timber harvest could have a negative impact on the economy, health, culture, and social fabric of rural southeast Alaska residents who have a subsistence-based economy (Turek and others 1998). It could also escalate conflicts over resource access and use between subsistence hunters and fishers, recreational hunters and fishers, and commercial fishermen.

## *TIMBER*

The role of the National Forest System in supplying timber has declined markedly in the last two decades. In addition, significant changes have occurred in the timber industry as a result of fluctuation in wood product prices and international markets, changes in technology, and industry restructuring. Prior to the development of oriented strand board (OSB) and other engineered wood products, such as I-joists, the large, old growth timber harvested on national forests was in high demand. Globalization and product standardization of the forest sector will increase the number of sources of wood fiber to meet U.S. demands. There will likely continue to be niche markets for high-quality products from large trees, such as found on national forests, but other types of wood must be sold in an increasingly competitive market (Martin and Darr 1997).

In part because of increasing population, demands for solid and fiber-based products will continue to increase in the coming decades. For example, softwood lumber consumption is projected to increase about 28% between 2000 and 2040 (Haynes and others 1995). During this time, wood pulp production is projected to increase over 50%. Increased globalization, recycling, and application of wood-conserving technologies will affect the sources of timber products and the forms in which they are used. Global supply of wood fiber is considered sufficient to meet demands in the foreseeable future.

The product mix on national forests is increasingly made up of more pulp-type material (less sawtimber). The sawtimber that is harvested is smaller in average diameter. The current product mix from the national forests results in higher unit costs and lower bid prices and affects the profitability of timber sales, with more sales being below cost.

Significant changes have occurred in the timber industry in the last two decades. The Pacific Northwest (PNW) has seen possibly the most significant changes, partly because of major declines in federal harvest levels. However, changes in the industry preceded federal harvest declines. Regional job losses and wage reductions in the timber industry occurred in the 1980s. Lumber and wood products employment steadily decreased in the PNW in the 1980s. Currently in the PNW, the bulk of the lumber and wood products industry is located in or near metropolitan areas where it is a small portion of the economy and other jobs are available. While the timber industry's importance shrank, the rest of the region's economy boomed. Because of technology changes, timber-processing facilities are being consolidated close to major transportation corridors (Niemi and others 1999).

While harvest levels have declined in the Pacific Northwest, the South has taken on a larger role as a timber-producing region. Harvest increased by 13 percent between 1990 and 1995 (Appendix Table A2), while western regions showed declining harvest levels in the same period. The wood products sector (Standard Industrial Classification (SIC) codes 08, 24 and 26) accounted for slightly more than 1 percent of total U.S. gross domestic product (GDP) in 1996. Total employment related to forest products increased about 5% between 1992 and 1996 (Table 5). Gains in employment were primarily in the eastern U.S., which accounts for over 75% of total wood products jobs. The contribution of National Forest System harvest to wood products

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employment declined 50% between 1992 and 1996, accounting for only 3% of all wood products jobs in 1996. Even at constant harvest levels from the National Forest System, as total production increases on other lands, the share of jobs from National Forest System harvest will continue to decline.

Although its share of the market has declined markedly, the harvest of timber from National Forest System lands continues to generate jobs and income for both the local and national economy. In addition to distributional effects, data on net revenues can be used to predict whether or not timber sales in inventoried roadless areas are likely to be below cost.

**Table 5. Wood Products Sector Employment in the U.S., and associated with National Forest System (NFS) timber harvest, 1992 and 1996.**

<b>Region (Forest Service Region)</b>	<b>Total Wood Products Sector Jobs, 1992</b>	<b>NFS Related Wood Products Sector Jobs, 1992</b>	<b>Total Wood Products Sector Jobs, 1996</b>	<b>NFS Related Wood Products Sector Jobs, 1996</b>
<b>North (R9)</b>	350,358	6,079	375,987	5,032
<b>South (R8)</b>	396,868	8,628	414,752	6,865
<b>Rocky Mountain (R1, R2, R3, R4)</b>	56,637	14,675	62,535	4,163
<b>Pacific Coast (R5, R6, R10)</b>	176,194	29,668	172,762	11,724
<b>U.S. Total</b>	980,057	59,050	1,026,035	29,426

Historically, 25% of all receipts generated from timber sales have been returned to states and counties to spend on schools and roads. The decline of timber harvest from the national forests and grasslands over the past decade has resulted in decreasing payments to states. On October 30, the President signed H.R. 2389, "Secure Rural Schools and Community Self-Determination Act of 2000," new legislation that allows counties to choose between the 25% payment and a new payment formula based on historic payment levels. The legislation will affect payments to states through fiscal year 2006. As a result, the effects of the Roadless Rule will not reduce payments to states through 2006, even in those counties where timber harvest declines are expected to occur.

### **Timber Baseline**

The baseline for timber harvest is an average of National Forest System harvest volumes between fiscal years 1996 and 1999. This baseline was chosen because harvest in those years more accurately reflects likely future harvest volumes. Allowable sales quantities in forest plans are upper limits and not harvest targets, and many of those projections are based on forest plans that are dated and do not reflect current timber program volumes.

The annual reported volumes are based on data compiled for the Timber Sales Program Information Reporting System (TSPIRS). The average annual harvest volume from 1996-1999 is 3.3 billion board feet. The annual data by Forest Service region are shown in Appendix Table A3. The Forest Service expects harvest levels to remain between 3.0 and 4.0 billion board feet in the near future, and the baseline falls within that range.

The estimate of jobs and income associated with National Forest System harvest is based on response coefficients from the IMPLAN model<sup>5</sup>. Employment and income effects can include direct, indirect, and induced effects. Direct employment and income effects include jobs and income associated with the harvest of timber and primary wood products processing. Indirect effects include jobs and income associated with industries that supply inputs to the harvesting and processing sectors. Induced effects include jobs and income associated with spending in the economy from the salaries created by the direct and indirect effects.

IMPLAN is used to calculate job and income effects of the timber sales program for each national forest as part of the annual reporting requirements of TSPIRS. The regional total (the sum of direct, indirect and induced effects) job and income effects were estimated using regional job and income response coefficients from the data reported in TSPIRS. Regional data on jobs and income for fiscal years 1996 through 1998 were used to create response coefficients for average total jobs per million board feet and average income per million board feet that were applied to the baseline harvest levels (Appendix Table A5 and A6). Estimates of these measures are shown in Table 6.

Some of the receipts generated from the sale of timber are returned to the U.S. Treasury. States also receive a portion of timber sale receipts based on congressionally determined formulas, generally referred to as payments to states. Receipts from timber sales historically have been the largest source of Forest Service payments to states. The baseline receipts are a three-year average of National Forest Fund receipts from 1996 to 1998 (Appendix Table A5). Payments to states are estimated to be 25% of total receipts. Actual payments to states in those years averaged about \$100 million higher because of guarantee payments<sup>6</sup> to Regions 5 and 6, put in place to mitigate the effects of protecting the northern spotted owl.

**Table 6. Average Annual Jobs, Income, Receipts, and Payments to States Associated with Baseline Timber Harvest from the National Forest System (1997 dollars).**

Forest Service Region	Baseline Harvest (MMBF)	Direct Jobs (number)	Total Jobs (number)	Direct Income (\$000)	Total Income (\$000)	Timber Receipts (\$000)	Payments to States (\$000)
Northern (1)	320	3,196	8,950	\$99,493	\$276,369	\$61,369	\$15,342
Rocky Mountain (R)	143	861	2,008	22,730	53,037	23,524	5,881
Southwestern (3)	77	690	1,380	18,059	36,117	4,982	1,245
Intermountain (4)	199	1,794	2,990	104,038	173,397	29,105	7,276
Pacific Southwest (5)	492	3,442	5,409	165,306	259,767	107,678	26,919
Pacific Northwest (6)	694	5,551	9,714	159,627	279,347	140,847	35,212
Southern (8)	663	6,627	12,591	208,853	398,821	100,727	25,182
Eastern (9)	596	4,172	6,556	246,453	387,284	60,795	15,199
Alaska (10)	125	625	1,000	28,563	45,338	10,995	2,749
<b>National</b>	<b>3,308</b>	<b>26,957</b>	<b>50,596</b>	<b>\$1,053,122</b>	<b>\$1,907,477</b>	<b>\$540,022</b>	<b>\$135,006</b>

<sup>5</sup> IMPLAN (Impact Analysis for Planning) is the input-output model used by the USDA Forest Service to estimate economic effects by tracing the interrelationships between producers and consumers in an economy. See Appendix A4 for additional details.

<sup>6</sup> Owl guarantee payments were enacted by PL 103-66, Title XIII.

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In order to offer timber sales, the Forest Service spends money on preparing sales, doing environmental analyses, and other administrative and planning activities associated with timber sales. Timber sales are offered for sale competitively, so stumpage prices received for National Forest System timber reflect market prices. However, the Forest Service does not necessarily recover its cost from timber sale revenues. Below-cost sales have long been a controversial issue for the Forest Service. As a result, TSPIRS was developed and put into place to create a consistent accounting framework for comparing revenues and costs associated with the agency's timber sales program.

The TSPIRS data from 1996 to 1998 were used to estimate the average revenues and costs associated with the timber sales program in each region. Timber sales can be designed as stewardship sales or commodity sales. Stewardship sales are undertaken to accomplish ecosystem management objectives, usually associated with forest health goals. Timber harvest is one method for achieving those objectives. Although revenues do exceed costs for some stewardship sales, it is more appropriate to evaluate the "efficiency" of stewardship sales by comparing the costs of timber harvest to other methods of achieving the management objective.

Commodity sales are undertaken to deliver fiber to the market, and therefore it is appropriate to assess the "profitability" of the commodity portion of the timber program, even though the revenues do not remain with the agency. On average, revenues exceeded costs in the commodity component for most regional timber sales programs, as shown in Table 7. Three regions had average costs in excess of average revenues between 1996 and 1998.

Under the baseline, the volume planned for offer in inventoried roadless areas would be part of the total planned program offer. The amount of volume actually offered for sale is likely to be less than planned offer for several reasons related to on-site analysis undertaken for preparing timber sales. Changes in planned offer can occur for various reasons, such as the need to mitigate for threatened and endangered species, and settlement of appeals and litigation. Once the final volume to be offered is determined, bids are taken on the offered volume. Not all volume for sale is purchased, so the sold volume is often less than offer volume.

**Table 7. Average Volume Harvested for Commodity Purposes, and Average Net Revenue per Thousand Board Feet Harvested (1997 dollars).**

	Average Annual Commodity Harvest (MMBF)	Average net revenue per thousand board feet
<b>Northern (1)</b>	248	\$ (8)
<b>Rocky Mountain (2)</b>	85	\$ 44
<b>Southwestern (3)</b>	12	\$ (179)
<b>Intermountain (4)</b>	126	\$ 7
<b>Pacific Southwest (5)</b>	130	\$ 21
<b>Pacific Northwest (6)</b>	320	\$ 77
<b>Southern (8)</b>	366	\$ 67
<b>Eastern (9)</b>	439	\$ 49
<b>Alaska (10)</b>	115	\$ (178)
<b>National</b>	1,841	\$ 29

Numbers may not add due to rounding.  
Numbers in parentheses are negative.

The data on planned offer from inventoried roadless areas estimate offer in the next five years. For purposes of analysis, the five-year planned offer volume was converted to an average

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annual offer volume. Volume sold can be harvested over a period of 3 to 4 years after the sale. Therefore, the conversion to an average annual volume accounts for the multi-year effect of sales in inventoried roadless areas.

To estimate a likely annual harvest volume from inventoried roadless areas, a two-step process was used to adjust average annual planned offer volumes. First, an adjustment was made to account for differences between planned offer and actual offer. No data are available that directly addresses this difference. A comparison of offer targets to offer accomplishments by national forest was examined for fiscal years 1993 through 1999. On average, accomplishments were 85% of targets. One drawback of this data is that salvage volumes are included that inflate accomplishments, since salvage is not included in offer targets. Data comparing volume sold in inventoried roadless areas from 1993 to 1999 to planned offer volumes in inventoried roadless areas in the next five years were also examined. Nationally, average planned offer volume in the next five years was twice the average volume sold between 1993 and 1999.

Since the data do not support any particular adjustment factor, a high-end estimate was developed using the 15% adjustment suggested by the accomplishment reports for the lower 48 states, with a 5% adjustment for the Tongass. A low-end estimate was estimated using the 50% adjustment suggested by examining historic sold volumes from inventoried roadless areas. A medium and "most likely" estimate were based on a reduction of 30% for the lower 48 states, and 10% for the Tongass. An adjustment factor of 10% was used on the Tongass to be consistent with analysis done in evaluating market demand for Tongass Timber (USDA Forest Service 1999).

The second step addresses the difference between volume offered and volume sold. This adjustment was straightforward, based on the TSPIRS data for offer and sold volume between 1996 and 1999. The average percent difference between volume offered and volume sold was applied by national forest. The same percentage was applied to all three scenarios. The range of harvest volumes is shown in Table 8. Forest-level details of the adjustment process are shown in Appendix Tables A7 to A9.

### **Summary of Public Comment**

Many members of the public responded that the national forests and grasslands should provide an economic base for rural communities. They believe that the Roadless Rule would cost jobs in the timber industry, hit small timber producers especially hard, and have negative consequences for loggers and forest-dependent communities, particularly in the West. Concern was also raised that prohibiting road building and limiting logging in inventoried roadless areas would concentrate harvest on other private and public lands, and increase environmental impacts in these areas. Reduced National Forest System harvest was also seen as leading to increased prices for wood products.

Other respondents believe that timber-dependent communities will be caught in a continuous boom-bust economy if they remain tied to National Forest System harvest. The importance of diversifying economies was mentioned, with frequent mention of the importance of tourism and other sectors that benefit from maintaining inventoried roadless areas.

Some individuals believe that timber harvest on National Forest System lands is not an economically sound practice, and does not produce enough revenue to cover costs. Some suggested that the Forest Service should direct money towards forest and watershed

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restoration projects, which could provide jobs for environmentally beneficial purposes. Other believe no logging should occur in inventoried roadless areas, including helicopter logging, because of the negative environmental consequences.

A number of comments addressed the baseline used for timber harvest. Some believe the baseline should reflect allowable sales quantity volumes in forest plans, while others believe that future effects were underestimated because of recent policies to decrease harvest in roadless areas.

A number of comments raised a concern about the economic and environmental effects of the roadless proposal on other ownerships in the U.S. Some respondents believe that increased harvest on state and private lands will have more negative environmental effects because federal lands have stricter environmental standards. Two main concerns were raised related to global economic and environmental effects. One was the potential to increase U.S. dependence on foreign wood products, with a resulting increase in trade deficits and loss of domestic jobs. The second concern addressed the environmental consequences of increasing timber harvest in other countries that may have less stringent environmental regulations.

### **Timber Economic Effects**

The Roadless Rule would only allow limited timber harvest that does not require road construction or reconstruction in inventoried roadless areas. The estimated average annual reduction in harvest volume from inventoried roadless areas ranges from 38 to 63 million board feet per year in the next 5 years.

The total planned offer from the Tongass in the next 5 years was estimated to be a total of 539 million board feet (107.8 million board feet per year). The final rule would allow continuation of timber sales for which a notice of availability for a draft environmental impact statement has been published in the Federal Register by the publication date of this rule. Based on agency estimates, the Tongass will be able to offer about 386 million board feet of timber under this provision. Therefore, the baseline harvest estimate is based on the 539 million board feet, while the estimated harvest that will occur is based on the 386 million board feet. After that harvest has been completed, the economic impacts associated with reduced harvest on the Tongass will likely increase.

The effects of the Roadless Rule are not evenly distributed across forests within Forest Service regions. Therefore, rather than apply the regional job and income coefficients used in calculating the national baseline, a weighted average was estimated using forest-level impact coefficients from those forests planning to offer volume in inventoried roadless areas (weighted averages by region are shown in Appendix Table A10).

**Table 8. Range of Average Annual Harvest in Inventoried Roadless Areas Under Current Management (Baseline) and Under the Final Rule (million board feet), next 5 years.**

Region	Baseline Harvest in Inventoried Roadless Areas			Harvest in Inventoried Roadless Areas Under Final Rule			Reduced Harvest from Final Rule		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
<b>Northern (1)</b>	7.9	11.0	13.3	4.7	6.6	8.0	3.1	4.4	5.3
<b>Rocky Mountain (2)</b>	4.1	5.7	6.9	0.3	0.4	0.5	3.8	5.3	6.4
<b>Southwestern (3)</b>	0.3	0.4	0.4	0.1	0.1	0.0	0.2	0.3	0.4
<b>Intermountain (4)</b>	17.0	23.8	29.0	4.8	6.7	8.1	12.3	17.1	20.9
<b>Pacific Southwest (5)</b>	3.0	4.2	5.1	0.8	1.1	1.4	2.2	3.1	3.8
<b>Pacific Northwest (6)</b>	7.8	10.9	13.3	2.1	3.0	3.6	5.7	8.0	9.7
<b>Southern (8)</b>	2.7	3.8	4.6	0.4	0.5	0.6	2.3	3.3	4.0
<b>Eastern (9)</b>	7.4	10.3	12.6	1.5	2.0	2.5	5.9	8.3	10.1
<b>Alaska (10)</b>	59.6	76.6	80.9	42.7	54.0	57.9	16.9	22.7	23.0
<b>National</b>	<b>109.7</b>	<b>146.7</b>	<b>166.1</b>	<b>57.3</b>	<b>74.3</b>	<b>82.6</b>	<b>52.5</b>	<b>72.5</b>	<b>83.5</b>

*Totals may not be exact due to rounding.*

Effects on jobs and income were estimated using a volume-weighted average of forest-level coefficients that were aggregated at the regional level. The Roadless Rule could affect from 333 to 537 direct jobs associated with timber harvest in the next 5 years (Table 9). Total jobs affected range from 607 to 986. Compared to the National Forest System timber baseline, direct jobs and income associated with timber harvest would be between 1 and 2% less per year nationally. In Regions 3, 5, 6, and 8 the effects on jobs and income are less than 1% across the range of effects. Effects in Regions 1 and 9 vary between 1% and 2%, while in Region 2 effects range from about 3 to 4%. In Region 4, jobs and income effects range from 4% to 7%.

In the next five years, the impacts on direct jobs and income associated with harvest reductions on the Tongass would range from 14 to 20%. After the allowed activities are completed, impacts would increase, assuming that timber harvest from inventoried roadless areas would continue to be an important source of timber in the absence of the Roadless Rule. The timber economic in Southeast Alaska is already in a state of transition. Therefore, it is difficult to predict potential harvest impacts in five years. Assuming that harvest levels would be similar to those projected for the near term, up to 65% of timber jobs and income could be affected in the long-term, using the medium scenario baseline harvest projection (76.6 million board feet). Up to an additional 269 direct and 431 total jobs could be affected, with associated impacts of \$12.4 million in direct income and \$20.2 million in total income.

The economic impacts in Table 9 do not account for any potential substitute harvest from other ownerships or substitute job opportunities. The potential for substitute harvest can be estimated using U.S. harvest trends by RPA Assessment region and ownership (Haynes and others 1995) (Appendix Table A2). The percent change in regional harvest by ownership between 1990 and 1995 is shown in Table 10. During this period, National Forest System harvest levels declined 41% nationally, while total U.S. harvest increased 1%. In Regions 8 and 9, harvest on other ownerships more than offset declines on National Forest System lands. The contribution of

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**Table 9. Estimated Average Annual Economic Impacts from Roadless Rule (1997 dollars), next 5 years.**

	Direct Jobs (number)			Total Jobs (number)			Direct Income (\$000)			Total Income (\$000)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
<b>Northern (1)</b>	29	41	50	84	117	143	895	1,252	1,523	2,518	3,520	4,282
<b>Rocky Mountain (2)</b>	22	31	37	49	69	83	472	660	802	1,111	1,553	1,887
<b>Southwestern (3)</b>	2	3	3	4	5	6	49	68	82	99	137	165
<b>Intermountain (4)</b>	75	105	128	128	178	217	4,321	6,029	7,346	7,259	10,128	12,341
<b>Pacific Southwest (5)</b>	15	22	26	24	34	41	789	1,107	1,342	1,240	1,739	2,109
<b>Pacific Northwest (6)</b>	50	70	85	80	112	135	1,496	2,095	2,542	2,365	3,312	4,019
<b>Southern (8)</b>	18	25	30	44	62	75	906	1,268	1,540	1,843	2,578	3,132
<b>Eastern (9)</b>	37	52	63	59	83	101	2,169	3,030	3,684	3,470	4,849	5,894
<b>Alaska (10)</b>	85	114	115	135	182	184	3,884	5,217	5,286	6,214	8,347	8,457
<b>National</b>	<b>333</b>	<b>461</b>	<b>537</b>	<b>607</b>	<b>841</b>	<b>986</b>	<b>14,981</b>	<b>20,725</b>	<b>24,147</b>	<b>26,118</b>	<b>36,163</b>	<b>42,286</b>

**Table 10. Percent change in timber harvest volume between 1990 and 1995, by RPA Assessment Region and ownership.**

Region (FS Region)	Forest Industry	Farmers and other Private	National Forest	Other Government	Total
<b>Pacific Northwest (Regions 6 and 10)</b>	-8	22	-67	-45	-25
<b>Pacific Southwest (Region 5)</b>	-29	61	-62	-3	-30
<b>Rocky Mountains (Regions 1-4)</b>	-10	41	-46	-20	-15
<b>North (Region 9)</b>	26	-7	15	45	7
<b>South (Region 8)</b>	17	13	13	-15	13
<b>Total U.S.</b>	8	9	-41	-8	1

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National Forest System harvest is extremely small in the eastern U.S. because private lands are the dominant source of wood fiber. In the western U.S., increased harvest on non-industrial private ownerships provided some substitute harvest to offset declines on all other ownerships. These data indicate there is some potential for substitution in those regions, although these opportunities probably occur primarily in Regions 1, 4, 5, and 6. Little substitute volume is likely to exist in Regions 2, 3, and 10.

To the extent that harvest substitution could occur, the effects on both jobs and income would be less. In the absence of substitute harvest, it is difficult to provide substitute opportunities for direct and some types of indirect effects (particularly effects associated with purchases of supplies unique to wood product manufacturing). Harvest substitution is most likely in the eastern U.S., while opportunities for substitution vary widely across the West. Where substitution could occur, those substitute opportunities are not necessarily available to the same workers affected by the reduction in National Forest System volume.

There is likely to be additional potential for substitution for some indirect and most induced jobs in a growing economy. Even if no harvest substitution exists, increases in other economic sectors can substitute for those jobs not dependent on the special requirements of the wood sector. Employment increased in all major sectors of the economy except mineral industries between 1992 and 1997 (U.S. Department of Commerce 2000), which indicates a strong potential for substitution.

The substitution of harvest on public and private lands, in addition to creating opportunities for jobs, would also result in some environmental degradation associated with harvest activities. Therefore, some of the environmental benefits achieved by reducing timber harvest in inventoried roadless areas would be offset by environmental costs at substitute harvest sites.

### *Financial Efficiency*

The effects of the prohibitions on net revenues of the timber sales program cannot be estimated with any certainty, since costs and revenues vary greatly between individual sales and are often dictated by larger economic forces. However, the average historic net revenue of the commodity portion of the timber sales program should be indicative of whether future sales would likely be above cost or be below cost. The average net revenue for commodity purpose timber sales was calculated for each of the national forests planning to offer volume from inventoried roadless areas (using the medium scenario). Applying this average net revenue the estimated reduction in commodity harvest volume from the Roadless Rule provides a rough estimate of the change in financial efficiency by region. Using the historic average net revenue for the affected forests indicates that commodity harvest within inventoried roadless areas in 5 regions (Regions 4, 5, 6, 8, and 9) is likely to be above cost overall, although some forests within those regions could still be below cost. These revenues would be foregone under the Roadless Rule (Table 11). No timber harvest for commodity purposes would be allowed in inventoried roadless areas, which would affect about 27 million board feet per year in the lower 48 states. The Tongass would be able to harvest about 54 million board feet per year under the Rule's provision for the Tongass. All of that volume would be for commodity purpose sales. Since the average cost of preparing sales in roadless areas may be higher than for other sales, the actual net revenue may be even lower than historic averages.

**Table 11. Estimated Net Revenue Effects Associated with Reduced Commodity Harvest in inventoried roadless areas using medium scenario (1997 dollars).**

<b>Forest Service Region</b>	<b>Baseline Average Annual Commodity Harvest in Inventoried Roadless Areas (MMBF)</b>	<b>Estimated Net Revenue from Commodity Harvest in Inventoried Roadless Areas</b>
<b>Northern (1)</b>	0.5	(14,995)
<b>Rocky Mountain (2)</b>	4.7	(82,471)
<b>Southwestern (3)</b>	0.2	(68,613)
<b>Intermountain (4)</b>	5.7	70,519
<b>Pacific Southwest (5)</b>	2.7	116,898
<b>Pacific Northwest (6)</b>	4.3	388,057
<b>Southern (8)</b>	2.6	179,017
<b>Eastern (9)</b>	6.5	237,903
<b>Alaska (10) (after 2004)</b>	53.5	(9,523,000)
<b>National</b>	<b>77.9</b>	<b>(8,696,6855)</b>

*Effects on Consumer Prices*

The reductions in National Forest System harvest resulting from the prohibitions are not likely to affect timber prices. Therefore, consumers should not be affected by the rule. Total U.S. wood consumption would likely be unaffected by the reduction in total National Forest System volume. The total affected volume is less than 0.5% of total U.S. production. There would be ample opportunity to substitute timber from other ownerships to replace reduced volume in the eastern U.S. In the West, some substitution is possible, although some substitution could occur in the form of increased imports from Canada.

*Effects on other Ownerships and International Effects*

The reduction in timber harvest on National Forest System lands in the past decade resulted in increased harvest on other ownerships in the U.S. and increased imports, primarily from Canada. Most of the National Forest System harvest reductions occurred in the Pacific Northwest. The market response to the reduced supply of timber was an increase in regional prices, a high degree of competition that eliminated a number of marginal processing facilities, reduced regional production of lumber and pulp, and reduction in logs exported. While production in the Pacific Northwest declined, tighter supplies and higher prices provided incentives to other suppliers to increase harvests. Substitute harvest came from private timber lands in the South (primarily nonindustrial private forest land), and increased imports from Canada (Sedjo and others 1999).

The harvest from National Forest System lands, substantially reduced from the late 1980s and early 1990s, now plays a much smaller role in timber markets. The alternatives examined in this section would affect from 1% to 2% of total National Forest System projected harvest in the next 5 years and less than 0.5% of national timber supply. The reductions in inventoried roadless area harvest would transfer some harvest effects to other ownerships, but these effects will be small and difficult to isolate from the expected trends in the supplies from other ownerships contributing to total U.S. production. For example, much of the future U.S. production of softwood sawtimber is expected to come from plantations in the South.

The U.S. is the largest producer and consumer of sawnwood, wood-based panels, and wood pulp for paper and paperboard. The U.S. is a major importer of softwood lumber, but also is a

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significant exporter of logs, sawnwood, and woodpulp for paper. Except for hardwood plywood from Southeast Asia, much of the import volume over the years has come from Canada. Although imports from other countries have increased, Canada remains the dominant supplier to the U.S. and supplies over 95% of the imported softwood sawtimber (USDA Forest Service 2000a).

Softwood sawtimber imports from Canada increased through the early 1990s, but have stabilized at about 36% of the total U.S. softwood lumber market since 1996. Most of these imports are from British Columbia, although an increasing share is coming from Quebec.

The estimated range of harvest effects from the Roadless Rule would have little effect on total imports. The largest potential total harvest effect (63 million board feet annually) is less than 1% of average softwood lumber imports in the last 4 years. Therefore, the economic impacts of the roadless proposal on global forest production are expected to be negligible.

The environmental effects of timber harvest on private and other public lands in the U. S. will vary depending on state forest practice acts and implementation of requirements established by laws such as the Clean Water and Endangered Species Acts. These controls along with market incentives such as certification for sustainable forestry management have done much to improve forest and range management practices to minimize negative ecological effects.

Other countries are willing to supply wood products to the U.S. and other nations. The environmental oversight on harvest in other countries varies dramatically. British Columbia and Quebec, the main suppliers of U.S. imports, have environmental regulations governing harvest. It is possible that increasing concerns over old-growth harvest in Canada will change production and imports from this country in the future. Other suppliers, such as New Zealand and Chile, provide supplies from intensively managed plantations.

## *ENERGY AND NON-ENERGY MINERALS*

Many different mineral commodities are produced from National Forest System lands. Production levels for some of those commodities are shown in Table 12. Other mineral outputs from National Forest System lands include crushed stone, sand and gravel, dimension stone, perlite, pumice, quartz crystals, molybdenum, helium, sulfur, carbon dioxide, and geothermal energy.

For some of these commodities, output from National Forest System lands accounts for a large share of total U.S. mine production. For example, the Stillwater Mine on the Custer National Forest is the only U.S. mine producing platinum and palladium as primary products. In addition, the Riley Ridge area on the Bridger-Teton National Forest provides a significant portion of the nation's helium. (The helium is extracted from helium-rich natural gas.) Even where its share of total U.S. supplies is small, National Forest System production can be very important to local markets. In some areas, the only sources of sand and gravel or crushed stone within a reasonable shipping distance may be on National Forest System lands.

**Table 12. 1999 Production of Selected Minerals from National Forest System Lands**

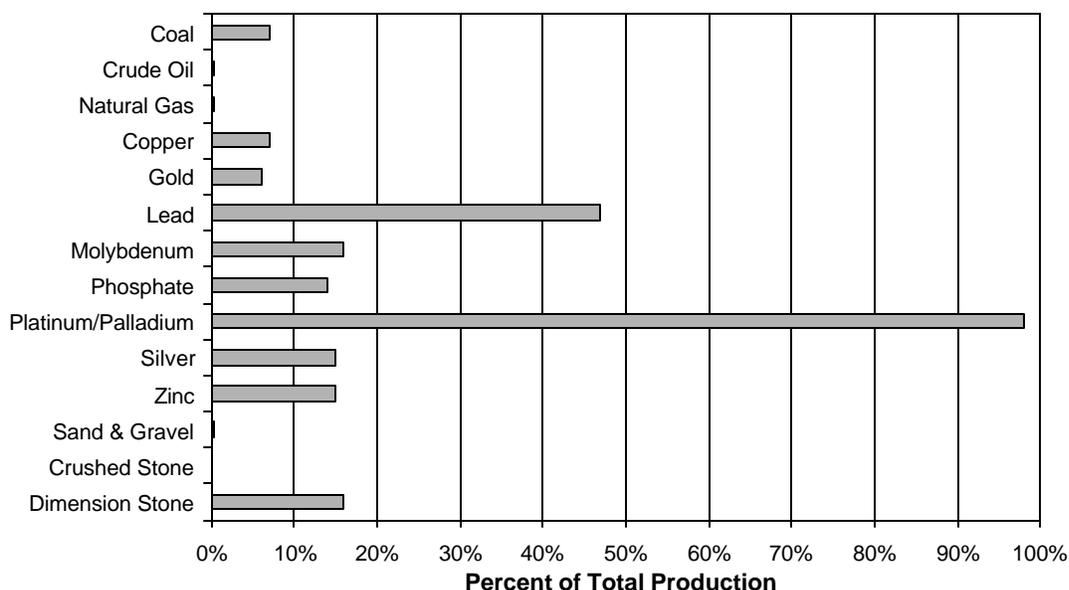
<i>Precious Metals (troy ounces)</i>	
Gold	558,238
Silver	9,787,684
Platinum	95,000
Palladium	315,000
<i>Base Metals (short tons)</i>	
Copper	105,935
Lead	319,869
Zinc	147,713
<i>Energy Minerals</i>	
Oil (million barrels)	8.5
Natural Gas (billion cubic feet)	76.4
Coal (million short tons)	69.4
<i>Industrial Minerals (short tons)</i>	
Limestone	1,388,962
Mica	135,585
Phosphate	4,852,617

*Source: USDA, Forest Service, "Production Report for FS Leases," November 2, 1999; company annual reports, various dates; Securities and Exchange Commission, 10-K and 10-Q reports included in the EDGAR database, <http://www.sec.gov/cgi-bin/srch-edgar>; personal communications with companies.*

Locatable minerals are metallic and nonmetallic minerals subject to appropriation under the General Mining Law of 1872 (17 Stat. 91). This law affords U.S. citizens a right to prospect for, claim, and develop these minerals on public domain and certain other federal lands. These lands are open to location of mining claims unless otherwise withdrawn. All valuable mineral deposits on lands open to mineral entry are considered locatable unless they are determined to be leasable or salable. Exploration and development of locatable mineral resources are non-discretionary activities. Locatable minerals include most of the base and precious metals listed in Table 12 if they occur on public domain and certain other federal lands.

Leasable minerals are those minerals that can be appropriated according to one of several mineral leasing acts. They include energy resources, such as oil, gas, coal, and geothermal. They also include minerals important for their sodium or potassium content, and deposits of base and precious metals on lands acquired under the Weeks Law (Public Law 61-435) and the Bankhead Jones Farm Tenant Act (Public Law 75-210). The Bureau of Land Management has the authority to dispose of leasable mineral resources in National Forest System lands, generally subject to Forest Service concurrence.

Salable minerals are common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. These are generally of widespread occurrence, relatively low unit value and used primarily in construction and landscaping. Their designation as a resource is dependent on their potential for development and their value, which is determined primarily by proximity to the market and availability of transportation. Disposal of salable minerals is at the sole discretion of the Forest Service.



**Figure 1. Forest Service Minerals Production as a Percentage of Total U.S. Production, 1998.<sup>7</sup>**

### Minerals Baseline

Figure 1 shows the percentage of U.S. mine production coming from National Forest Service lands for selected commodities. An input-output model called IMPLAN was used to estimate the number of jobs and the amount of income attributable to minerals production on National Forest System lands (Table 13). Total economic impacts generated from the IMPLAN analysis are the aggregation of three types of effects. The direct impacts are the effects on the initial sector (e.g., mining) experiencing a change in output. Indirect effects are the impacts on those industries that provide goods and services to the initial sector, and induced impacts are the effects associated with the expenditure of household income generated by the direct and indirect effects of the output changes.

Mineral activities on National Forest System lands generated about \$104 million in receipts to the U.S. Treasury in 1999, most of which is attributable to royalty payments on leasable minerals production. A portion of the U.S. Treasury receipts is returned to states and counties to be used for schools and roads. States receive 50% of leasable receipts on public domain lands, except in Alaska, where the State receives 90%. This same 50% share applies when the surface is managed as a national grassland, but the mineral estate is determined to be public domain. On acquired lands of the national forests, the states receive 25% of receipts, with the requirement that the funds be used for the benefit of the counties where the national forest is located. Where the mineral estate underlying a national grassland is acquired, 25% of leasable receipts are returned to the counties in which the grassland is located. States also receive 25% of receipts from salable minerals, and those funds are passed down to the counties in which the

<sup>7</sup> (USDA, Forest Service, "Common Variety Mineral Materials Report-FY 1998, 1999," "Production Report for FS Leases," November 2, 1998; U.S. Geological Survey, Mineral Commodity Summaries, various years, and Mineral Industry Surveys, various months; U.S. Department of Energy, Energy Information Administration, Annual Energy Review 1998, July 1999; Company annual reports, various dates; Securities and Exchange Commission, 10-K and 10-Q reports included in the EDGAR database, <http://www.sec.gov/cgi-bin/srch-edgar> )

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national forest is located. Estimated receipts and payments to states/counties for Fiscal Year 1999 are shown in Table 14.

**Table 13. Employment and Labor Income Attributable to Minerals Production from National Forest System Lands**

Sector	Number of Jobs		Labor Income	
	Direct (number)	Total (number)	Direct (million \$)	Total (million \$)
Agriculture	0	681	0.0	12.3
Mining	5,902	9,139	374.5	594.4
Construction	0	1,126	0.0	39.5
Manufacturing	2,619	5,999	241.9	411.9
Transportation, Communications, Public Utilities	0	1,904	0.0	96.3
Trade	0	7,574	0.0	185.2
Finance, Insurance, Real Estate	0	2,590	0.0	93.6
Services	0	10,980	0.0	337.1
Government	0	434	0.0	23.9
<b>Total</b>	<b>8,521</b>	<b>40,427</b>	<b>616.4</b>	<b>1,794.2</b>

Source: Input-output model developed using IMPLAN Professional Version 2.0 software, Minnesota IMPLAN Group Inc., 2000.

The recently passed legislation will affect payments to states based on receipts from salable minerals and leasable minerals from acquired lands of the national forests. Payments to states based on receipts from leasable minerals on the national grasslands and from public domain lands of the national forests will continue to be determined by other statutes. Therefore, the potential effects of the Roadless Rule on mineral-based payments to states will vary, depending on the source of receipts.

**Table 14. Fiscal Year 1999 U.S. Treasury Receipts and Payments to States/Counties From Mineral Activities on National Forest System Lands**

Region	Total Receipts (million dollars)	Payments to States/Counties (million dollars)
Northern (1)	8.8	2.7
Rocky Mountain (2)	34.2	16.1
Southwestern (3)	6.0	2.6
Intermountain (4)	40.0	20.0
Pacific Southwest (5)	2.4	1.1
Pacific Northwest (6)	0.1	0.0
Southern (8)	6.4	1.7
Eastern (9)	6.4	1.8
Alaska (10)	0.1	0.0
<b>Total</b>	<b>104.4</b>	<b>45.9</b>

Source: USDA Forest Service, "Financial Report Details," November 2, 1999, and "Statement of Receipts – Actual," December 27, 1999.

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Despite higher interest in some commodities (e.g., coal bed methane), the total number of energy and non-energy operations processed by the Forest Service declined about 24% from 1997 to 1999. The Energy Information Administration (EIA) forecasts that coal and natural gas production in the U.S. will rise steadily through 2020, while the downward trend in domestic crude oil output is expected to reverse after 2010 (U.S. Department of Energy 1999). Activity levels on National Forest System lands should correlate fairly well with EIA's forecasts. As mentioned previously, coal bed methane is currently attracting a lot of exploration attention. National forests and grasslands where coal and natural gas production are the dominant energy activities are likely to fare better from an economic standpoint (i.e., jobs, income, payments to states and counties) than those where the emphasis is on crude oil. Industry interest in phosphate also remains high.

*Phosphate.* Demand for phosphate in the U.S. has steadily increased since the early 1960s, primarily as a result of demand for phosphate fertilizer. World demand is expected to continue to grow in the future, although at a slightly slower rate since environmental concerns are reducing fertilizer application rates. The majority of phosphate production occurs in the eastern U.S., but production in the western U.S. has increased, and is expected to make up an increasing share of total production in the future (Jasinski 1999).

In 1999, a decline in fertilizer demand in the East and Midwest resulted in a reduction of phosphate rock production in the eastern U.S. Several mines and fertilizer production plants closed as a result. Western producers were largely unaffected, because their products are sold regionally. The short-term outlook for the domestic phosphate industry is for a lower than average production of phosphate rock in the East, although eastern production will continue to account for over 80% of total production (Jasinski 1999).

The majority of western phosphate production occurs on the Caribou National Forest, accounting for about 12% of national production. Southeastern Idaho has extensive phosphate reserves. In 1999, about \$2.2 million was paid to the State of Idaho as their share of royalty payments on National Forest System phosphate leases.

Phosphate mining is expected to continue to expand on national forests in southeastern Idaho. Operators of current mines all have plans to expand existing operations and are in various stages of NEPA analysis. These operators also own processing facilities that produce phosphate fertilizers or elemental phosphorus. Current production levels are expected to be maintained or possibly increase in the near future.

*Coal.* U.S. coal production steadily increased from the early 1960s through most of the 1990s. While production has increased, increases in worker productivity reduced direct employment by nearly half between 1986 and 1997. The number of operating mines has also decreased, but average production per mine has increased. Coal prices have declined through the 1990s, and are expected to continue to decline in the near future, which will continue to limit investment in exploration and new development. Although the U.S. has extensive coal reserves, lack of investment in development of new reserves could result in a shortage of coal in the next 20-30 years, as existing reserves are depleted (Bonskwoski 1999).

In the short-term, there will be continued interest in coal development. Production is expected to increase in the western U.S., especially in areas like the Powder River Basin where low-sulfur coal can be surface mined at relatively low cost (Bonskwoski 1999). Large reserves of low-sulfur coal are located in Wyoming, Utah, Montana, Colorado, and New Mexico, where the Federal government owns the rights to the majority of coal reserves. Current federal coal

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production is concentrated in Colorado, Montana, Utah, and Wyoming, with smaller amounts of production in Alabama, Kentucky, New Mexico, North Dakota, Oklahoma, and Washington.

Federally owned coal plays an important role in the energy supply of the United States. Coal produced from Federal leases tripled from about about 12% of total U.S. production in 1976 to almost 34% in 1995, because of the demand for low-sulfur coal for use in power plants. Coal accounts for more than 56% of utility power generation (U.S. Department of Energy 1998).

In 1998, coal production from federal leases on National Forest System land accounted for almost 7% of total national production, and about 22% of production from federal leases. (USDA Forest Service 1999 and U.S. Department of Interior 1998). Based on planned projects in the next 5 years, there is industry interest in expanding current operations in Colorado and Utah to replace reserves as they become depleted. With continuing declines in coal prices, the longer-term outlook is more difficult to predict. Although production is expected to increase, productivity increases are still expected to result in further reductions in direct jobs associated with coal mining (U.S. Department of Energy 1999).

*Oil and Gas.* The U.S. has considerable reserves of oil and gas. Despite recent price increases for crude oil, total U.S. production of crude oil is expected to continue to decline through 2010. Increased prices for natural gas are expected to lead to increases in production of natural gas (U.S. Department of Energy 1999). Federal leases are an important source of oil and gas, but most of the production is from off-shore leases. Production from national forests and grasslands accounts for 0.4% of total U.S. oil and gas production.

Interest in natural gas development may increase on national forests and grasslands, in response to increasing prices and increasing demands. Although much of the increased development is expected to be off-shore, a number of national forests and grasslands either have current leases, or have applications for permits to explore for natural gas. Therefore, increased activity in this area is likely. Increased activity for crude oil is not expected, given the outlook for crude oil.

Prices for some metals (copper, gold) have declined in the past few years, providing less of a financial incentive for firms to explore for and develop those commodities. The continuing low prices have resulted in the shutdown of a number of mines or a reduction in production levels. In addition, lengthy processing times, increasing environmental mitigation and permitting costs, less public acceptance of resource extraction activities, and delays caused by appeals and lawsuits are often seen as a disincentive to explore and develop on federal lands.

Within the next 5 years, several new metal mines on National Forest System lands should begin producing, and some existing metal mines will expand their output. Thus, the amount of copper, gold, silver, platinum, and palladium produced from National Forest System lands should increase over current levels. Over the longer run, however, the overall interest in exploring for and developing metal deposits domestically is likely to continue to decline unless prices for certain commodities increase substantially and mining companies perceive a significant improvement in the regulatory and policy framework. Eventually, the lack of exploration activity will result in a drop in metals production and associated decreases in jobs and income.

### **Summary of Public Comment**

The public expressed polar views about mining in inventoried roadless areas. Some people believe mining should be prohibited in inventoried roadless areas because they think it has a

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negative impact on human health and the environment. Others believe roadless areas contain valuable mineral resources that should continue to be available for development.

Concern was raised about the potential economic impact to dependent communities, and increasing dependency on foreign sources of supply. Others expressed concern that the proposed rule would not protect access to existing claims. Moreover, some believe that banning mining in roadless areas would be contrary to existing laws.

### **Energy and Non-energy Minerals Economic Effects**

The economic effects focus on how the Roadless Rule would affect future exploration for and development of energy and non-energy minerals. Under the baseline, forest plan and other leasing, licenses, permits, or sales decisions would be implemented and mineral operations would be approved under existing authorities. Mineral activity on National Forest System lands will continue to depend upon such factors as market conditions, environmental regulations, tax policies, technological advances, and mineral potential. For locatable minerals, the construction and reconstruction of roads reasonable and necessary for exploration and development would be allowed under the General Mining Law of 1872.

For leasable minerals, the road prohibition would not affect road construction and reconstruction providing access to and development within existing lease boundaries. However, the prohibition would likely prevent expansion of existing lease areas into adjacent inventoried roadless areas. In many cases, such expansion is more economically advantageous to the operator than developing new deposits.

Where reserves are known to occur in inventoried roadless areas, the road prohibition is likely to preclude future development, except in situations where development can occur without road construction. The economic effects of precluding development depend on the availability of alternate resources in areas that may be available for leasing (either on other National Forest System lands or on other ownerships). Since mineral deposits tend to be concentrated in some geographic areas, it is likely that the impacts on mining jobs and income would also be concentrated in a few areas. The most immediate economic effects are associated with current proposals to expand existing leases into adjacent inventoried roadless areas for phosphate and coal mining (USDA Forest Service 2000b).

*Phosphate.* Phosphate mining on the National Forest System currently occurs only on the Caribou-Targhee National Forest in southeastern Idaho. There are eight Known Phosphate Lease Areas<sup>8</sup> (KPLAs) in southeastern Idaho, totalling over 81,000 acres. About 48% of those acres are on National Forest System lands administered according to the Caribou National Forest Land and Resource Management Plan.

Currently, the Caribou-Targhee National Forest has 46 phosphate leases affecting 23,843 acres, accounting for almost 60% if the KPLA lands on the forest. Approximately 6,282 of those acres are within inventoried roadless areas. However, these areas include leases on areas that have already been developed and contain no more minable phosphate rock. An additional 7,939 acres of inventoried roadless areas are within KPLAs, and are not currently leased. About 873 million tons of phosphate resources are estimated to occur within these unleased areas. There are other inventoried roadless areas containing phosphate resources in other states, but no

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<sup>8</sup> A Known Phosphate Lease Area is land known to contain phosphate deposits and is classified by the USGS as subject to competitive leasing.

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estimates of the resources within inventoried roadless areas are available, and there has been no demonstrated industry interest in those areas.

Three mines are currently operating on the Caribou-Targhee National Forest, with a fourth operation scheduled to begin soon. One of the active mines is operating partially within an inventoried roadless area, and accounts for about half of the phosphate rock production in Idaho. Future production at this site depends on an Interior Board of Land Appeals decision on a lease that was issued within an inventoried roadless area, and approval of expansion into a contiguous area that is not within an inventoried roadless area. The lease appeal is not related to the lease being within an inventoried roadless area. If production is allowed to go forward at either or both sites, then no short-term effects are expected related to phosphate mining on the Caribou.

If production is not allowed to go forward at either site, then production will likely be interrupted. The operator would not have sufficient time for the required permitting and construction necessary to develop substitute reserves before reserves at the existing operation are depleted. Other mine operators in southeast Idaho are not likely to have sufficient excess capacity to provide substitute production in the short-term. The potential interruption in supply is not related to imposing a road prohibition, but a road prohibition could constrain future options for developing substitute reserves. Therefore, the economic impacts of interrupting the production of 3 million tons of phosphate rock per year (the estimated current production level) were estimated to illustrate the level of impacts that could occur if the Roadless Rule precludes future development of reserves within inventoried roadless areas (Table 15). An interruption in supply is also likely to affect jobs at the production facility that is owned by the mine operator. Those impacts are not included in the table, because the impact analysis was limited to effects from primary processing.

Over the long term, phosphate leasing potential on National Forest System outside of inventoried roadless areas and non-National Forest System lands is generally limited to small areas that are contiguous to existing leases or deposits with a low development potential. Over 1,000 acres in inventoried roadless areas on the Caribou have been formally applied for through Lease Modifications, Exploration Licenses, and Prospecting Permits. Most of the applications would be significantly affected by road prohibitions.

*Coal.* There are approximately 2.5 million acres of coal-bearing rocks within inventoried roadless areas. About 93% of those acres are in the Rocky Mountain area. Coal mining from inventoried roadless areas is not extensive, but two national forests have active coal mining either within or contiguous to inventoried roadless areas, all using underground mining methods. The Grand Mesa-Uncompaghre-Gunnison National Forest in Colorado consented to lease approximately 500 acres in an inventoried roadless area in March 2000. In addition, the forest received an application for coal lease modification encompassing approximately 300 acres in an inventoried roadless area. Coal resources are estimated to range from 237 million to 1.3 billion tons of coal within the 47,400 acres of inventoried roadless areas that are not currently under lease .

On the Grand Mesa-Uncompaghre-Gunnison National Forest in Colorado, one coal mine operator is interested in expansion into a contiguous inventoried roadless area. Although the mine is an underground operation, expansion may require road access for exploration and development drilling, and construction of ventilation shafts. The mine currently produces about 7 million tons per year. The operator will need access to new reserves to maintain production levels in two to five years. If production cannot be expanded into inventoried roadless areas,

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the mine could close when current reserves are exhausted, which could occur in the next two to five years. The potential effects on jobs and labor income of reducing production by 7 million tons per year are shown in Table 15. Company estimates indicate that about 200 million tons of coal could be recovered from the inventoried roadless area. In addition, the company indicated that about 50 million tons of coal under the current lease may not be extracted because planned longwall panels that would extend into unleased federal coal would not proceed because of the road prohibition. The impacts of a closure would be concentrated in the local communities where the workers reside (see Forest Dependent Communities section).

Two other operating mines on the Grand Mesa-Uncompaghe-Gunnison could also be affected by the Roadless Rule. The recent consent to lease 500 acres was conditioned on the outcome of the Roadless Rule. If road construction or reconstruction is necessary for mining that tract, development would likely be restricted or precluded. Similar conditions exist for the proposed coal lease modification. No data were available on when current reserves may be depleted for these mines. Together, the two mines currently produce about 9 million tons per year and employ 368 people with an annual payroll of \$22.5 million. If future expansion of these operations is precluded by the road prohibition, and no alternative sources of production are economically attractive, then these mines could be closed after current reserves under leased are mined.

The coal produced from these mines is used by electric utilities in the eastern U.S. The Colorado coal has both a low sulfur content and high BTU value. Utilities depend on the coal to blend with higher sulfur, lower BTU coal as their Clean Air Act compliance strategy. The three mines described are significant contributors to total federal production from Colorado. The impacts of a reduced supply from these mines on the overall supply of low-sulfur, high BTU coal are difficult to predict. The western U.S. has abundant sources of low-sulfur, low BTU coal reserves, particularly in the Powder River Basin of Wyoming, where few inventoried roadless areas occur to limit future development. Use of low-sulfur, low BTU coal requires a higher volume to be burned. During times of peak demand, utilities normally depending on high BTU coal are not able to burn enough coal to meet demand if they have to rely on lower BTU coal. Another option is to use high BTU, high sulfur coal, and use emissions trading to comply with Clean Air Act standards. Emission allowances would cost the equivalent of between \$1 and \$8 more per ton of coal, depending on the available alternatives.

The Manti-LaSal National Forest in Utah also has active underground coal mining. Three potential coal tracts remain on the Wasatch Plateau that total 36,200 acres and contain recoverable reserves of about 185 million tons of high-BTU bituminous coal. None of these tracts are currently leased. Approximately 40% of those reserves are in inventoried roadless areas. One tract would require full development of an underground mine (e.g. transportation and portal facilities) in an inventoried roadless areas; surface development of another could be done outside any inventoried roadless area. The third tract could be developed from an adjacent underground mine. However, development of the three tracts would depend on the ability to conduct both pre-lease exploration drilling and post-lease development drilling. Included in the recoverable reserve estimate are about 22 million tons of recoverable coal reserves in inventoried roadless areas that were transferred to the State of Utah School and Institutional Trust Lands Administration (SITLA) under the Utah Schools and Land Exchange Act of 1998 (Public Law 105-335). These reserves would be considered to have outstanding rights, and therefore be excepted from the prohibitions. The rights to the coal would revert to federal ownership once the SITLA portion is recovered.

Two of the potential tracts on the Manti-LaSal have relatively small recoverable reserves, but the third tract has an estimated 135 million tons of minable reserves, of which 50 million tons is within inventoried roadless areas. This tract would require development facilities in an inventoried roadless area, which may preclude development of the entire tract. Access to coal owned by the State of Utah would be guaranteed, as would access to any privately held rights. Information provided by one company indicated that reserves within one of the tracts are privately held, which would also be treated as an outstanding right and therefore excepted from the prohibitions. Development of tracts without outstanding rights or existing leases may occur, but complying with the prohibitions would likely increase costs, and lower the bonus bids. A reduction in bonus bids reduces returns to the U.S. Treasury, and the share of receipts to the states.

**Table 15. Potential Annual Economic Impacts of the Roadless Rule on Selected Mineral Commodities and National Forests and Grasslands.**

Commodity	National Forest/ Grassland	Labor Income (millions of 1999\$)		Employment (number of jobs)		Payments to States
		Direct	Total	Direct	Total	(millions of 1999\$)
Coal	Grand Mesa, Uncompahgre, & Gunnison	25.8	89.3	361	2119	2.1
Phosphate	Caribou	10.4	38.5	185	976	1.3
Total		36.2	127.8	546	3095	3.4

*Note: The Payments to States estimates are based upon 1999 prices for coal and phosphate. Impacts could occur within two to five years, depending on depletion of reserves at existing operations. Other operations could be impacted in the longer term.*

**Oil and Gas.** Most inventoried roadless areas with oil and gas potential are in the Rocky Mountain area (Forest Service Regions 1, 2, 3, and 4). The exception is the Los Padres National Forest in California. Because of the downturn in the domestic oil and gas industry, the amount of National Forest System land under oil and gas lease dropped from about 35 million acres in the mid-1980s to about 5 million acres today. As mentioned previously, increasing prices and demand for natural gas has increased interest, particularly in development of coal-bed methane on National Forest System lands. Current interest is focused on the Powder River Basin of Wyoming and Montana. Other areas, including the Dakota Prairie Grasslands, may also have coal-bed methane resources.

Oil and gas lease sales are scheduled on a regular basis for lands where there is interest in leasing and where environmental analyses have been completed. Since 1992, more than 30 environmental impact statements have been completed for National Forest System lands where there is current industry interest. The Records of Decision for these analyses did concur with some leasing in inventoried roadless areas. Some of these decisions allow leasing under standard lease terms, while others would be available with stipulations, such as no surface occupancy (USDA Forest Service 2000b).

The Roadless Rule would have no effect on areas currently under lease. The Roadless Rule contains an exception that would allow road construction or reconstruction on those lease areas for the continuation, extension, or renewal of a mineral lease. New leases could also be issued upon expiration of an existing lease, and the exception would still apply. Data from the national forests and grasslands were used to estimate that about 759,000 acres of inventoried roadless areas that are considered to have high oil and gas potential are already under lease.

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*Salable minerals.* For salable minerals, the Roadless Rule would reduce the supply of and demand for mineral materials (e.g., crushed stone) used in building roads on National Forest System lands. The most likely reason for developing salable deposits in inventoried roadless areas for agency administrative use is in support of road building in those areas or for road maintenance in nearby areas. However, there could be impacts on Agency, State and local governments and on commercial businesses that would propose development of such sites, even though transportation costs could be substantial. These effects would be highly localized, primarily in areas where substitute deposits are scarce on National Forest System lands outside of inventoried roadless area or other lands.

For both locatable and leasable minerals, there may also be impacts associated with potential increases in costs of permitting and environmental mitigation of activities within inventoried roadless areas. This could affect future exploration and development for locatable minerals. Most proposed activities, particularly if they are proposed within an inventoried roadless area, are already subject to intense scrutiny through preparation of environmental impact statements. However, it is possible that in some cases, the requirements for environmental analysis may increase, mitigation requirements may increase, and the processing time may increase,

Over the long term, higher costs and longer processing times might cause some portion of the mineral resources in inventoried roadless areas to become uneconomic. If that occurred, the level of development would be reduced, resulting in fewer mining-related jobs, less income, and a reduction in U.S. Treasury receipts and payments to states and counties. There is not enough information available, however, to quantitatively estimate the degree to which jobs, income, and revenue would be reduced by increased costs.

*Undiscovered Resources.* U.S. Geological Survey (USGS) has conducted assessments of undiscovered deposits of numerous mineral resources<sup>9</sup>. Based on knowledge of the geologic environment and a comparison with known deposits having similar geologic attributes, the USGS has estimated the amount of undiscovered mineral resources for areas that seem conducive to the existence of such deposit types. These areas are referred to as permissive tracts for metallic minerals and as provinces for oil and gas resources. The estimates were provided in the form of probability distributions, which describe the likelihood of existence of varying amounts of mineral resources in the tract or province.

The USGS maps of undiscovered resources were overlaid with the location of inventoried roadless areas. Permissive tracts and provinces that did not contain inventoried roadless areas were eliminated. Within the remaining permissive tracts and provinces, the percentage of the area within inventoried roadless areas varies widely. Therefore, the proportion of these resources that may fall within inventoried roadless areas will also vary widely. The resources estimates in Tables 16 to 18 are estimates of total undiscovered resources, not resources underlying inventoried roadless areas.

Table 16 to Table 18 contain the USGS estimates of undiscovered resources for gold, silver, copper, lead, zinc, oil, and natural gas. In Table 16 and Table 17 the estimated quantity and value of undiscovered resources are shown at the 50<sup>th</sup> percentile, which means there is an equal chance that the actual quantity is higher or lower. The mean (or average) estimate of the quantity and value of oil and gas that could be extracted with current technology is shown in

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<sup>9</sup> Undiscovered resources are resources, the existence of which are only postulated, comprising deposits that are separate from identified resources. Undiscovered resources may be postulated in deposits of such grade and physical location as to render them economic, marginally economic, or subeconomic.

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Table 18. Natural gas estimates do not include estimates of unconventional resources, such as coal bed methane.

The data in Tables 16, 17, and 18 indicate that there are potentially valuable mineral deposits within these permissive tracts and provinces. In most cases, inventoried roadless areas account for a small portion of the area within the permissive tract or province. This is particularly true in the East, where National Forest System lands account for a small portion of total land area, and inventoried roadless areas are a small percentage of total National Forest System lands. In addition, oil and gas resources in the Gulf Coast region (Table 18) include off-shore resource estimates. The likelihood of deposits occurring within inventoried roadless areas is higher in the Intermountain West, where many inventoried roadless areas are located, and where most existing mining activity occurs on NFS lands.

**Table 16. Estimates at the 50th Percentile of Undiscovered Resources of Gold, Silver, Copper, Lead, and Zinc for Permissive Tracts Containing Inventoried Roadless Areas (metric tons).<sup>a</sup>**

Region	States	Gold	Silver	Copper	Lead	Zinc
Colorado Plateau	AZ CO NM UT	0	0	0	0	0
Central/Southern Rocky Mountains	CO NM TX WY	619	4,853	4,468,980	832,000	919,000
East-Central US	AL GA IL IN KY MD MI MS NC NJ NY OH PA TN VA WV	0	910	0	4,450,000	36,200,000
Great Basin	AZ CA ID NV OR UT	1,891	52,991	16,937,217	4,800,500	6,700,900
Great Plains	AR IA IL IN KS KY MI MO NE NM OH OK TN TX WI	0	440	9,400,000	1,900,000	10,000,000
Lake Superior	IA KS MI MN MO ND NE SD WI	488	13,003	25,600,000	570,000	10,000,000
Northern Appalachian Mountains	CT MA ME NH NY VT	20	1,636	840,000	383,000	2,946,000
Northern Rocky Mountains	ID MT SD WA WY	550	34,968	13,490,800	2,170,100	3,865,000
Pacific Coast	CA ID NV OR WA	389	5,612	6,855,030	67,100	516,900
Southern Appalachian Mountains	GA NC TN VA	12	430	910,000	0	250,000
Southern Basin and Range	AZ CA NM	715	27,193	63,664,000	3,228,000	3,703,000
<b>Total All Regions</b>		<b>4,684</b>	<b>142,036</b>	<b>142,166,027</b>	<b>18,400,700</b>	<b>74,570,800</b>

<sup>a</sup> The numbers in this table refer to total resources within permissive tracts that contain roadless areas and are not an estimate of resources within inventoried roadless areas.

Source: U.S. Geological Survey, Data Base for a National Mineral-Resource Assessment of Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc in the Conterminous United States, Open File Report 96-96, 1996.

Market conditions play an important role in determining the level of exploration and development interest for a particular mineral commodity, and prices for some commodities would have to increase significantly over current levels to generate much interest in exploration and development. If operators face higher costs in inventoried roadless areas, the Roadless Rule would reduce the investment attractiveness of conducting activities in inventoried roadless areas and cause some portion of the mineral resources to go undeveloped. The amount of the resources that would be affected and the magnitude of the related economic impacts would depend, in part, upon the availability of alternative investment opportunities.

The resources shown in Tables 16 and 17 are usually locatable minerals on National Forest System lands. The main exception is lead that is mined on the Mark Twain National Forest as a leasable. Oil and gas resources are leasable, and therefore are more likely to be impacted by the road prohibition. The data in Table 18 indicate there may be as much as 20.8 billion barrels of technically recoverable oil resources and 171.34 trillion cubic feet of gas resources in provinces containing some inventoried roadless areas. In addition to the conventional gas resources, federal lands are believed to contain significant unconventional natural gas resources. The Rocky Mountain area (Forest Service Regions 1, 2, and 4) is of particular interest, because of the concentration of oil and gas resources, and the relatively large acreage of inventoried roadless area in that area. An analysis using more recent estimates of undiscovered resources in the Rocky Mountains indicated that between 3.5 and 23.1 trillion cubic feet of technically recoverable gas resources might underlie inventoried roadless areas in those three Forest Service regions, with a mean estimate of 11.3 trillion cubic feet. Between 119 million and 1.2 billion barrels of oil are estimated to underlie inventoried roadless areas in the same area, with a mean estimate of 550 million barrels (Advanced Resources International, 2000b). See Appendix A11 for a more detailed discussion of undiscovered oil and gas resources.

**Table 17. Estimates at the 50th Percentile of the Number of Undiscovered Deposits and the Value of Gold, Silver, Copper, Lead, and Zinc for Permissive Tracts Containing Inventoried Roadless Areas.<sup>a</sup>**

Region	1998 Gross Value of Contained Metal (billion dollars)					
	Number of Deposits	Gold	Silver	Copper	Lead	Zinc
Colorado Plateau	0	0	0	0	0	0
Central/Southern Rocky Mountains	27	5.9	0.9	7.4	0.8	0.9
East-Central U.S.	9	0	0.2	0	4.4	35.9
Great Basin	120	17.9	9.4	28.0	4.8	6.1
Great Plains	6	0	0.1	15.5	1.9	9.9
Lake Superior	100	4.6	2.3	42.3	0.6	9.9
Northern Appalachian Mountains	1	0.2	0.3	1.4	0.4	2.9
Northern Rocky Mountains	51	5.2	6.2	22.3	2.2	3.8
Pacific Coast	52	3.7	1.0	11.3	0.1	0.5
Southern Appalachian Mountains	6	0.1	0.1	1.5	0	0.2
Southern Basin and Range	85	6.8	4.8	105.3	3.2	3.7
<b>Total All Regions</b>	<b>467</b>	<b>44.5</b>	<b>25.3</b>	<b>235.1</b>	<b>18.3</b>	<b>74.0</b>

<sup>a</sup> The numbers in this table refer to total resources in permissive tracts that contain inventoried roadless areas, and are not an estimate of resources within inventoried roadless areas.

Source: U.S. Geological Survey, Data Base for a National Mineral-Resource Assessment of Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc in the Conterminous United States, Open File Report 96-96, 1996.

**Table 18. Mean Estimates of Undiscovered Technically Recoverable Conventional Resources of Crude Oil and Natural Gas for Provinces Containing Inventoried Roadless Areas.<sup>a</sup>**

Region	Crude Oil		Natural Gas	
	Billion Barrels	1998 Gross Value (billion dollars)	Trillion Cubic Feet	1998 Gross Value (billion dollars)
Alaska	0.96	10.4	2.16	4.2
Pacific Coast	4.01	43.6	12.00	23.2
Colorado Plateau/Basin and Range	1.31	14.2	8.56	16.6
Rocky Mountains/Northern Great Plains	4.51	49.0	21.98	41.6
West Texas/ Eastern New Mexico	2.88	31.3	18.71	31.8
Gulf Coast	5.40	58.7	98.02	190.2
Mid-continent	0.26	2.8	19.58	6.5
Eastern	1.47	16.0	11.54	18.4
<b>Total All Regions</b>	<b>20.80</b>	<b>226.1</b>	<b>171.34</b>	<b>332.4</b>

<sup>a</sup> The numbers in the table are estimates of total resources within provinces that contain inventoried roadless areas and are not estimates of resources within inventoried roadless areas.

Source: (U.S. Geological Survey, 1995 National Assessment of United States Oil and Gas Resources, Digital Data Series DDS-30, DDS-36, 1996.)

**Table 19. Estimates of Coal Resources in the Northern Rocky Mountains and Great Plains Region in Counties Containing Inventoried Roadless Areas (millions of short tons).<sup>a</sup>**

Basin	States	Measured (<1/4 mile)	Indicated (1/4-3/4 mile)	Total	1998 Gross Value (billion dollars)
Powder River	MT, WY	77,870	295,180	373,050	6,532
Williston	ND	622	4,038	4,660	82
Greater Green River	WY		no roadless areas		
Hanna-Carbon	WY		no roadless areas		
<b>Total All Basins</b>		<b>78,492</b>	<b>299,218</b>	<b>377,710</b>	<b>6,614</b>

<sup>a</sup> The numbers in this table refer to total resources within the basins and are not estimates of resources within inventoried roadless areas.

Source: U.S. Geological Survey, Fort Union Coal Assessment Team, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region, Professional Paper 1625-A, 1999.

The USGS has also conducted coal resource assessments for several regions in the United States. Estimates from the Northern Rocky Mountains and Great Plains assessment are shown in Table 19. The figures represent coal that should be used over the next 20-30 years. Coal resources in several other tertiary basins in the Northern Rocky Mountains and Great Plains were not assessed, because they were less likely to be used during that time. The estimates do not include resources within mine or lease areas, or resources in coal beds less than 2.5 feet thick.

The estimates are presented at two levels of geologic assurance, which relate to the distance from drill holes. Measured coal resources are those within a 0.25-mile radius from a drill hole,

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while indicated resources are within 0.75 mile. The USGS reported resources for two other categories (inferred and hypothetical), but these are not presented in Table 19 as they represent lower levels of geologic assurance. Similar to the oil and gas and metal resources discussed above, the USGS coal estimates have been adjusted where coalfields within a basin clearly contain no inventoried roadless areas. Even so, for the reasons mentioned previously for undiscovered oil and gas and metal deposits, the percentage of these resource estimates in Table 19 that occur within inventoried roadless areas is unknown. For example, in the Powder River Basin, 87 percent of the coalfield containing inventoried roadless areas is federally owned coal. However, there is very little area in inventoried roadless areas within that basin. In the Williston Basin 37% of the coal is federally owned. As with undiscovered oil and gas and metal deposits, over the long term some coal resources will likely not be developed under the Roadless Rule, which will reduce the number of jobs, the amount of income, and the level of payments to the federal treasury, states and counties.

#### *Effects on Other Ownerships and International Effects*

The U.S. is a net importer of phosphate rock. Despite having large reserves, projected growth in demand for phosphate rock for production facilities in the East will be met by increased imports, primarily from Morocco. High transportation costs currently prohibit western phosphate rock from being economically competitive with imports in supplying eastern production facilities. Phosphate rock imports to eastern facilities are used primarily in producing value-added products, primarily fertilizers. The U.S. is a net exporter of numerous phosphate fertilizer products and elemental phosphorous (Jasinski 1999).

Western phosphate production is used to provide raw materials to western processing plants. The only two elemental phosphorous plants in the U.S. are in southeast Idaho. Phosphate reserves in the West are sufficient to provide raw materials to western processing facilities for the foreseeable future. Restrictions on development in inventoried roadless areas may cause some temporary disruptions as production moves to other areas. In the long-run, lack of development of reserves within inventoried roadless areas would result in reserves being depleted at an earlier date.

The U.S. is a net exporter of coal, although exports have declined in recent years as a result of increasing competition from other countries, declining coal consumption in Europe, and a strong U.S. dollar. International competition has had minor impacts on national production and prices, with the exception of certain premium coal and steam coal producers (mostly mines in northern Appalachians, Colorado, and Utah) (Freme and Hong 1999).

The potential reductions in coal production associated with road prohibitions in inventoried roadless areas are unlikely to have any effect on national production or prices. The majority of federal production in the near future is expected to continue to come from surface-mining operations in the Powder River Basin. Current production in that area is primarily from other federal lands, and there is little inventoried roadless area within the Basin area. If reserves within inventoried roadless areas are unavailable for future development, reserves on other federal land and other ownerships are likely to be developed.

U.S. imports of crude oil are expected to continue to increase. The share of petroleum consumption met by net imports is projected to increase from 52% in 1998 to 64% in 2020. The U.S. was essentially self-sufficient in natural gas until the late 1980s. Net imports as a share of consumption more than tripled from 1986 to 1999. Production has declined, and most imports are from Canada. Despite increases in domestic production, net imports are expected to

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increase through 2020, from 14.6% to 16.3% of total gas consumption (U.S. Department of Energy 1999). Production from national forests and grasslands is a small part of total U.S. production of oil and natural gas and is unlikely to have any appreciable effect on import dependence.

## *LIVESTOCK GRAZING*

Forest and rangelands in the United States provide forage and browse for over 100 million cattle and 8 million sheep (USDA Forest Service 2000a). In the mid-1980s, permitted use on federal lands (primarily grazing on National Forest System and Bureau of Land Management lands) made up about 7% of beef cattle forage and about 2% of total feed consumed by beef cattle in the lower 48 states (Joyce 1989). Permitted use on National Forest System lands declined 11% between 1985 and 1998 (USDA Forest Service Range Management Staff).

### **Livestock Grazing Baseline**

In 1998, about 92 million acres of National Forest System lands were in grazing allotments, of which 84 million acres were actively used. Some 2,114,000 cattle and sheep grazed on National Forest System grazing allotments in 1998 (USDA Forest Service Range Management Staff). Approximately 81% of Forest Service permittees run small to medium-sized family ranch operations specializing in beef cattle production. Cow-calf and cow-calf-yearling operations are the most common of these (Council for Agricultural Science and Technology 1996). On National Forest System lands, all areas that are suitable for grazing have already been placed in allotments, and the opportunity to expand is negligible.

In 1998, there were 8,395 grazing permittees using National Forest System lands, as compared with 9,126 in 1990. Although the number of grazing permittees has decreased over the last decade, this trend is affected more by the consolidation of permits than by declining use. The number of grazing permittees is expected to remain stable, or to decline slightly in the future.

No readily available regional or national data on the percent of grazing allotments that occur within inventoried roadless areas exists. No road construction or reconstruction projects were planned in the next five years for range management purposes in inventoried roadless areas. Ranchers can use roads built for other purposes, but it cannot be determined whether planned road building would occur in locations that would allow improved access to grazing allotments.

Ranchers who depend on National Forest System lands for grazing are located primarily in the eleven western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming). In those states, about 260 miles of roads are planned in inventoried roadless areas over the next five years to access 503 million board feet of timber that are planned for offer.

If those roads were built, only 71 miles would remain open and available for use by ranchers to improve their access to current allotments in roadless areas. An additional 422 miles of roads may be built in the next five years in the western states for non-timber project purposes. Use of those roads might reduce operating costs where they occur in close proximity to access points for grazing allotments. However, many of these roads would be single use roads that may not be available for use by others. Although few additional roads would be available from timber harvest, the harvest would open up the forest to understory growth in many areas, temporarily

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increasing forage for livestock. This could benefit ranchers if those areas were available for grazing. Balanced against the potential benefits of easier access and a temporary increase in forage is the increased probability of introducing non-native invasive species to grazing allotments in inventoried roadless areas.

### **Summary of Public Comment**

Comments received expressed a variety of viewpoints regarding grazing in and near roadless areas. Some individuals stated that grazing is one of the multiple uses that is appropriate on National Forest System lands, and should be continued. Several people wanted current road access to allotments protected so that permittees could engage in range management and infrastructure maintenance. Others expressed the view that permittees who have successful livestock businesses are able to retain rather than sell their ranches, thereby preventing the sub-division and development of private ranchlands, and keeping these areas in open space. Comments also reflected a belief that grazing can reduce fire risk on National Forest System lands.

In contrast, other individuals believe that grazing is environmentally destructive, and undermines the ecological integrity of roadless areas. They believe, therefore, that it should be eliminated entirely, restricted, or monitored and evaluated, with permits cancelled if it is found to cause environmental damage. At a minimum, they believe that no new grazing allotments should be opened up in roadless areas. Some people believe no new roads should be built to accommodate grazing on National Forest System land in the future.

### **Livestock Grazing Economic Effects**

Much of the concern about potential effects to livestock grazing focused on a belief that the Roadless rule would close existing access routes. The Roadless Rule would not affect existing routes of access to grazing allotments. Nor would it affect the future supply of grazing allotments. The prohibition on road construction and reconstruction does not affect any planned projects in the next 5 years related to range management. The 260 miles of roads planned to facilitate timber harvest over the next five years in the western states would not be built, and another 201 miles of roads associated with other projects may be prohibited. Therefore, there may be some potential losses in terms of future increases in access. Reduced harvest could also reduce future opportunities for increasing forage availability. However, prohibiting roads will reduce the threat of invasive species, which reduces forage quality and quantity. Given the balance of potential positive and adverse effects, and the relatively small number of miles of road that might become available, negligible economic impacts on existing permittees are expected.

### ***NON-TIMBER FOREST PRODUCTS***

Non-timber forest products include five broad categories: wild food plants, such as mushrooms, fruits, nuts, and berries; medicinal plants and fungi; floral greenery and horticultural stocks; plants, lichens, and fungi used for fiber and dyes; and other chemical plant extracts such as oils and resins (Weigand and others 1999). For this discussion woody material such as firewood, poles, and boughs are included because they, too, are commonly used non-timber forest products.

Many non-timber forest products are gathered for both subsistence and recreational use. In the Pacific Northwest, for example, American Indians use hundreds of species of non-timber forest

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products for subsistence purposes, including food, firewood, construction material, and medicinal uses (von Hagen and Fight 1999). In parts of California and in the Southwest, many rural Hispanic communities depend on gathering firewood from National Forest Service land for both cooking and heating (Raish in press). Many recreational users, such as amateur mushroom collectors, also gather non-timber forest products (Fine 1998). The size, structure, and dynamics of the sector for non-timber forest products remain poorly understood (von Hagen and Fight 1999).

Aside from their subsistence and recreational values, non-timber forest products have gained increasing commercial importance since the mid-1980s. The non-timber forest products industry provides economic opportunities for producers, buyers, dealers, and for those who add value to them by manufacturing them into products such as medicinals. Roughly 1,400 plant species found in the United States are traded for commercial purposes (Gucinski and Furness 2000). The market for herbal products in the United States was about \$2.5 billion in 1996, and has been growing at a rate of 13 to 15 percent annually (von Hagen and Fight 1999). Over 50% of the 25 top selling botanicals in the United States come from native plant species.

Mosses and lichens, which are harvested extensively from public forestlands and are exported to worldwide markets, were valued at more than \$14 million in 1995. In 1992, the wild edible mushroom industry contributed over \$41 million to the regional economy of the Pacific Northwest, employing over 11,000 people full or part time (von Hagen and Fight 1999). By 1995, harvests of Christmas boughs in the Pacific Northwest had reached nearly 20 million pounds annually.

### **Non-Timber Forest Products Baseline**

Data on the distribution and abundance of non-timber forest products, even the most important ones, are lacking (von Hagen and Fight 1999). The role of national forests and grasslands as a source for these products varies regionally, but is particularly important in the Pacific Northwest and in the northern Rocky Mountains.<sup>10</sup> In fiscal year 1998, National Forest System lands generated almost \$3 million in revenue from the sale of, or the sale of permits and leases to collect, non-timber forest products (Gucinski and Furniss 2000). Growing markets for non-timber forest products make it safe to assume that demand for these products will continue to increase in the coming years, increasing harvest pressure on National Forest Service lands.

No road construction or reconstruction is planned in the next 5 years to improve access to non-timber forest products. However, roads built for other purposes can be used to access these resources. New roads and timber harvest also create openings and disturbance that benefit some populations of non-timber forest products, and harm others. For example, one assessment found that 30 percent of the non-timber forest products in Oregon occur in openings and along roadsides (Gucinski and Furniss 2000). In contrast, species that require undisturbed forest, such as wild gingers (*Asarum* spp.), pitcher plants (*Sarracenia* spp. and *Darlingtonia californica*), and shade-loving mosses, are harmed by road-building and timber cutting. Some non-timber forest product species, which are highly sensitive to harvest pressure, are more likely to be over-harvested in areas close to roads where they are easily accessible.

Timber harvest and road building alter the opportunities available to harvest different species. Depending upon the species of interest to a particular person, roads and timber harvests may

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<sup>10</sup> James Weigand, U.S. Department of Agriculture Forest Service, Region 5, personal communication, February 2000).

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be viewed as either ecologically (and economically) beneficial, or detrimental. Biological evidence suggests that managing forests for the joint production of timber and non-timber forest products is economically and ecologically viable for North American forests, though more research is needed in this area (Von Hagen and others 1996).

Some products, such as firewood, cannot be harvested without roads because of their weight. Other products can be gathered away from roads, but the time and labor investment increases. Use of off-highway vehicles (OHVs) to harvest these products can offset this increase.

Roads have two additional negative effects on non-timber forest products. Populations of non-timber forest product species that grow along roads may be degraded from pollution or herbicide and pesticide spraying. Of more concern, roads can also promote the spread of invasive weeds, which are often more competitive and can drastically reduce native species valued as non-timber forest products. As a result, herbicides may then be used as a control measure.

Harvest pressure on non-timber forest products is likely to be greatest in the areas that are closest to roads, and to decrease in areas that are more remote. Therefore, harvesting in areas away from roads may be worthwhile if product quality and net returns are better. Harvesting in areas distant from roads is not feasible for all products or all individuals. While roads facilitate the illegal taking of non-timber forest products, they also facilitate the monitoring and enforcement of harvest activities by Forest officials.

New roads would have the short-term effect of enabling harvesters to disperse along more roads, better distributing harvest pressure on non-timber forest products located close to roads. It would also provide new opportunities to those people whose harvest activities are restricted to roadsides, such as the elderly, or firewood gatherers. By increasing access to currently unroaded areas, individuals who now use those areas in their unroaded condition would experience greater competition for resources.

### **Summary of Public Comment**

Members of the public commenting on the Notice of Intent and the Draft Environmental Impact Statement expressed the importance of harvesting non-timber forest product species to their way of life. They believe they should be allowed to continue to gather non-timber forest products in roadless areas, including those products gathered for commercial purposes. Some believe that without roads they would no longer be able to gather non-timber forest products because they would not be able to access certain areas. The majority of the uses mentioned were for subsistence, such as native plants and fuel wood. Some commentators asserted the production of non-timber forest products from National Forests was of much greater economic value than the production of timber. Other people feared that the negative ecological impacts of road building could threaten some species. Several people felt that roadless areas should be protected because they may contain non-timber forest product species that could prove valuable for medicinal or other purposes to be discovered in the future.

### **Non-Timber Forest Product Economic Effects**

The Roadless Rule would not alter current access conditions for the harvest of non-timber forest products, and would therefore have no impact on existing harvest opportunities. A prohibition on road construction and reconstruction could limit future opportunities to harvest non-timber

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forest products in inventoried roadless areas for those people who lack OHVs and can only engage in non-timber forest product harvest along existing roads.

Assuming that harvest pressure on non-timber forest products is greatest along roads, and decreases with increasing distance from roads, maintaining current access conditions could have the long-term effect of heavily impacting those species populations that are located close to roads by failing to provide new opportunities to harvest products in areas that are currently less accessible. However, species populations located in unroaded areas, especially those that are remote from existing roads, would be protected from heavy harvest pressure by preventing roaded access to them. People who harvest non-timber forest products close to roads could see declining economic returns, while those who harvest non-timber forest products away from roads would be less likely to do so. This effect could be offset if more people used OHVs to gain access to harvest opportunities in unroaded areas. Increasing demand for some of these products may result in regulation of harvest to prevent unsustainable harvest levels, regardless of the Roadless Rule.

To the extent that prohibiting road construction and reconstruction protects biodiversity and limits the spread of invasive weeds, the rule would have a positive impact on non-timber forest product populations. Species would be protected from road-related pollution and from pesticides and herbicides. A prohibition on road construction and reconstruction would especially favor those species that are adverse to disturbance, not only because it would prevent road-building, but also because it would limit timber harvest in inventoried roadless areas. Individuals who gather non-timber forest products that do not tolerate disturbance would likely benefit economically from the prohibition. Those who depend on non-timber forest products that grow in disturbed areas would not see those species populations increase through road-building and associated timber harvesting (though they could do so as a result of other types of disturbance).

The amount of new road construction that is likely to occur in inventoried roadless areas is minor compared to the existing road system. Therefore, although a variety of both beneficial and adverse effects are associated with new road construction, the overall effect for non-timber forest products is likely to be minor. The greatest number of road miles for all purposes is planned in Alaska, mostly on the Tongass National Forest. Prohibitions on road construction would not be applied to the Tongass until 2004. Little effect is likely to occur in other regions because of the limited miles of roads that would be constructed and remain in use.

## *SPECIAL USES*

The Forest Service administers a wide variety of special use authorizations on the National Forest System. The agency administers about 46,500 non-recreation special use authorizations for over 80 different types of uses. The more common of these special uses include communication sites, utility corridors (oil/gas pipelines, fiber optic, telephone lines, and power lines), linear irrigation facilities (pipelines, ditches, and canals), and public and private roads. Recreation special uses include ski resorts, lodges, outfitter and guide services, marinas, and other resorts.

### **Special Uses Baseline**

The general trend has been for increasing numbers of both non-recreation and recreation special uses on National Forest System lands. Revenue generated from non-recreation special uses has been increasing. Between 1996 and 1998, receipts to the National Forest Fund from

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non-recreation special uses increased from \$4.3 million to \$8.7 million. The approval of non-recreation special use permits is based on direction in land management plans and other current policy direction.

Currently, the Forest Service has over 26,000 recreation special use permits. The largest number of permits is for recreation residences (14,504), followed by outfitter and guide permits (5,777). Demand for recreation special use permits is expected to increase in the future. Receipts from recreation special uses were almost \$37 million in 1998.

The winter resort special permits on National Forest Service lands include most of the downhill skiing capacity in the Western U.S. The number of ski areas has decreased since 1985, primarily through the closure of small ski areas. Most downhill skiing capacity has increased through expansion of existing resorts. New ski developments require a high capital investment, and a lengthy approval process, and therefore are rarely proposed. For example, every large ski area in the Rocky Mountain Region has expanded in the last 10 years and no new developments have been proposed (personal communication Ed Ryberg Region 2).

According to ski industry reports, the number of ski resorts declined from 700 in 1986 to 519 in 1996. Resort consolidation is expected to continue, with ownership of resorts concentrated in fewer companies. Downhill skiing participation has been relatively flat in the last few years. Annual variations are often related to weather conditions. For example, in the 1998/1999 season, the overall decline in skier numbers was linked to weather conditions. Future demand for downhill skiing depends largely on whether the participant base is expanded. White males have historically made up the majority of customers, and they are declining as a demographic group relative to the total U.S. population (Gardner 1999).

Outfitters and guides provide services to a wide variety of recreation participants, including participants in hunting, fishing, hiking, horseback riding, rafting, and OHV touring. Demand for most of these activities is expected to increase in the future (Bowker and others 1999). The availability of undeveloped lands is essential for many outfitter and guide businesses (Adams 2000).

### **Summary of Public Comment**

Concerned were raised that the proposed rule would interfere with the building, maintenance, or operation of existing water holding and delivery systems and electrical facilities, as well as prevent future development. Others believe any new human development and water projects should be prohibited within inventoried roadless areas. Numerous comments were received regarding ski area special use permits. Respondents asked for clarification about the effects of the proposed rule. In addition, respondents expressed support for exempting or not exempting particular ski area developments or expansions currently being considered. Some respondents also indicated support for the proposed rule because they believe it will protect areas critical to outfitter and guide permittees.

### **Special Uses Economic Effects**

Authorized use and occupancy of National Forest System lands, including roads associated with these uses, would continue as provided within the authorization in all inventoried roadless areas throughout the term of their authorization. Upon expiration, re-authorization and proposals for new roads or uses would be evaluated and authorized in compliance with existing rules, regulations, and Agency policies.

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Potential effects on non-recreation special uses in inventoried roadless areas would be limited. These uses may be authorized in inventoried roadless areas if the use could be accommodated without road access. All or part of the more common types of uses could occur without road construction, but likely at a higher cost. In some circumstances, the cost to construct, operate, and maintain a facility without a road would make the use and occupancy economically and/or technically infeasible.

Special use authorization data are very limited regarding road building beyond the next 5 years. Within the next 5 years, fewer than 20 non-recreation special uses projects may be affected by the prohibition on road construction. An estimated 35 miles of roads would have been constructed or reconstructed in association with those projects.

Designation of major utility corridors is generally incorporated into land management plans. A review of the Western Regional Corridor Study (Clayton and others 1992) conducted in 1993, is a valuable resource used by the Forest Service and Bureau of Land Management for making reasonably foreseeable estimates of utility corridor needs. This study identified many of the existing and proposed utility corridors throughout the western United States. The study indicates that the Roadless Rule may affect two proposed corridors in the West. However, at this time, it is unknown if those corridors would be precluded from consideration for authorization in an inventoried roadless area, since all or part of the corridor could still be considered if no road construction or reconstruction would be required.

Current uses and occupancies authorized in inventoried roadless areas would not be affected. Since fewer than 20 proposed uses over the next 5 years are proposed, most involving small development and uses, it is reasonable to conclude that the effects on businesses, individuals, and communities would be minimal from a national perspective.

The recreation special use most likely to be impacted is future ski area development in inventoried roadless areas. If historic trends continue, future increases in ski area capacity are most likely to occur through expansion of existing areas. Such expansion is not prohibited within existing permit boundaries. However, expansion beyond existing permit boundaries into inventoried roadless areas, and new ski developments within inventoried roadless areas are not likely to be allowed unless a decision to approve them is made prior to rule implementation. The likelihood of such proposals being approved under current policy is difficult to predict, given the complex procedures and increased public interest in these projects.

Protection of inventoried roadless areas is likely to be beneficial for those outfitter and guide special use permittees that provide opportunities in undeveloped settings. Non-resident recreationists may be more likely to use these services, so increases in use could generate additional external revenue for local communities.

## *ROADS*

Users of the National Forest System depend on road access for both commercial and amenity uses of the national forests and grasslands. The economic effects of those uses are discussed in previous sections. However, road construction, reconstruction, maintenance, and decommissioning activities also generate jobs that are not captured in the resource-specific analyses.

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Road construction and reconstruction activities generate about 20 total jobs per million dollars expended on roads. About 10 of those jobs are direct jobs, while the remaining are indirect and induced jobs. The cost of road construction varies widely, depending on the type of road, intended use, environmental conditions, and other factors. Roads to access timber sales are most likely to be local roads. Average costs to construct local roads range from \$50,000 to \$60,000 per mile, while average reconstruction costs vary from \$8,000 to \$16,000 per mile. Temporary road construction costs were estimated to vary between \$5,000 and \$10,000 per mile. Costs are higher in Alaska, where temporary road construction is estimated to cost \$120,000 per mile, and permanent road construction is estimated to cost \$140,000 per mile.

### Roads Baseline

Under current policies, road construction and reconstruction needed to implement planned projects is assumed to go forward. A total of 537 miles of roads were projected in association with non-timber projects over the next five years. Of that total, 448 miles would be new construction, 80 miles would be reconstruction, and 9 miles would be temporary. It is unlikely that all planned projects will go forward, so that the total number of miles will be less than 537. Since most of the planned projects are associated with mineral development and special uses, most of the roads are likely to be single use local roads.

A total of 623 miles were projected in association with planned timber offer over the next five years. Of the total, 346 miles are new construction, 99 miles are reconstruction, and 178 miles are temporary construction. Although there is not a direct correlation between harvest volume and road miles, the same process used to adjust planned offer volumes for harvest was also applied to road miles to get an estimate of miles likely to be constructed and reconstructed for estimated timber harvest. Using the medium scenario in this process, total timber roads were estimated to be 403 miles over the next 5 years. Of that total, 226 would be new construction, 62 would be reconstruction, and 116 miles would be temporary roads.

To estimate effects on jobs, the total miles of roads were converted to average annual figures (Table 20). The total cost of road development was estimated using the costs described above. If all of the planned road miles were built, annual costs would range from \$12.2 to \$13.4 million. Using this range of costs, direct jobs associated with road activities would range from 122 to 134 per year, while total jobs would range from 244 to 268 per year, as shown in Table 20.

**Table 20. Total Average Annual Jobs Associated with Road Construction and Reconstruction for Estimated Timber Harvest and Planned Activities in Inventoried Roadless Areas.**

Region	Average Annual Miles for Non-Timber Projects	Average Annual Miles for Timber Harvest	Range of Average Annual Direct Jobs Affected	Range of Average Annual Total Jobs Affected
Northern (1)	17	7	9-11	18-22
Rocky Mountain (2)	14	7	8-10	16-20
Southwestern (3)	4	0	2	4-5
Intermountain (4)	31	14	14-18	28-36
Pacific Southwest (5)	12	1	6-7	12-15
Pacific Northwest (6)	7	2	4-5	9-11
Southern (8)	6	3	3-4	6-8
Eastern (9)	3	6	2-3	4-5
Alaska (10)	14	40	73	147
<b>National</b>	<b>107</b>	<b>81</b>	<b>122-134</b>	<b>244-268</b>

*Totals may not sum due to rounding.*

## Roads Economic Effects

Under the final rule, none of the roads planned for timber harvest would be built, and a portion of the roads planned for other projects may be prohibited. Of the 537 miles of roads planned for non-timber projects over the next 5 years, up to 244 miles may be prohibited. If all of the prohibited projects were assumed to proceed in the absence of the rule, then jobs associated with the 244 miles would be affected.

The roads associated with timber harvest would be prohibited. However, under the Tongass provisions of the final rule, additional roads would be built for those sales for which a notice of availability for a draft environmental impact statement was published in the Federal Register by the publication date of the rule. Since the estimated offer volume under this provision is about 72% of the planned offer volume, it was assumed that 721% of the road miles would also be built. The range of potentially affected direct and total jobs is shown in Table 21. Over the longer term, additional 39 direct road construction jobs and 78 total jobs associated with road construction on the Tongass could be affected, as harvest volumes decline further after completion of allowed sales.

As discussed in the Timber section, there may be substitution opportunities for jobs related to road construction and reconstruction. Substitution opportunities may be more limited in some of the small communities associated with the Tongass National Forest. Between 1992 and 1997, total employment in the construction industries increased by 20% (U.S. Department of Commerce 2000). Job growth in other sectors of the economy would provide substitute opportunities for indirect and induced jobs.

**Table 21. Average Annual Jobs Affected by Prohibitions on Road Construction and Reconstruction in Inventoried Roadless Areas.**

Region	Average Annual Prohibited Miles for Non-Timber Projects	Average Annual Prohibited Miles for Timber Harvest	Range of Direct Jobs Affected	Range of Total Jobs Affected
Northern (1)	3	7	2-3	5-7
Rocky Mountain (2)	9	7	5-7	11-14
Southwestern (3)	1	0	1	1-2
Intermountain (4)	19	14	10-12	19-25
Pacific Southwest (5)	6	1	3-4	7-8
Pacific Northwest (6)	2	2	2	4-5
Southern (8)	2	3	1-2	3-4
Eastern (9)	2	6	2-3	4-5
Alaska (10)	4	12	17	34
National	49	52	43-51	88-104

## FOREST-DEPENDENT COMMUNITIES

The well being of rural communities connected to Forest Service administered lands has been an important factor in forming many social and economic policies enacted by the Forest Service and Congress. The concept of stability, in reference to economy, community, and industry, has been a dominant theme of management especially in relation to timber. In examining community

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economic stability, the distinction between the business needs of industry and community economic needs is often overlooked (Society of American Foresters 1989). While employing local residents, industry interests such as mining, tourism, and timber inevitably differ somewhat from the communities in which they are located.

Forces beyond their control substantially affect both communities and industry. The community has little influence on the business decisions made by firms operating in their area, while the firms have little influence on macroeconomic forces that influence their operations. As such, rural communities often find themselves vulnerable to boom/bust cycles, commodity price fluctuations, and national and regional recessions (DeVilbiss 1992). Among the economic factors that affect the relationship between a community and local firms are alternative sources of supply, geographic isolation (proximity to larger labor markets), inter-community competition for jobs, international markets, and changing technology.

### *Timber Dependency*

The concept of community stability has been closely tied to timber dependency. Timber dependency has been extensively studied, particularly in regard to the relationship between National Forest System lands and rural communities in the Western U.S. Historically, the remedy favored by the Forest Service for the “boom and bust” cycles has been to maintain an even flow of timber sales, transferring a large share of cyclic economic adjustment costs from the community to the Federal Treasury (Boyd and Hyde 1989). The intent was to maintain a constant supply of timber so that mills and jobs in rural Western communities were protected from external market changes.

The literature is ambiguous about whether sustained yield policies resulted in more stable employment in the timber industry (Force 1993). Macroeconomic forces and associated changes in the timber industry probably influenced rural communities more than the Forest Service could with even flow policies. Today, with National Forest System harvest levels at a fraction of earlier levels, the ability of federal land managers to offset economic cycles with even flows of timber volume has been greatly reduced.

Even if current managers could provide an even flow of timber sale volume, the industry has changed to such an extent that it can no longer be assumed that local mills will be the successful bidder for agency timber sales, nor that local communities will receive logging and processing jobs as a result of those sales. In today’s market, the destination of federal timber is generally unpredictable as processors reach far to supply their mills. Log sorting yards and high efficiency mills disperse logs differently, directing logs to their most profitable use. These conditions undermine confidence that federal timber supply policy is capable of supporting jobs in specific communities.

### *From Community Stability to Community Resiliency*

Many social scientists are investigating new concepts to replace traditional notions of community stability. The common theme through most of these concepts is an ability to adapt to change. Beckley (1994) suggested that community adaptability might be a more useful concept than community stability in assessing those communities that will thrive in our rapidly changing world. Levels of human capital, the imagination of community leaders, the ability to access information, and the availability of a flexible, diverse resource base are variables that will likely affect community adaptability.

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Community resiliency is a concept developed as an indicator of a community's health and vitality. Resiliency is a measure of ability to successfully deal with the inevitable multiple social and economic changes that are evident in our society. Harris (1996) described community resiliency in the Interior Columbia Basin as consisting of population size, economic diversity, attractiveness and surrounding amenities, strong leadership, and other factors such as community residents' ability to work together and be proactive toward change.

This definition of resiliency is similar to the concept of community capacity (FEMAT 1993). Harris (1996) noted the most resilient communities tended to be larger in population, have an economy based on a mix of industries, view themselves as autonomous, and to have worked as a community to develop strategies for the future. Horne and Haynes (1999) developed measures of socioeconomic resiliency based on a composite of economic resiliency, population density, and lifestyle diversity.

A study by Ashton and Pickens (1995) found it was not the presence of resource use employment in a county that caused communities to be vulnerable to change, but the absence of other jobs that would contribute to a more diverse economy. Areas with proportionately high resource use employment and Forest Service involvement tended to be less diverse. More favorably, these less diverse counties tend to be diversifying more rapidly than others.

Because tourism and recreation, retirement settlement, and other uses of National Forest System lands can provide considerable sources of jobs, income, and personal enjoyment, communities value national forests and grasslands and other public lands for these uses (Society of American Foresters 1989). The presence of desirable environmental amenities, and especially the types supplied by public lands, can contribute to an area's population and economic growth. Scientists differ in their interpretation of the value of this benefit, which can vary depending on the scale at which it is measured. Some evidence to support this relationship is the high population growth occurring in areas with high recreation use (Johnson and Beale 1994).

Ashton and Pickens (1995) found that recreation counties tend to be diversifying more rapidly than non-recreation counties, attributing this to Forest Service multiple-use policy that provides an environment that attracts both tourists and permanent residents to the area. Rasker (1994), and Power (1994), have emphasized the role of a high quality natural environment, scenic beauty, and recreation opportunities in influencing population growth and shaping local economies.

### *Population and Community Resiliency*

The population of a community and the rate of change the population experiences are often used as indicators of economic diversity, economic resiliency, and community vitality. Communities with larger populations have more businesses. Economic diversity provides a cushion to job losses in declining industries because the economy does not depend heavily on any single industry or firm. A larger economy also means that less money leaves the local economy to pay for goods purchased from outside. The result is a more economically resilient community. It is unlikely that land use decisions of the Forest Service will substantially affect communities with larger populations and diverse economies. This is confirmed by the findings in the Assessment of Ecosystem Components of the Interior Columbia Basin (Quigley and Arbelbide 1997).

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The opposite is generally true for communities with small populations, having fewer industries and fewer firms per industry. Even where many industries are represented, each may include a few firms. A decline in one industry or loss of a firm, especially a major employer, can mean high job loss in the community until adjustments are made. This can be especially disruptive if the community is geographically isolated with few alternative employment opportunities. This situation describes many rural communities with a high proportion of employment in agriculture and natural resource commodity industries. It is reasonable to expect that Forest Service land use decisions can affect industries that are important to smaller communities near lands administered by these agencies, especially where the communities are geographically isolated.

Population growth is usually associated with economic growth and vice versa, but not always. A community can experience rapid growth followed by rapid decline, a “boom and bust” situation. Finally, it must be determined whether economic growth is driving population growth or the other way around.

### *Economic Diversity*

Economic diversity is considered an important component of economic resiliency, whether measured at community, county, or regional levels. Economic diversity is considered vital to quality of life attributes provided by economic opportunity and services, including infrastructure, medical care, education, commercial services, and the critical presence of job opportunities (Rojek and others 1975).

The Shannon-Weaver Diversity Index (Inventory and Monitoring Institute 2000) provides a measure of economic diversity for each county. It is based on the number and variety of industry sectors and associated employment using data from the IMPLAN input/output model. A greater number of industry sectors provide a greater diversity of employment opportunities. Therefore, the higher the diversity index, the more likely that a county’s economy can absorb and rebound from changing conditions than those with a lower index.

A study conducted in support of the Interior Columbia Basin Project to calculate the economic diversity at the community level assessed the type and amount of employment in nearly 400 communities in the project area (USDA FS and USDI BLM 1998). However, there is no consistent measure for community diversity nation-wide. The size of area over which economic diversity is measured is critical. The larger the area considered the greater the economic diversity and expected economic resiliency, especially if it means including a large metropolitan area (trade center). This explains why a multi-county region can be highly resilient while individual counties or communities in the region are not.

### **Forest-Dependent Communities Baseline**

Under the baseline, management of national forests and grasslands would continue according to current policies and land management plan direction. Flows of goods and services under the no action alternative were described by resource area in the previous sections. Road construction and reconstruction in inventoried roadless areas would proceed, based on local decisions, and economic activity associated with that development would continue.

### **Summary of Public Comment**

Public comments indicated that people are concerned about the potential effects of the Roadless Rule on local economies close to national forests and grasslands. Some respondents

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believe that road prohibitions and limitations on timber harvest and mineral exploration and development will be economically devastating to nearby communities. Reductions in payments to states related to declines in timber harvest and mineral development were a major concern, often raised in conjunction with concerns about maintaining funding for roads and schools. Lost revenue, decreased employment, and loss of community integrity were cited as negative impacts of the proposal. The importance of recreation to local communities was also raised, although comments varied as to whether protecting roadless areas was seen as having negative or positive community effects.

### **Forest-Dependent Communities Economic Effects**

The Roadless Rule would reduce timber harvest in inventoried roadless areas and likely reduce future mineral exploration and development, especially for leasable minerals. Reductions in the timber program could affect National Forest System employment on some units. This section describes potential impacts on timber-dependent communities, agency employment associated with the timber program, and potential impacts on mining-dependent communities.

#### *Potentially Affected Timber- Dependent Communities*

The effects of the alternatives on national, and to a large extent regional, social and economic systems with the possible exception of timber harvest on the Tongass are minor. None of the alternatives are likely to have measurable impacts against the broader social and economic conditions and trends observable at these scales. However, the effects of the alternatives are not distributed evenly across the U.S.

A subset of national forests has been identified that is likely to experience the greatest timber-related impacts on local communities in the next 5 years, based on planned offer volumes described previously. A total of 61 administrative units planned to offer timber from inventoried roadless areas.

Of those 61 administrative units, units were selected that were either a) planning to offer 5 or more million board feet in the next 5 years and the offer required road construction, or b) the average annual planned offer within inventoried roadless areas was greater than 10% of the total forest average annual offer between 1996 and 1999. Using these criteria, a total of 30 administrative units were selected for further consideration.

Table 22 contains a list of the 30 administrative units considered most likely to be impacted. The list of communities is based on several sources described below, and may not reflect the most current circumstances. Some communities that could be affected may not be represented on this list, and this list may include communities that will not be affected.

The starting point for the list of communities was a list of timber dependent communities compiled by the Forest Service in 1987. The criteria for being on that list was that forest products employment in a community was at least 10% of total employment and that local wood processing firms used at least 50% National Forest System timber. This list is dated, given the major declines in the timber program since that time. A second source was an analysis of communities in the Interior Columbia Basin (USDA Forest Service and USDI Bureau of Land Management 1998) that estimated employment specialization ratios for 423 communities. Communities from the 1987 list that were rated as having no or low wood product specialization were removed from the initial list. Communities from the Interior Columbia Basin with high to very high timber specialization and with ties to the selected list of forests (part of the forest is in

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the county) that were not on the 1987 list were added. Input from the public comment and from agency input was also used in revising the list.

This combined community list was then refined. If the community's county is classified, based on Economic Research Service (ERS) County Typology (USDA Economic Research Service 1995), as metropolitan or urban and next to a metropolitan area, the community was removed from the list. These metropolitan and urban counties and associated communities are likely to be resilient. This result was then combined with the list of communities potentially affected by the Forest Service's interim roads suspension. This information added communities, particularly in the eastern U.S. where a limited number of communities were identified in 1987.

Communities that currently have softwood sawmills or other primary wood products manufacturing facilities were identified based on a recent report (Spelter and McKeever 1999) and input from the public comment and agency personnel. No communities were identified as being potentially impacted for seven national forests that met the criteria for planned timber offer (Lincoln, Rogue River, Willamette, George Washington/Jefferson, Ozark/St. Francis, Chequamegon/Nicolet, and White Mountain).

The planned timber volume offer data are not specific to any particular inventoried roadless area, so it is not possible to link the planned offer to production sites in local communities. In fact, even with that information, it is not certain that local mills or communities would gain the jobs from volume harvested. With increased haul distances, the effects of reduced volume may occur in communities at considerable distance from the forest. In some states there are a limited number of sawmills. These mills likely draw volume from a wide radius around the state.

The analysis of community effects is based on county resilience to external shocks. It is founded on the premise that large populations and diverse economies can more readily adapt to changing social and economic conditions. The Shannon-Weaver Diversity Index (Inventory and Monitoring Institute 2000) is used to identify diverse economies, and population density is the indicator of large populations. Additional information from the ERS County Typology (USDA 1995) is used to assess urbanization of the counties and the importance of several economic components of counties (farming, mining, manufacturing, government and services) and a sixth non-specialized type. The ERS classification scheme also identifies 5 overlapping rural policy-relevant types; retirement-destination, federal lands, persistent poverty, commuting and transfers-dependent.

The county resilience measure needs to be placed in perspective. This process compares a county to other counties in the Bureau of Economic Analysis (BEA) region (DOC Bureau of Economic Analysis 1999) in which it occurs. Comparison within a BEA region provides a local analysis that is more locally relevant than comparing counties nation-wide. The BEA regions selected are those containing components of the 30 national forest administrative units.

Counties with diversity indices less than the average of all counties in the BEA region and with population densities less than the average are designated as low in resiliency. Counties that have higher than average population densities and diversity indices are designated high in resiliency. Where the population and diversity indices split, a medium designation is assigned. Finally, a county with a population of less than 5 people per square mile is specified as low in resiliency. A low, medium or high resiliency has no positive or negative connotation. It means that communities located in counties that are less resilient will have more difficulty adapting to policy shifts such as decreases in timber harvest levels.

The ERS typology is then used to provide an indication of additional considerations that may lessen or contribute to county resiliency. It should be remembered that those communities classified as metropolitan or urban next to metropolitan areas are not included on the list of potentially affected communities. This is not to say that individuals or businesses in these communities will not be affected, but the inherent diversity of larger economies and populations will allow these communities to more readily adapt to the effects of the alternatives.

Table 22 displays results of the resilience determination and the direct timber jobs affected by the Roadless Rule (medium scenario). Overall population trends will be altered by the Rule, so that component of resiliency is not affected. Change in employment is an important factor affecting socioeconomic resiliency. Although a change in jobs within one industry or one firm in an industry may have minimal impact on overall employment diversity, it is assumed that decreases in employment will have negative effects on employment diversity and increases in jobs will have a positive effect.

The direct jobs displayed in Table 22 are associated with timber harvest and were based on the estimated change in timber harvest for each of the 30 administrative units. These job effects would be spread over a number of communities, depending on the location of the sales and the type of product harvested.

Although it is not possible to identify which communities might be affected, it is reasonable to discuss the types of effects given general community ties to national forest resources and resilience to social and economic change. A note of caution is advisable for interpreting Table 22. The current resiliency rate of a county does not suggest that timber jobs or the lack of timber jobs is the basis for a county's resiliency rating. The interpretation is the communities identified in Table 22 with existing ties to national forest timber would adapt more easily to timber supply changes if the county's resilience is higher. Because of the new payments to states legislation, communities will not be impacted by reductions in payments to states derived from timber receipts through 2006.

**Table 22. Resilience of Counties Containing Communities Potentially Affected by the Roadless Rule in the Next 5 Years.**

Region	National Forest Administrative Unit	Direct Jobs	Potentially Affected Communities <sup>a</sup>	County	County Resilience
Northern (1)	Clearwater	7	Kamiah, ID <sup>a</sup>	Idaho, ID	Low
			Kooskia, ID <sup>a</sup>	Idaho, ID	Low
			Orofino, ID <sup>a</sup>	Clearwater, ID	Low
			Pierce, ID	Clearwater, ID	Low
			Weippe, ID <sup>a</sup>	Clearwater, ID	Low
	Helena	6	Townsend, MT	Broadwater, MT	Low
	Idaho Panhandle	23	Bonner's Ferry, ID <sup>a</sup>	Boundary, ID	Medium
			Clark Fork, ID	Bonner, ID	Medium
			Hope, ID	Bonner, ID	Medium
			Moyie Springs, ID <sup>a</sup>	Boundary, ID	Medium
			Oldtown, ID	Bonner, ID	Medium
			Pinehurst, ID	Shoshone, ID	Low
			Plummer, ID <sup>a</sup>	Benewah, ID	Low
			Princeton, ID <sup>a</sup>	Latah, ID	Medium
Priest River, ID <sup>a</sup>			Bonner, ID	Medium	
Sandpoint, ID	Bonner, ID	Medium			
St Maries, ID <sup>a</sup>	Benewah, ID	Low			
Thompson Falls, MT		Sanders, MT	Low		

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Region	National Forest Administrative Unit	Direct Jobs	Potentially Affected Communities <sup>a</sup>	County	County Resilience		
<b>Rocky Mountain (2)</b>	Bighorn	2	Sheridan, WY <sup>a</sup>	Sheridan, WY	High		
	Medicine Bow/Routt	7	Saratoga, WY <sup>a</sup> Olathe, CO <sup>a</sup>	Carbon, WY Montrose, CO	Low Medium		
	Shoshone	9	Cody, WY <sup>a</sup>	Park, WY	Low		
	White River	6	Saratoga, WY <sup>a</sup> Olathe, CO <sup>a</sup>	Carbon, WY Montrose, CO	Low Medium		
<b>Southwestern (3)</b>	Lincoln	1	None Identified				
<b>Intermountain (4)</b>	Ashley	4	LaPoint, UT Vernal, UT	Uintah, UT Uintah, UT	Medium Medium		
	Boise	2	Cascade, ID <sup>a</sup> Council, ID Emmett, ID Horseshoe Bend, ID Montour, ID Sweet, ID	Valley, ID Adams, ID Gem, ID Boise, ID Gem, ID Gem, ID	Low Low Medium Low Medium Medium		
	Caribou	5	Ovid, ID <sup>a</sup>	Bear Lake, ID	High		
	Dixie	19	Escalante, UT <sup>a</sup> Panguitch, UT	Garfield, UT Garfield, UT	Low Low		
	Fishlake	15	Beaver, UT <sup>a</sup> Bicknell, UT <sup>a</sup> Lyman, UT <sup>a</sup> Sigurd, UT <sup>a</sup>	Beaver, UT Wayne, UT Wayne, UT Sevier, UT	Low Low Low Medium		
	Manti-Lasal	17	Gunnison, UT* Old La Sal, UT <sup>a</sup> Wellington, UT*	Sanpete, UT San Juan, UT Carbon, UT	Low Low Low		
	Payette	36	Cambridge, ID Casade, ID <sup>a</sup> Council, ID Emmett, ID New Meadows, ID <sup>a</sup>	Washington, ID Adams, ID Adams, ID Gem, ID Adams, ID	Medium Low Low Medium Low		
	Uinta	4	Fairview, UT <sup>a</sup> Heber City, UT <sup>a</sup>	Sanpete, UT Wasatch, UT	Low Medium		
	<b>Pacific Southwest (5)</b>	Klamath	5	Happy Camp, CA Yreka, CA	Siskiyou, CA Siskiyou, CA	Low Low	
		Shasta-Trinity	14	Burney, CA <sup>a</sup> Hayfork, CA Weed-Mt.Shasta-McCloud, CA <sup>a</sup> Weaverville-Douglas City, CA <sup>a</sup>	Siskiyou, CA Siskiyou, CA Siskiyou, CA Trinity, CA	Low Low Low Low	
		Six Rivers	2	Burnt Ranch-Willow Creek, CA	Humboldt, CA	Low	
		<b>Pacific Northwest (6)</b>	Okanogan	13	Omak, WA <sup>a</sup> Oroville, WA <sup>a</sup> Pateros, WA Twisp, WA Winthrop, WA	Okanogan, WA Okanogan, WA Okanogan, WA Okanogan, WA Okanogan, WA	Low Low Low Low Low
			Rogue River	14	None Identified		
	Siskiyou		5	Brookings, OR <sup>a</sup> Glendale, OR <sup>a</sup> Gold Beach, OR Powers, OR	Curry, OR Douglas, OR Curry, OR Coos, OR	Low Medium Low High	
Willamette	36		None Identified				
<b>Southern (8)</b>	George Washington/Jefferson		3	None Identified			

Region	National Forest Administrative Unit	Direct Jobs	Potentially Affected Communities <sup>a</sup>	County	County Resilience
<b>Eastern (9)</b>	Ozark/St. Francis	17	None identified		
	Chequamegon/Nicolet	18	None identified		
	Monongahela	8	Marlinton, WV <sup>a</sup>	Pocahontas, WV	Low
			Richwood, WV <sup>a</sup>	Nicholas, WV	Medium
			Webster Springs, WV <sup>a</sup>	Webster, WV	Low
	Superior	19	Grand Marais, MN <sup>a</sup>	Cook, MN	Low
			Isabella MN	Lake, MN	Low
			Two Harbors, MN <sup>a</sup>	Lake, MN	Low
			Tofte, MN	Cook, MN	Low
<b>Alaska (10)</b>	White Mountain	4	None Identified		
	Tongass	114	Coffman Cove, AK	Unorganized	Low
Craig, AK			Unorganized	Low	
Hoonah, AK <sup>a</sup>			Unorganized	Low	
Ketchikan, AK <sup>a</sup>			Ketchikan-Gateway	Low	
Klawock, AK <sup>a</sup>			Unorganized	Low	
Metlkatla, AK <sup>a</sup>			Unorganized	Low	
Petersburg, AK <sup>a</sup>			Unorganized	Low	
Thorne Bay, AK			Sitka	Low	
Wrangell, AK <sup>a</sup>	Unorganized	Low			

<sup>a</sup> Community has an operating sawmill

**Northern (1):** Changes in timber harvest result in the largest decreases in timber related direct employment for communities with timber resource ties to the Idaho Panhandle National Forest and to a lesser extent to the Helena and Clearwater National Forests. Ten of the communities have existing softwood manufacturing facilities and 6 of these communities are located in counties ranked low in resilience.

A predominant feature from the ERS typology for most of the counties where the communities are located is federal land comprises 30% or more of each county's land area. Also, the majority of counties are nonspecialized. Based on employment statistics from 1987 to 1989, 5 counties showed specialization. They are Shoshone County ID (mining), Clearwater, Bonner and Benewah County, ID (manufacturing), and Latah County, ID (government).

**Rocky Mountain (2):** Changes in timber harvest have the largest effects on communities with timber resource ties to the Shoshone, Medicine Bow-Routt and White River National Forests. The four communities identified for the four national forests in Region 2 have existing softwood manufacturing facilities. The locations of these communities in relation to the national forests reveal the long distances many wood processing facilities now haul sawlogs and pulpwood. Two of these communities are in counties that rank low in resilience.

In Region 2, a predominant feature from the ERS Typology is that federal land comprises 30% or more of each county's land area for most of the counties. Sheridan and Park County, WY are government specialized, and Carbon County, WY is nonspecialized. Montrose County, CO ranks high in services, which is consistent with being designated as a retirement destination county.

**Southwest (3):** Changes in timber related direct employment are small, accounting for only one job opportunity. No communities have been identified as potentially affected.

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Intermountain (4): This region would experience the largest reductions in timber related direct jobs in the lower 48 states, with the greatest potential effects associated with harvest reductions on the Dixie, Fishlake, Manti-LaSal, and Payette National Forests. Ovid, Idaho is the only community located in a county ranking high in resilience. Among the 14 communities associated with these forests, 11 are located in counties rated low in resilience.

Every county identified in Region 4 is 30% or more federal land. One county ranks as nonspecialized; 6 counties show farming specialization and 9 rank high in government employment. Horseshoe Bend and New Meadows, ID both rank high in manufacturing and have sawtimber facilities. None of the counties are highly specialized in services, and Boise County, ID and Wasatch County, UT are commuter counties.

Pacific Southwest (5): The reduction in timber harvest is greatest on the Shasta-Trinity National Forest. These reductions are spread across four communities, of which three have softwood sawmills. All of the communities identified in Region 5 are located in counties that have low resilience rankings.

In Region 5, two out of the three counties have federal land comprising 30% or more of each county's land area. Siskiyou County, CA is nonspecialized and a retirement destination county. Trinity County is government specialized and Humboldt County ranks high in services.

Pacific Northwest (6): Changes in timber harvest are estimated to have minimal effects in all communities except those associated with the Okanogan and Rogue River National Forests. Communities with resource ties to the Okanogan also are in a county with low resilience and with a high proportion of federal land. No communities are identified with the Rogue River or Willamette since they are located in counties that are classified as metropolitan or urban next to metropolitan areas.

A predominant feature from the ERS typology in Region 6 for most of the counties where the communities are located is federal land comprises 30% or more of each county's land area. One half of the counties are nonspecialized. Based on employment statistics, 4 counties showed farming specialization and the rest are distributed between manufacturing, government, and services. Curry, OR is a retirement destination county.

Southern (8): The George Washington/Jefferson and the Ozark/St. Francis National Forests in Region 8 have no identified communities.

Eastern (9): Changes in timber harvest result in the largest decreases in timber related direct employment related to the Chequamegon-Nicolet and Superior National Forests. Two of the communities associated with the Superior have existing softwood manufacturing facilities and both of these communities rank low in resilience. No communities were identified as potentially affected for the Chequamegon-Nicolet.

For the Monongahela National Forest, the ERS Typology identifies Pocahontas County, WV as nonspecialized and having 30% or more federal land. Lake and Cook County, MN associated with the Superior National Forest have a large component of federal land and both are government specialized.

Alaska (10): In the next 5 years, effects on timber jobs related to harvest on the Tongass were estimated to be 114 direct jobs. Timber harvest can continue until allowed sales are completed. At that point, most timber harvest from inventoried roadless areas would cease. If the estimated

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76.6 million board feet per year is eliminated, then an additional 269 direct jobs could be affected. These effects would be concentrated in communities where mills and logging companies are located. The Southeast Alaska economy is in a period of transition. Some sectors are growing rapidly, such as tourism and other amenity-based industries. Forces outside of Southeast Alaska can have a substantial effect on the growth and decline of industries within the region. For example, increased competition in the timber industry has eroded Alaska's market share and competitive position in the global timber market. If this trend continues, market demand may continue to decline. Thus, the longer-term effects of the Roadless Rule may be very different effect on the local economy than projected today.

*Effects on NFS Employment*

Forest Service headquarters and ranger stations are often located in small communities in or near National Forest System lands. Historically, these offices have provided relatively secure permanent and many seasonal jobs. Federal employees generally have stable wages and are often among the better paid residents in a community. The Agency has already downsized in response to significant declines in National Forest System harvest and offices have been combined or eliminated, leaving many small communities with fewer or no Forest Service employees.

Additional changes in the timber harvest program could affect Forest Service employment. Jobs may be fewer under the Roadless Rule since reductions in harvest volume directly affect funds in support of timber management. Between two and three jobs per million board feet timber harvest -- nationally 2.6 jobs in 1999 -- are associated with all aspects of the timber program and include planning, preparation and administration of timber sales.

The small harvest declines associated with the Roadless Rule are not likely to affect employment on most forests especially during the next five years. However, there are some exceptions. Effects are most likely to occur on those forests with larger timber sale programs in the inventoried roadless areas and where harvest requires road construction and reconstruction. The forests listed in Table 22 were used as the most likely forests to be impacted. The only exception was the Lincoln National Forest, which had such a small volume affected, that no employment impacts were considered likely. Table 23 lists those forests, the number of Forest Service jobs potentially affected under the Roadless Rule, the communities with Forest Service offices that are in counties that are not classified as metropolitan or urban and next to a metropolitan area (USDA Economic Research Service 1995), and the associated county. It is difficult to link employment changes to a particular community. District offices and Forest headquarters are sharing employee services on a wider basis. It is also difficult to assume the potential job losses identified will occur. Shifts in program emphasis to forest health, road decommissioning, fuels management, and other ecosystem restoration activities are changing the foundation for employment.

**Table 23. Forest Service Jobs Potentially Affected by Prohibitions on Road Construction and Reconstruction and Timber Harvest During the Next Five Years.**

Region	National Forest Administrative Unit	Forest Service Direct Jobs	Potentially Affected Communities <sup>a</sup>	County
Northern (1)	Clearwater	2	Kamiah, ID <sup>a</sup>	Idaho, ID
			Kooskia, ID <sup>a</sup>	Idaho, ID
			Orofino, ID <sup>a</sup>	Clearwater, ID

Region	National Forest Administrative Unit	Forest Service Direct Jobs	Potentially Affected Communities <sup>a</sup>	County
			Lolo, MT Potalch, ID	Missoula, MT Latah, ID
	Helena	1	Townsend, MT <sup>a</sup> Helena, MT Lincoln, MT	Broadwater, MT Lewis&Clark, MT Lewis&Clark, MT
	Idaho Panhandle	7	Bonner's Ferry, ID <sup>a</sup> Priest River, ID <sup>a</sup> Sandpoint, ID <sup>a</sup> St Maries, ID <sup>a</sup> Silverton, ID Avery, ID	Boundary, ID Bonner, ID Bonner, ID Benewah, ID Shoshone, ID Shoshone, ID
<b>Rocky Mountain (2)</b>	Bighorn	1	Sheridan, WY <sup>a</sup> Lovel, WY Buffalo, WY Greybull, WY Worland, WY	Sheridan, WY Big Horn, WY Johnson, WY Big Horn, WY Washakie, WY
	Medicine Bow/ Routt	3	Saratoga, WY <sup>a</sup> Laramie, WY Encampment, WY Douglas, WY Steamboat Springs, CO Yampa, CO Walden, CO Kremmling, CO	Carbon, WY Albany, WY Carbon, WY Convers, WY Routt, CO Routt, CO Jackson, CO Grand, CO
	Shoshone	4	Cody, WY <sup>a</sup> Lander, WY Dubois, WY	Park, WY Fremont, WY Fremont, WY
	White River	3	Glenwood Springs, CO Aspen, CO Meeker, CO Silverthorne, CO Eagle, CO Minturn, CO Carbondale, CO	Garfield, CO Pitkin, CO Rio Blanco, CO Summit, CO Eagle, CO Eagle, CO Garfield, CO
<b>Intermountain (4)</b>	Ashley	2	Vernal, UT <sup>a</sup> Duchesne, UT Roosevelt, UT	Uintah, UT Duchesne, UT Duchesne, UT
	Boise	1	Cascade, ID <sup>a</sup> Emmett, ID <sup>a</sup> Idaho City, ID Lowman, ID Mountain Home, ID	Valley, ID Gem, ID Boise, ID Boise, ID Elmore, ID
	Caribou-Targhee	2	Ashton, ID <sup>a</sup> Driggs, ID <sup>a</sup> St. Anthony, ID <sup>a</sup> Pocatello, ID Dubois, ID Island Park, ID Montpelier, ID Idaho Falls, ID Soda Springs, ID Malad, ID	Fremont, ID Teton, ID Fremont, ID Bannock, ID Clark, ID Fremont, ID Bear Lake, ID Bonneville, ID Caribou, ID Oneida, ID
	Dixie	10	Escalante, UT <sup>a</sup> Panguitch, UT <sup>a</sup> Cedar City, UT Teasdale, UT	Garfield, UT Garfield, UT Iron, UT Wayne, UT
	Fishlake	6	Richfield, UT	Sevier, UT

Region	National Forest Administrative Unit	Forest Service Direct Jobs	Potentially Affected Communities <sup>a</sup>	County
			Beaver, UT <sup>a</sup> Fillmore, UT Loa, UT	Beaver, UT Millard, UT Wayne, UT
	Manti-Lasal	7	Price, UT Ferron, UT Moab, UT Monticello, UT Ephraim, UT	Carbon, UT Emery, UT Grand, UT San Juan, UT Sanpete, UT
	Payette	14	Council, ID <sup>a</sup> New Meadows, ID <sup>a</sup> McCall, ID Weiser, ID	Adams, ID Adams, ID Valley, ID Washington, ID
	Uinta	2	Heber, UT <sup>a</sup>	Wasatch, UT
<b>Pacific Southwest (5)</b>	Klamath	2	Happy Camp, CA <sup>a</sup> Yreka, CA <sup>a</sup> Mt. Hebron, CA Orleans, CA Fort Jones, CA	Siskiyou, CA Siskiyou, CA Siskiyou, CA Humboldt, CA Siskiyou, CA
	Shasta-Trinity	5	Hayfork, CA <sup>a</sup> Mt. Shasta, CA <sup>a</sup> Weaverville, CA <sup>a</sup>	Siskiyou, CA Siskiyou, CA Trinity, CA
	Six Rivers	1	Willow Creek, CA <sup>a</sup> Eureka, CA Gasquet, CA Orleans, CA Bridgeville, CA	Humboldt, CA Humboldt, CA Del Norte, CA Humboldt, CA Humboldt, CA
<b>Pacific Northwest (6)</b>	Okanogan	4	Twisp, WA <sup>a</sup> Winthrop, WA <sup>a</sup> Okanogan, WA Tonasket, WA	Okanogan, WA Okanogan, WA Okanogan, WA Okanogan, WA
	Rogue River	4	None Identified	
	Siskiyou	1	Brookings, OR <sup>a</sup> Gold Beach, OR <sup>a</sup> Powers, OR <sup>a</sup>	Curry, OR Curry, OR Coos, OR
	Willamette	9	None Identified	
<b>Southern (8)</b>	George Washington/ Jefferson	1	Wise, VA Bridgewater, VA Natural Bridge Station, VA Covington, VA Marion, VA Edinburg, VA Newcastle, VA Hot Springs, VA	Wise, VA Rockingham, VA Rockbridge, VA Allegheny, VA Smyth, VA Shenandoah, VA Craig, VA Bath, VA
	Ozark/St. Francis	6	Rusellville, AR Hector, AR Ozark, AR Jasper, AR Paris, AR Clarksville, AR Mountain View, AR Marianna, AR	Pope, AR Pope, AR Franklin, AR Newton, AR Logan, AR Johnson, AR Stone, AR Lee, AR
<b>Eastern (9)</b>	Chequamegon/ Nicolet	6	Glidden, WI <sup>a</sup> Park Falls, WI <sup>a</sup> Washburn, WI <sup>a</sup> Laona, WI <sup>a</sup> Eagle River, WI	Ashland, WI Price, WI Washburn, WI Forest, WI Vilas, WI

Region	National Forest Administrative Unit	Forest Service Direct Jobs	Potentially Affected Communities <sup>a</sup>	County
			Florence, WI Lakewood, WI	Florence, WI Oconto, WI
	Monongahela	5	Marlinton, WV <sup>a</sup> Richwood, WV <sup>a</sup> Elkins, WV Parsons, WV Petersburg, WV Bartow, WV White Sulphur Springs, WV	Pocahontas, WV Nicholas, WV Randolf, WV Tucker, WV Grant, WV Pocahontas, WV Greenbrier, WV
	Superior	9	Grand Marais, MN <sup>a</sup> Tofte, MN <sup>a</sup>	Cook, MN Cook, MN
	White Mountain	1	Laconia, NH Bethlehem, NH Gorham, NH Bethel, ME Plymouth, NH Conway, NH	Belknap, NH Grafton, NH Coos, NH Oxford, ME Grafton, NH Carrol, NH
Alaska (10)	Tongass	41	Craig, AK <sup>a</sup> Hoonah, AK <sup>a</sup> Ketchikan, AK <sup>a</sup>  Petersburg, AK <sup>a</sup> Sitka, AK Thorne Bay, AK <sup>a</sup> Wrangell, AK <sup>a</sup> Yakutat, AK	Unorganized Unorganized Ketchikan-Gateway Unorganized Sitka Sitka Unorganized Unorganized

<sup>a</sup> Community is also identified as a potentially affected timber-dependent community.

**Northern (1):** In Region 1, the majority of timber-related Forest Service jobs potentially affected would be associated with the reduced timber program on the Idaho Panhandle National Forest. Eight out of the 14 communities with Forest Service offices included in this analysis are on the list of potentially affected timber dependent communities.

**Rocky Mountain (2):** Potentially affected Forest Service jobs are fairly evenly distributed across the 4 administrative units in Region 2. Saratoga, Sheridan and Cody, WY have Forest Service offices and are also identified as timber-dependent.

**Intermountain (4):** Region 4 has the second greatest potential impact on Forest Service employment, with the largest potential effects on the Dixie, Fishlake and Payette. Thirty-six communities with Forest Service offices are identified. Ten of these are also identified as timber-dependent.

**Pacific Southwest (5):** In Region 5, potential effects on Forest Service employment are greatest on the Shasta-Trinity National Forest, where decreased timber harvest projections are the greatest. About half of the communities with Forest Service offices are timber-dependent.

**Pacific Northwest (6):** Potential effects on Forest Service jobs are highest on the Willamette National Forest, with lesser potential effects on the remaining forests.

**Southern (8):** In Region 8, the potential effects are greatest on the Ozark/St. Francis National Forest, where 6 Forest Service jobs are potentially affected. None of the communities identified with Forest Service offices are previously identified as timber-dependent.

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Eastern (9): The potential effects on Forest Service jobs are greatest on the Superior National Forest (9 jobs), while the Monongahela and Chequamegon/Nicolet National Forests could have 5-6 Forest Service jobs affected. Four of the identified communities with Forest Service offices were previously identified as timber-dependent.

Alaska (10): Timber and road construction dollars accounted for more than 40% of the Tongass's fiscal year 2000 budget allocation. Current allocations by District indicate that the projected harvest levels on inventoried roadless areas provide employment for about 141 jobs. In the short-term, about 41 of those jobs could be affected. However, in the longer-term, a larger reduction in total harvest could have more substantial employment effects, affecting up to an additional 100 jobs. The greatest effects would occur in those locations where there is both a Supervisor's office and a District office (Sitka, Petersburg, and Ketchikan).

### *Effects on Mining Communities*

Of the more than 3000 counties in the lower 48 states, mining earnings exceed 15 percent of total earnings in 109 counties. A disproportionate number of the mining-dependent counties are within close proximity to national forests and grasslands. Of the 796 U.S. counties containing NFS lands, 67 have mining earnings greater than 15 percent of total earnings. These 67 counties are geographically dispersed throughout the lower 48 states (Table 24).

Mining earnings in the 67 counties tend to be concentrated in one segment of the industry. For example, there are 33 counties where coal mining accounts for more than 15 percent of total earnings. Another 20 counties rely on metal mining, 6 counties are dependent on oil and gas extraction, three counties on other nonmetallic mining, and one county is dependent on mineral materials mining for more than 15 percent of total earnings. The most mining-dependent national forest county is Eureka County, Nevada, where 87 percent of total earnings are derived from metal mining.

The contribution of production from the national forests and grasslands to mining earnings in these counties can vary widely. For example, earnings in Caribou County ID are largely dependent on phosphate mining on the Caribou National Forest. The counties associated with the Monongahela National Forest depend on coal mining, although no coal mining occurs on the national forest. County-level characterization may miss some communities that have a high level of dependence on mining, even though the county does not. For example, no county in close proximity to the Little Missouri National Grassland (ND) has total mining earnings over 15%. However, there are a number of communities that may be influenced by activity on the Grassland.

Counties with a heavy dependence on processing facilities are not included in this list, because processing is included in the manufacturing sector rather than the mining sector. In some cases, nearby processing facilities could be impacted by changes in levels of production from National Forest System lands.

The potential effects of the Roadless Rule would mostly likely occur in those counties where the mining dependence is primarily associated with leasable minerals, where National Forest System production provides a relatively significant contribution to total production, and inventoried roadless areas are likely to provide future production capacity. Existing mining activity is one indicator of likely future activity. Counties in the East are not likely to be affected

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because the area of inventoried roadless areas on eastern forests is relatively small, and most of the current production occurs outside of National Forest System lands.

**Table 24. National Forest Counties that are also Mining-Dependent Counties**

Region	National Forest Administrative Unit	Counties	Percent of Total Earnings From Mining
Northern (1)	Clearwater, Idaho Panhandle Custer	Shoshone, ID	18.3
		Big Horn, MT	23.5
		Rosebud, MT	21.9
		Stillwater, MT	35.7
		Jefferson, MT	34.1
Rocky Mountain (2)	Arapaho-Roosevelt, Pike/San Isabel	Clear Creek, CO	25.6
		Lawrence, SD	22.1
		Crook, WY	15.3
		Weston, WY	22.7
	Grand Mesa, Uncompahgre, Gunnison White River Medicine Bow-Routt, White River	Gunnison, CO	19.2
		Moffat, CO	25.0
		Rio Blanco, CO	27.4
		Costilla, CO	25.2
Southwestern (3)	Apache-Sitgreaves Coronado, Tonto Gila Lincoln	Greenlee, AZ	64.6
		Pinal, AZ	24.7
		Grant, NM	25.5
		Culberson, TX	47.5
		Eddy, NM	24.1
Intermountain (4)	Ashley Caribou Bridger-Teton, Shoshone (Region 2) Humboldt-Toiyabe	Sweetwater, WY	26.9
		Caribou, ID	20.8
		Sublette, WY	18.8
		Eureka, NV	86.9
		Humboldt, NV	38.2
		Lander, NV	55.6
		Nye, NV	18.8
	Humboldt-Toiyabe, Inyo (Region 5) Manti-La Sal	White Pine, NV	30.3
		Mineral, NV	31.5
		Carbon, UT	25.4
		Emery, UT	36.6
Wasatch-Cache	Uinta, WY	19.9	
Pacific Southwest (5)	Inyo	Esmeralda, NV	53.7
Southern (8)	Chattahoochee-Oconee Daniel Boone	Twiggs, GA	60.7
		Bell, KY	18.6
		Breathitt, KY	15.5
		Harlan, KY	32.5
		Knott, KY	53.3
		Leslie, KY	47.9
		Perry, KY	16.1
	George Washington and Jefferson	Buchanan, VA	40.5
		Letcher, KY	30.5
		McDowell, WV	28.2
		Pike, KY	34.5
		Wyoming, WV	38.4
		Walker, AL	18.7
		National Forests in Alabama National Forests/Grasslands in Texas	Hemphill, TX
Jack, TX	17.1		
Leon, TX	26.0		

Region	National Forest Administrative Unit	Counties	Percent of Total Earnings From Mining	
Eastern (9)	Hoosier	Greene, IN	16.4	
		Pike, IN	22.3	
	Mark Twain	Iron, MO	22.6	
		Reynolds, MO	20.4	
	Monongahela	Barbour, WV	18.4	
		Clay, WV	34.3	
		Grant, WV	18.7	
		Webster, WV	42.1	
		Shawnee	Gallatin, IL	20.3
			Hardin, IL	20.8
			Livingston, KY	19.5
	Perry, IL		18.7	
	Superior Wayne	Saline, IL	22.6	
		Union, KY	40.5	
		Webster, KY	42.9	
		Lake, MN	20.1	
		Marshall, WV	17.3	
Meigs, OH		44.9		
	Monroe, OH	22.0		

Source: Vasievich, Mike, USDA Forest Service, "National Forest and Buffer Counties With Greater Than 15 Percent of All Sector Earnings From Mining," spreadsheet, February 6, 2000.

Because of the uncertainty about the effects of the road prohibitions and likelihood of development in inventoried roadless areas, a community list was not developed for each of the national forests and grasslands listed in Table 24. A list of potentially affected communities was developed, based on input from Forest Service personnel, for those national forests where impacts are likely in the near future (Table 25). The Dakota Prairie National Grassland was also considered because of public concerns about the potential effects on future oil and gas production. Several counties are listed that are not mining dependent, but the communities have the potential to be impacted. Some communities were added where processing or transportation facilities are located, if those communities were not part of a metropolitan area. Communities in Delta County CO were included because the coal transport facilities from mining are located in Delta County, even though mining occurs in Gunnison County. Communities such as Mandan ND and Pocatello ID were not included because they are within a metropolitan area.

The resilience of each of the counties in Table 25 was assessed, using the same procedures described previously for counties associated with potentially affected timber-dependent communities. The current resiliency rating may not be tied to economic activity related to mining. The tie is likely to be strongest for counties identified in Table 24 as mining-dependent (Gunnison, Carbon, and Emery counties). Most of the counties listed in Table 25 have low resiliency. Except for Sanpete, Stark, and William counties, these counties have a population density of five or fewer people per square mile. The potential impacts on these communities depend on the future role of inventoried roadless areas as a source of leasable mineral deposits. The information available indicates there is likely to be new development for coal and phosphate leasing, and possibly for oil and gas development. Lack of access to those areas could have negative social and economic impacts on these communities, including reductions in payments to states if no substitute deposits are available for development within the same counties.

**Table 25. Resilience of Counties Containing A Sample of Communities Potentially Affected by Prohibitions on Road Construction and Reconstruction on Leasable Mineral Exploration and Development in the Next Five Years.**

Region	National Forest Administrative Unit	Potentially Affected Communities	County	County Resilience
Northern (1)	Dakota Prairie National Grasslands	Bowman, ND	Bowman, ND	Low
		Baker, MT	Fallon, MT	Low
		Watford City, ND	McKenzie, ND	Low
		Sidney, MT	Richland, MT	Medium
		Belfield, ND	Stark, ND	High
		Dickinson, ND	Stark, ND	High
		Williston, ND	Williams, ND	High
Rocky Mountain (2)	Grand Mesa-Uncompaghe-Gunnison	Paonia	Delta, CO	Medium
		Hotchkiss	Delta, CO	Medium
		Somerset	Gunnison, CO	Low
Intermountain (4)	Caribou	Soda Springs, ID	Caribou, ID	Low
		Afton, WY	Lincoln, WY	Low
	Manti-Lasal	East Carbon, UT	Carbon, UT	Low
		Helper, UT	Carbon, UT	Low
		Price, UT	Carbon, UT	Low
		Scofield, UT	Carbon, UT	Low
		Wellington, UT	Carbon, UT	Low
		Castle Dale, UT	Emery, UT	Low
		Cleveland, UT	Emery, UT	Low
		Elmo, UT	Emery, UT	Low
		Emery, UT	Emery, UT	Low
		Ferron, UT	Emery, UT	Low
		Huntington, UT	Emery, UT	Low
		Orangeville, UT	Emery, UT	Low
		Ephraim, UT	Sanpete, UT	Low
		Fairview, UT	Sanpete, UT	Low
		Manti, UT	Sanpete, UT	Low
		Mount Pleasant, UT	Sanpete, UT	Low
Spring City, UT	Sanpete, UT	Low		

### FOREST HEALTH

Forest health is the perceived condition of forests based on age, structure, composition, function, vigor, level of insects or disease, presence or absence of exotic organisms, and resilience to disturbance, including wildland fire. The Roadless Area Conservation FEIS provides an in-depth discussion that is summarized here (USDA Forest Service 2000b).

Wildland fires are generally considered to be increasing in size and severity since the first half of the 20<sup>th</sup> century. Factors potentially contributing to increasing size and severity of fires include increased incidence of human-caused ignitions, changes in the fuels (related to fire exclusion, forest management practices, and generally warmer and moister climatic conditions), and changes in succession regime (related to fire exclusion).

Millions of acres of the national forests are currently outside their historic fire regimes. Because of the cumulative effects of past wildland fire suppression, past logging, and grazing, natural occurrences of fires have not occurred for years or sometimes decades in some national forests. Forests and rangelands at most risk today are those that developed under a historic cycle of high frequency, low intensity wildland fire.

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As a result, about 38 million acres of National Forest System lands are at high risk to ecosystem health and from uncharacteristic wildfire effects<sup>11</sup>. The number of acres at high risk from uncharacteristic wildfire effects in inventoried roadless areas is about 8 million acres in the lower 48 states. Risk is defined as the probability that once a fire starts and becomes large, it would harm one or more key ecological factors. Four million of the eight million acres in inventoried roadless areas are identified as potentially needing treatment for fuel management, with 3.5 million acres in the West, and the remainder in the East.

In most Forest Service regions, the population density within one to five miles of inventoried roadless areas is very low. Exceptions occur in the Southern and Eastern regions. Therefore, most inventoried roadless areas are not high priority for fuel treatment, based on wildland urban interface criteria.

The national budget for fuel management on NFS lands has averaged \$60 million annually. Costs for individual fuel management projects can average from \$15 to \$150 per acre, although costs can be as high as \$500 to \$1800 per acre in high value areas.

In 1999, 1.4 million acres of NFS lands received fuel treatments. Most of these acres were treated using prescribed fire, and 60% of the treated acres occurred in the Southern Region. The national average cost was \$43 per acre in 1999. The per acre cost of mechanical pretreatment needed is expected to range from \$176 to \$276 per acre (Lavery and Williams 2000).

### **Forest Health Baseline**

Approximately 160,000 acres within inventoried roadless areas are projected to burn annually. More than 90% of this acreage will burn in an estimated 17 large (1,000 acres or more) wildland fires. Acreage and the number of large wildland fires are expected to increase over the next 20 years.

Very little fuel management work would be conducted in inventoried roadless areas, since most are classified as low priority compared to needs outside of inventoried roadless areas. However, all forms of vegetation manipulation could occur in these areas, with or without road construction. Of the 14 million acres of inventoried roadless area acres identified as potentially requiring fuel treatment under the FEIS analysis, all 3 million of the low risk acres and about 3.5 million of the moderate risk acres could be treated using prescribed fire without mechanical pretreatment. About 3.5 million of the moderate risk acres and all 4 million of the high risk acres would require some type of mechanical pretreatment before prescribed fire could be used to reduce the fire hazard (USDA Forest Service 2000b).

An estimated 90,000 to 95,000 acres of hazardous fuel could be treated in the next 5 years by commodity-purpose and stewardship-timber harvest methods. This represents just over 1% of the 7.5 million acres in inventoried roadless areas potentially needing treatment that could require mechanical pretreatment before prescribed burning. Fuel treatment costs would vary by method selected, but should average \$176 to \$276 per acre.

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<sup>11</sup> Uncharacteristic wildfire effects are an increase in wildfire size, severity, and resistance to control and the associated impacts to people and property.

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## **Forest Health Economic Effects**

The Roadless Rule would have little effect on the number of acres burned by wildland fire, with no significant difference from the baseline. Options for treating fire hazards in the wildland-urban interface would be limited by restrictions on road building. However, since relatively few populated areas occur on boundaries between inventoried roadless areas and private lands, the overall direct effect is expected to be slight.

Overall fire hazard can still be reduced without roads. Restricted road access would likely increase the cost of treatments, which would result in fewer acres treated. Some fuel treatment techniques available under the baseline would not be economically or logistically feasible. Of the 14 million acres in inventoried roadless areas identified as potentially requiring fuel treatment, 6.5 million could still be treated with prescribed fire without mechanical pretreatment. For the next 5 years, about 22,000 acres could be treated by stewardship timber harvest. Although a significant decline in treatment acres compared to the baseline, the total acreage affected is still less than 1% of all inventoried roadless areas that potentially require mechanical pretreatment.

The Agency does not generally build roads for fuels treatment projects. Instead, treatment is often done from existing roads. Planning and implementing fuel reduction projects would be more time-consuming and expensive in the absence of roads, with costs possible doubling. However, the agency may choose not to treat these areas, depending on priorities.

Of particular concern is the potential effect on fire risk in the wildland-urban interface. The road prohibition could slightly decrease the agency's ability to treat fuels in the interface area to protect private property. However, the actual number of fire hazard reduction projects within inventoried roadless areas needed to protect the wildland urban interface is very low.

## **AGENCY COSTS**

### **Agency Cost Baseline**

Agency costs would continue in line with current budget requests. Emphasis will continue to be placed on watershed protection and restoration, sustainable forest management, the National Forest road system, and recreation (Natural Resource Agenda for 21<sup>st</sup> Century, March 2, 1998).

### **Summary of Public Comments**

Concerns were raised about the effects of the Roadless Rule on revenues needed for management of National Forest System lands. Some respondents believed that less money would be available for law enforcement and other management actions. Concerns were also raised about lost revenue from timber sales, higher costs for fuels and other forest health treatments, fire suppression, monitoring costs, and enforcement costs.

### **Agency Cost Economic Effects**

The implementation of the Roadless Rule may affect some types of agency costs. The potential reduction in timber sales will reduce sale preparation and other planning costs on sales that would have been offered from inventoried roadless areas.

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The costs of fire suppression are not likely to increase because of road prohibitions. Roads needed for fire suppression for public health and safety would be allowed under an imminent threat. Few roadless areas are located near the wildland-urban interface, where suppression is a high priority. The likelihood of human-caused fires is lower in roadless areas, so that suppression costs for human-caused fires should be less than under the baseline.

Lack of access to roadless areas will decrease the likelihood of fuel treatment and other forest health activities, and result in higher costs of treatment when undertaken. This increased cost would only impact agency costs if roadless areas contain areas with a high priority for treatment relative to other, more accessible areas. In such cases, the Agency could respond by treating a smaller number of acres at a higher cost, or re-direct projects to priority areas with roaded access.

Most of the roads prohibited by the rule would be built by the benefiting user. Therefore, there would be little effect on appropriated funds used for construction or reconstruction. However, there would be cost savings since Forest Service employees would not have to engage in planning, design, and oversight of these projects. If the planned roads were built, those roads that remain part of the classified road system would be the Agency's responsibility to maintain. Therefore, the reduction in road miles will reduce the miles of road added to the system compared to the baseline. Maintenance costs are estimated at approximately \$1,500 per mile. The potential savings in maintenance costs from not building 146 miles of roads over the next five years would be about \$219,000 per year, once all of the roads were in place. Since the agency has a significant backlog for maintenance, this reduction would allow limited funds to be allocated to existing maintenance needs.

The national prohibitions are expected to remove some of the controversy over roadless area management from forest and project level planning. This may reduce the number of future appeals and litigation at the forest level, which will reduce agency costs. However, there are likely to be litigation costs associated with implementation of the roadless rule, when promulgated.

## **CONCLUSIONS**

The Roadless Rule would provide long-term protection for inventoried roadless areas by prohibiting road construction and reconstruction and allowing only limited timber harvest. Few of the benefits and costs associated with the rule were quantifiable, and therefore many of the costs and benefits are described qualitatively. Although the analysis does not provide a quantitative measure of net benefits, the Agency believes the benefits of the rule would outweigh the costs. In addition to the benefits described in this analysis, the aggregate transactions costs (costs associated with the time and effort needed to make decisions) of local level decisions would be much higher than the transactions costs of a national policy, because of the controversy surrounding roadless areas management.

Many of the beneficial effects are related to the protection of the ecological values in these areas, and the economic benefits associated with those values. For example, maintaining watershed health, protecting endangered species, and protecting biological diversity benefit the public by protecting water supplies, recreation opportunities, and passive use values. There may also be some agency cost savings from reduced road maintenance costs and reduced appeals and litigation associated with roadless area management.

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The costs associated with the rule are primarily associated with foregoing potential development opportunities in roadless areas. Commodity production, such as timber harvest and mineral extraction, will be constrained by the Roadless Rule. Expansion of roaded recreation opportunities is likely to be limited as well. The Agency may face increased costs for forest health treatments in roadless areas. The potential benefits and costs of the Roadless Rule are summarized in Table 26.

**Table 26. Summary of Costs and Benefits of the Roadless Area Conservation Rule Compared to the Baseline.**

<i>Category</i>	<i>Baseline</i>	<i>Final Rule</i>
Air quality <sup>1</sup>	Potential increase in dust, vehicle emissions associated with road use and management activities in inventoried roadless areas.	Air quality is maintained in inventoried roadless areas.
Water quality <sup>1</sup>	Potential increase in sediment associated with roads and management activities in inventoried roadless areas.	Water quality is maintained in inventoried roadless areas.
Land base available for dispersed recreation activities <sup>1</sup>	Decrease in remote settings, increase in developed settings on National Forest System lands.	Current land base for remote and developed settings is maintained on National Forest System lands.
Quality of fishing and hunting for recreation, commercial, and subsistence users <sup>1</sup> .	Potential habitat degradation, increase in roaded access, and decrease in remote hunting and fishing opportunities.	Existing hunting and fishing quality and access in inventoried roadless areas maintained. Opportunities for remote experiences are maintained.
Forage quality for livestock grazing <sup>1</sup>	Increased risk of non-palatable invasive species.	Existing forage quality is maintained.
Non-timber forest products <sup>1</sup>	Increased risk of invasive species displacing desired products.	Non-timber forest products maintained at current levels.
Existence and bequest values <sup>1</sup>	Potential decrease due to loss of biological diversity and increased risks to threatened and endangered species habitat in inventoried roadless areas.	Values maintained at existing levels due to conservation of biological diversity and habitat for threatened and endangered species in inventoried roadless areas.
Agency costs associated with planning activities <sup>1</sup>	No change in current costs associated with appeals and litigation on roadless area management.	Savings in costs associated with appeals and litigation on roadless area management.
Agency cost associated with road maintenance <sup>2</sup>	Increase up to \$219,000 per year in maintenance cost associated with new roads in inventoried roadless areas.	No increase in road maintenance costs in inventoried roadless areas.
Projected timber harvest (average annual) from inventoried roadless areas <sup>3</sup>	146.7 million board feet	74.3 million board feet
Timber related jobs <sup>4</sup>	No change to current estimates of future timber associated direct and total jobs.	Estimated job loss of 461 direct jobs and 841 total jobs. An additional 269 direct and 431 total jobs could be affected in Alaska over the longer term.

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Timber related income <sup>4</sup>	No change to current estimates of future timber associated direct and total income.	Estimated annual income loss of about \$20.7 million direct income and \$36.2 million total income. An additional \$12.4 million direct income and \$20.2 total income could be affected in Alaska over the longer term.
Road construction jobs <sup>5</sup>	No change to current estimates of future road construction direct jobs.	Projected annual job loss ranging from 43 to 51 direct jobs and between 88 and 104 total jobs. An additional 39 direct and 78 total jobs could be affected in Alaska over the longer term.
Exploration and development for locatable minerals (gold, silver, lead, etc.) <sup>1</sup>	Existing mineral availability continues subject to General Mining Law of 1872.	Access continues subject to General Mining Law of 1872.
Exploration and development for leasable minerals (e.g.oil, gas, coal) <sup>1</sup>	Existing mineral availability continues along with current exploration and development costs.	Exploration and development requiring roads would be precluded, except in areas under lease as of the effective data of the Roadless Rule.
Leasable minerals related jobs <sup>6</sup>	No change to current estimates of future mineral associated direct and indirect jobs.	Potential annual effect on mining related employment is a decrease of 546 direct and 3,095 total jobs.
Leasable minerals related income <sup>6</sup>	No change to current estimates of future minerals associated direct and total income.	Potential effect on mining related income is \$36.2 million less direct and \$127.8 million less total income.
Payments to states for leasable minerals	Payments will continue to vary as extraction varies over time.	Payments associated with coal and phosphate could be reduced by \$3.2 million per year.
Leasable mineral resources	No change to current estimates of available leasable resources	About 873 million tons of phosphate and 308 to 1,371 tons of coal would likely be unavailable for development. About 11.3 trillion cubic feet of undiscovered gas and 550 million barrels of undiscovered oil resources could be affected.
Exploration and development for saleable minerals (sand, stone, gravel, pumice, etc.) <sup>1</sup>	Existing mineral availability continues along with current exploration and development costs.	In a few isolated cases, development requiring roads may be precluded or costs may increase.
Operating costs for grazing permittees <sup>1</sup>	Increased access can potentially decrease cost	No change in operating costs
Operating costs for collectors of non-timber products <sup>1</sup>	Increased access can potentially decrease cost	No change in operating costs

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Special-use authorizations (such as communications sites, electric transmission lines, pipelines) <sup>1</sup>	Current use and occupancies	Current use and occupancies not affected, future developments requiring roads excluded in inventoried roadless areas unless one of the exceptions applies
Forest health <sup>1</sup>	Potential lower cost of treatments due to increased access	Slightly increased risk because of fewer treatment opportunities. Cost of current treatments remain unchanged.

1 Analysis based on qualitative discussion.

2 Analysis based on historic Agency data on expenditures .

3 Analysis based on forest-level data on projected timber volumes in inventoried roadless areas.

4 Analysis based on Agency data from Timber Sales Program Information System Reporting System (TSPIRS) and IMPLAN model multipliers.

5 Analysis based on Agency estimates of historic expenditures and IMPLAN model multipliers.

6 Analysis based on Agency production estimates and IMPLAN model multipliers.

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## APPENDICES

**Appendix Table A1. Planned miles of classified and temporary roads by Forest Service Region in the next 5 years.**

Region	Excepted Non-timber related road miles	Not Excepted Non-Timber Related Road Miles	Timber-Related Road Miles	Total Road Miles
Northern (1)	72	15	52	139
Rocky Mountain (2)	25	43	59	127
Southwestern (3)	13	7	3	23
Intermountain (4)	60	93	116	269
Pacific Southwest (5)	27	31	11	69
Pacific Northwest (6)	24	12	19	55
Southern (8)	19	11	25	55
Eastern (9)	1	12	47	60
Alaska (10)	52	20	291	363
<b>Total</b>	<b>293</b>	<b>244</b>	<b>623</b>	<b>1160</b>

**Appendix Table A2. Timber Harvest Substitution between 1990 and 1995, by RPA Assessment Region and Ownership (million board feet)**

	Pacific Northwest	Pacific Southwest	Rocky Mountain	North	South	Total United States
<b>Forest Industry</b>						
1990	6,006	2,358	1,156	4,365	13,015	26,899
1995	5,505	1,686	1,041	5,519	15,184	28,935
Percent Change	-0.08	-0.29	-0.10	0.26	0.17	0.08
<b>Farmer and Other Private</b>						
1990	2,538	517	1,149	11,784	24,822	40,809
1995	3,085	833	1,619	10,979	27,999	44,515
Percent Change	0.22	0.61	0.41	-0.07	0.13	0.09
<b>National Forest</b>						
1990	4,002	1,661	2,166	1,061	1,643	10,533
1995	1,335	638	1,168	1,224	1,857	6,221
Percent Change	-0.67	-0.62	-0.46	0.15	0.13	-0.41
<b>Other Government</b>						
1990	2,407	92	743	1,977	1,223	6,442
1995	1,335	90	591	2,860	1,039	5,913
Percent Change	-0.45	-0.03	-.20	0.45	0.15	-0.08
<b>All Ownerships</b>						
1990	14,953	4,628	5,214	19,186	40,703	84,683
1995	11,258	3,246	4,418	20,581	46,079	85,583
Percent Change	-0.25	-0.30	-0.15	0.07	0.13	0.01

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**Appendix Table A3. Timber Harvest from the National Forest System, 1996 – 1999, and Average Annual Baseline Harvest (million board feet).**

<b>Region</b>	<b>Fiscal Year 1996</b>	<b>Fiscal Year 1997</b>	<b>Fiscal Year 1998</b>	<b>Fiscal Year 1999</b>	<b>Average Annual</b>
<b>Northern (1)</b>	342.6	316.7	362.7	256.5	319.6
<b>Rocky Mountain (2)</b>	154.5	123.6	154.4	141.3	143.4
<b>Southwestern (3)</b>	46.3	83.2	93.5	83.6	76.6
<b>Intermountain (4)</b>	264.9	221.2	169.5	141.8	199.4
<b>Pacific Southwest (5)</b>	548.1	505.1	462.2	451.3	491.7
<b>Pacific Northwest (6)</b>	775.8	768.0	662.1	569.5	693.8
<b>Southern (8)</b>	847.5	571.9	636.8	594.6	662.7
<b>Eastern (9)</b>	621.2	587.1	622.1	553.8	596.0
<b>Alaska (10)</b>	123.5	108.9	121.2	146.2	124.9
<b>Total</b>	<b>3,724.4</b>	<b>3,285.4</b>	<b>3,284.4</b>	<b>2,938.6</b>	<b>3,308.2</b>

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## Appendix A4. IMPLAN

IMPLAN, short for IMpact analysis for PLANning, is an input-output model used to assess localized economic, socio-political, or resource management changes that can have widespread ripple effects on a region's employment, production, income, and natural resource base. IMPLAN allows the user to build economic models to estimate the impacts of economic changes in states, counties, or communities. It is also a descriptive tool rich in socio-economic information. The IMPLAN system is comprised of two pieces software and database. The software IMPLAN Professional<sup>®</sup> and databases are available from the Minnesota Implan Group, Inc. (<http://www.mig-inc.com/>).

IMPLAN databases combined with the software system allow the user to estimate the economic impact of new firms moving into an area, the contributions of existing industries in a local economy, recreation and tourism, and many other activities. The data and software also generates a complete set of social accounting matrices for advanced CGE and tax analysis.

Database Components:

IMPLAN databases consist of the following components:

- Employment;
- Industry Output;
- Value Added
  - Employee Compensation;
  - Proprietary Income;
  - Other Property Type Income;
  - Indirect Business Taxes;
- Institutional Demands
  - Personal Consumption Expenditures (PCE) - three income levels;
  - Federal Government Military Purchases;
  - Federal Government Non-Military Purchases;
  - State and Local Government Non-Education Purchases;
  - State and Local Government Education Purchases;
  - Commodity Credit Corporation;
  - Inventory Purchases;
  - Capital Formation;
  - Foreign Exports;
  - State and Local Government Sales;
  - Federal Government Sales;
  - Inventory Sales.
- National Structural Matrices
  - Use
  - Make
- Inter-Institutional Transfers (SAM)

Database sources are primarily government data sources including information from:

- US Bureau of Economic Analysis Benchmark I/O Accounts of the US
- US Bureau of Economic Analysis Output Estimates
- US Bureau of Economic Analysis REIS Program
- US Bureau of Labor Statistics ES202 Program
- US Bureau of Labor Statistics Consumer Expenditure Survey
- US Census Bureau County Business Patterns

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- US Census Bureau Decennial Census and Population Surveys
- US Census Bureau Economic Censuses and Surveys
- US Department of Agriculture
- US Geological Survey

Database Features:

- 528 Industrial Sectors, typically 4 digit SIC in manufacturing, 2-3 digit for other sectors
- All states and counties in the US
- ZIP code level databases
- All elements balanced to the National Income and Product Accounts
- Conforms to I/O accounting definitions

**Appendix Table A5. Income Associated with Timber Harvest on the National Forest System, by Region and Fiscal Year.**

Region	FY 96 Total Income (million dollars)	FY 97 Total Income (million dollars)	FY 98 Total Income (million dollars)	Sum 96- 98 Total Income (million dollars)	Average Income per MMBF	Baseline Harvest (MMBF)	Baseline Total Income (million dollars)
<b>Northern (1)</b>	\$ 296	283	305	884	864,738	319.6	276
<b>Rocky Mountain (2)</b>	48	48	64	160	369,750	143.4	53
<b>Southwestern (3)</b>	28	35	42	105	471,260	76.6	36
<b>Intermountain (4)</b>	196	203	171	570	869,943	199.4	173
<b>Pacific Southwest (5)</b>	279	272	250	801	528,360	491.7	260
<b>Pacific Northwest (6)</b>	299	305	283	888	402,586	693.8	279
<b>Southern (8)</b>	459	353	418	1,231	598,784	662.7	397
<b>Eastern (9)</b>	381	388	420	1,189	649,751	596.0	387
<b>Alaska (10)</b>	44	40	45	128	362,992	124.9	45
<b>Total</b>	<b>\$2,031</b>	<b>1,926</b>	<b>1,999</b>	<b>5,957</b>		<b>3,308.2</b>	<b>1,907</b>

Totals may not add due to rounding.

**Appendix Table A6. Direct and Total Timber Jobs for National Forest System Baseline Harvest**

Region	Baseline Harvest (MMBF)	Direct Jobs per MMBF	Total Jobs per MMBF	Direct Jobs for Baseline	Total Jobs for Baseline	Ratio of Direct to Total Jobs
<b>Northern (1)</b>	319.6	10	28	3,196	8,950	0.36
<b>Rocky Mountain (2)</b>	143.4	6	14	861	2,008	0.43
<b>Southwestern (3)</b>	76.6	9	18	690	1,380	0.50
<b>Intermountain (4)</b>	199.4	9	15	1,794	2,990	0.60
<b>Pacific Southwest (5)</b>	491.7	7	11	3,442	5,408	0.64
<b>Pacific Northwest (6)</b>	693.8	8	14	5,551	9,714	0.57
<b>Southern (8)</b>	662.7	10	19	6,627	12,591	0.53
<b>Eastern (9)</b>	596.0	7	11	4,172	6,556	0.64
<b>Alaska (10)</b>	124.9	5	8	625	1,000	0.63
<b>Total</b>	<b>3,308.2</b>		<b>1,926</b>	<b>26,957</b>	<b>50,596</b>	

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<b>Table A7. Adjustment of Planned Offer to Harvest in Inventoried Roadless Areas, low scenario</b>								
	<b>Planned</b>		<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>50% of</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Planned</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>with</b>	<b>Under</b>
	<b>in IRAs</b>	<b>Offer</b>	<b>Percent</b>	<b>IRAs</b>		<b>Stewardship</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
National Forest								
Bitterroot	0.40	0.20	1.00	0.20		0.12	0.06	0.14
Clearwater	2.94	1.47	0.98	1.44		1.04	0.51	0.93
Custer	0.37	0.19	1.00	0.19		0.37	0.19	0.00
Flathead	0.29	0.15	1.00	0.15		0.05	0.03	0.12
Helena	1.56	0.78	1.00	0.78		0.74	0.37	0.41
Idaho Panhandle	8.63	4.32	0.86	3.71		4.40	1.89	1.82
Kootenai	0.22	0.11	1.00	0.11		0.00	0.00	0.11
Lewis and Clark	0.26	0.13	1.00	0.13		0.20	0.10	0.03
Lolo	0.32	0.16	0.89	0.14		0.00	0.00	0.14
Nez Perce	2.00	1.00	1.00	1.00		0.00	0.00	1.00
Region 1 Totals	16.99	8.50		7.85		6.92	3.14	4.70
Arapaho-Roosevelt	0.40	0.20	0.85	0.17		0.06	0.03	0.14
Bighorn	0.61	0.31	0.87	0.27		0.61	0.27	0.00
Black Hills	0.72	0.36	0.75	0.27		0.72	0.27	0.00
GM-Uncomp.-Gunn.	0.70	0.35	0.76	0.27		0.70	0.27	0.00
Medicine Bow/Routt	2.38	1.19	0.75	0.89		2.26	0.85	0.05
Rio Grande	0.28	0.14	0.97	0.14		0.20	0.10	0.04
San Juan	0.40	0.20	0.97	0.19		0.32	0.16	0.04
Shoshone	2.13	1.07	1.00	1.07		2.13	1.07	0.00
White River	1.95	0.98	0.82	0.80		1.95	0.80	0.00
Region 2 Totals	9.57	4.79		4.06		8.95	3.79	0.27
Kaibab	0.20	0.10	0.86	0.09		0.20	0.09	0.00
Lincoln	0.33	0.17	0.99	0.16		0.24	0.12	0.04
Region 3 Totals	0.53	0.27		0.25		0.44	0.21	0.04
Ashley	1.00	0.50	1.00	0.50		1.00	0.50	0.00
Boise	4.14	2.07	0.83	1.72		0.40	0.17	1.56
Bridger-Teton	0.60	0.30	1.00	0.30		0.60	0.30	0.00
Caribou	2.12	1.06	0.74	0.78		1.46	0.54	0.24
Dixie	8.31	4.16	0.70	2.93		7.89	2.78	0.15
Fishlake	4.06	2.03	0.87	1.77		4.06	1.77	0.00
Humbolt-Toiyabe	0.40	0.20	0.59	0.12		0.20	0.06	0.06
Manti-Lasal	6.62	3.31	0.96	3.18		3.96	1.90	1.28
Payette	10.90	5.45	0.87	4.77		8.73	3.82	0.95
Targhee	1.00	0.50	1.00	0.50		0.00	0.00	0.50
Uinta	0.95	0.48	0.99	0.47		0.88	0.43	0.03
Region 4 Totals	40.10	20.05		17.04		29.18	12.27	4.77

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<b>Table A7. Continued</b>								
	<b>Planned</b>		<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>50% of</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Planned</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>with</b>	<b>Under</b>
	<b>in IRAs</b>	<b>Offer</b>	<b>Percent</b>	<b>IRAs</b>		<b>Stewardship</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
National Forest								
Klamath	1.49	0.75	0.97	0.73		1.04	0.51	0.22
Mendocino	0.24	0.12	1.00	0.12		0.24	0.12	0.00
Shasta-Trinity	3.68	1.84	0.97	1.78		2.88	1.39	0.39
Six Rivers	1.09	0.55	0.71	0.39		0.54	0.19	0.20
Region 5 Totals	6.50	3.25		3.01		4.70	2.21	0.80
Gifford Pinchot	0.55	0.28	0.90	0.25		0.48	0.22	0.03
Okanogan	2.57	1.29	0.82	1.05		2.49	1.02	0.03
Rogue River	3.32	1.66	0.81	1.35		2.60	1.06	0.29
Siskiyou	1.00	0.50	1.00	0.50		0.70	0.35	0.15
Siuslaw	0.40	0.20	1.00	0.20		0.08	0.04	0.16
Umatilla	1.66	0.83	0.90	0.75		0.00	0.00	0.75
Umpqua	0.06	0.03	1.00	0.03		0.00	0.00	0.03
Wallowa-Whitman	0.80	0.40	1.00	0.40		0.80	0.40	0.00
Wenatchee	1.65	0.83	0.82	0.67		0.00	0.00	0.67
Willamette	5.34	2.67	0.98	2.61		5.34	2.61	0.00
Region 6 Totals	17.35	8.68		7.80		12.49	5.69	2.12
Chattahoochee/Oconee	0.23	0.12	0.85	0.10		0.11	0.05	0.05
Cherokee	0.32	0.16	0.81	0.13		0.08	0.03	0.10
GW/Jefferson	1.00	0.50	0.94	0.47		0.60	0.28	0.19
Mississippi	0.60	0.30	0.84	0.25		0.57	0.24	0.01
NC Forests	0.21	0.11	0.79	0.08		0.13	0.05	0.03
Ozark-St. Francis	3.56	1.78	0.94	1.68		3.56	1.68	0.00
Region 8 Totals	5.92	2.96		2.71		5.05	2.33	0.38
Allegheny	0.06	0.03	0.81	0.02		0.06	0.02	0.00
Chequamegon/Nicolet	4.82	2.41	0.99	2.39		3.32	1.65	0.74
Green Mountain	0.20	0.10	1.00	0.10		0.00	0.00	0.10
Hiawatha	0.20	0.10	0.98	0.10		0.18	0.09	0.01
Monongahela	3.60	1.80	0.92	1.66		3.25	1.50	0.16
Superior	5.22	2.61	0.91	2.38		5.22	2.38	0.00
White Mountain	1.60	0.80	0.92	0.74		0.65	0.30	0.44
Region 9 Totals	15.70	7.85		7.39		12.68	5.94	1.45
Tongass	107.80	75.46	0.79	59.61		0.00	16.90	42.71
National	220.46	131.79		109.72		80.41	52.47	57.25

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<b>Table A8. Adjustment of Planned Offer to Harvest in Inventoried Roadless Areas, medium scenario</b>								
	<b>Planned</b>	<b>70% of</b>	<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>Planned</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Offer</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>Under</b>	<b>Under</b>
	<b>in IRAs</b>	<b>in IRAs</b>	<b>Percent</b>	<b>IRAs</b>		<b>Stewardship</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
National Forest								
Bitterroot	0.40	0.28	1.00	0.28		0.12	0.08	0.20
Clearwater	2.94	2.06	0.98	2.02		1.04	0.71	1.30
Custer	0.37	0.26	1.00	0.26		0.37	0.26	0.00
Flathead	0.29	0.20	1.00	0.20		0.05	0.04	0.17
Helena	1.56	1.09	1.00	1.09		0.74	0.52	0.57
Idaho Panhandle	8.63	6.04	0.86	5.20		4.40	2.65	2.55
Kootenai	0.22	0.15	1.00	0.15		0.00	0.00	0.15
Lewis and Clark	0.26	0.18	1.00	0.18		0.20	0.14	0.04
Lolo	0.32	0.22	0.89	0.20		0.00	0.00	0.20
Nez Perce	2.00	1.40	1.00	1.40		0.00	0.00	1.40
Region 1 Totals	16.99	11.89		10.99		6.92	4.40	6.59
Arapaho-Roosevelt	0.40	0.28	0.85	0.24		0.06	0.04	0.20
Bighorn	0.61	0.43	0.87	0.37		0.61	0.37	0.00
Black Hills	0.72	0.50	0.75	0.38		0.72	0.38	0.00
GM-Uncomp.-Gunn.	0.70	0.49	0.76	0.37		0.70	0.37	0.00
Medicine Bow/Routt	2.38	1.67	0.75	1.25		2.26	1.19	0.06
Rio Grande	0.28	0.20	0.97	0.19		0.20	0.14	0.05
San Juan	0.40	0.28	0.97	0.27		0.32	0.22	0.05
Shoshone	2.13	1.49	1.00	1.49		2.13	1.49	0.00
White River	1.95	1.37	0.82	1.11		1.95	1.11	0.00
Region 2 Totals	9.57	6.70		5.68		8.95	5.31	0.37
Kaibab	0.20	0.14	0.86	0.12		0.20	0.12	0.00
Lincoln	0.33	0.23	0.99	0.23		0.24	0.17	0.06
Region 3 Totals	0.53	0.37		0.35		0.44	0.29	0.06
Ashley	1.00	0.70	1.00	0.70		1.00	0.70	0.00
Boise	4.14	2.90	0.83	2.41		0.40	0.23	2.18
Bridger-Teton	0.60	0.42	1.00	0.42		0.60	0.42	0.00
Caribou	2.12	1.48	0.74	1.09		1.46	0.75	0.34
Dixie	8.31	5.82	0.70	4.10		7.89	3.89	0.21
Fishlake	4.06	2.84	0.87	2.48		4.06	2.48	0.00
Humbolt-Toiyabe	0.40	0.28	0.59	0.17		0.20	0.08	0.08
Manti-Lasal	6.62	4.63	0.96	4.46		3.96	2.67	1.79
Payette	10.90	7.63	0.87	6.68		8.73	5.35	1.33
Targhee	1.00	0.70	1.00	0.70		0.00	0.00	0.70
Uinta	0.95	0.67	0.99	0.66		0.88	0.61	0.05
Region 4 Totals	40.10	28.07		23.85		29.18	17.18	6.67

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<b>Table A8. Continued</b>	<b>Planned</b>	<b>70% of</b>	<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>Planned</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Offer</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>Under</b>	<b>Under</b>
	<b>in IRAs</b>	<b>in IRAs</b>	<b>Percent</b>	<b>IRAs</b>		<b>Stewardship</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
Klamath	1.49	1.04	0.97	1.02		1.04	0.71	0.31
Mendocino	0.24	0.17	1.00	0.17		0.24	0.17	0.00
Shasta-Trinity	3.68	2.58	0.97	2.49		2.88	1.95	0.54
Six Rivers	1.09	0.76	0.71	0.54		0.54	0.27	0.27
Region 5 Totals	6.50	4.55		4.22		4.70	3.10	1.12
Gifford Pinchot	0.55	0.39	0.90	0.35		0.48	0.30	0.04
Okanogan	2.57	1.80	0.82	1.47		2.49	1.42	0.05
Rogue River	3.32	2.32	0.81	1.89		2.60	1.48	0.41
Siskiyou	1.00	0.70	1.00	0.70		0.70	0.49	0.21
Siuslaw	0.40	0.28	1.00	0.28		0.08	0.06	0.22
Umatilla	1.66	1.16	0.90	1.05		0.00	0.00	1.05
Umpqua	0.06	0.04	1.00	0.04		0.00	0.00	0.04
Wallowa-Whitman	0.80	0.56	1.00	0.56		0.80	0.56	0.00
Wenatchee	1.65	1.16	0.82	0.94		0.00	0.00	0.94
Willamette	5.34	3.74	0.98	3.65		5.34	3.65	0.00
Region 6 Totals	17.35	12.15		10.93		12.49	7.96	2.97
Chattahoochee/Oconee	0.23	0.16	0.85	0.14		0.11	0.07	0.07
Cherokee	0.32	0.22	0.81	0.18		0.08	0.05	0.14
GW/Jefferson	1.00	0.70	0.94	0.66		0.60	0.39	0.26
Mississippi	0.60	0.42	0.84	0.35		0.57	0.33	0.02
NC Forests	0.21	0.15	0.79	0.12		0.13	0.07	0.04
Ozark-St. Francis	3.56	2.49	0.94	2.35		3.56	2.35	0.00
Region 8 Totals	5.92	4.14		3.79		5.05	3.26	0.53
Allegheny	0.06	0.04	0.81	0.03		0.06	0.03	0.00
Chequamegon/Nicolet	4.82	3.37	0.99	3.35		3.32	2.31	1.04
Green Mountain	0.20	0.14	1.00	0.14		0.00	0.00	0.14
Hiawatha	0.20	0.14	0.98	0.14		0.18	0.12	0.01
Monongahela	3.60	2.52	0.92	2.32		3.25	2.10	0.23
Superior	5.22	3.65	0.91	3.33		5.22	3.33	0.00
White Mountain	1.60	1.12	0.92	1.03		0.65	0.42	0.61
Region 9 Totals	15.70	10.99		10.35		12.68	8.31	2.03
Tongass	107.80	97.02	0.79	76.65		0.00	22.70	53.95
National	220.46	175.88		146.80		80.41	72.50	74.30

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<b>Table A9. Adjustment of Planned Offer to Harvest in Inventoried Roadless Areas, high scenario</b>								
	<b>Planned</b>	<b>85% of</b>	<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>Planned</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Offer</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>Under</b>	<b>Under</b>
	<b>in IRAs</b>	<b>in IRAs</b>	<b>Percent</b>	<b>IRAs</b>		<b>Needing Roads</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
National Forest								
Bitterroot	0.40	0.34	1.00	0.34		0.12	0.10	0.24
Clearwater	2.94	2.50	0.98	2.45		1.04	0.87	1.58
Custer	0.37	0.31	1.00	0.31		0.37	0.31	0.00
Flathead	0.29	0.25	1.00	0.25		0.05	0.04	0.20
Helena	1.56	1.33	1.00	1.33		0.74	0.63	0.70
Idaho Panhandle	8.63	7.34	0.86	6.31		4.40	3.22	3.09
Kootenai	0.22	0.19	1.00	0.19		0.00	0.00	0.19
Lewis and Clark	0.26	0.22	1.00	0.22		0.20	0.17	0.05
Lolo	0.32	0.27	0.89	0.24		0.00	0.00	0.24
Nez Perce	2.00	1.70	1.00	1.70		0.00	0.00	1.70
Region 1 Totals	16.99	14.44		13.34		6.92	5.34	8.00
Arapaho-Roosevelt	0.40	0.34	0.85	0.29		0.06	0.04	0.25
Bighorn	0.61	0.52	0.87	0.45		0.61	0.45	0.00
Black Hills	0.72	0.61	0.75	0.46		0.72	0.46	0.00
GM-Uncomp.-Gunn.	0.70	0.60	0.76	0.45		0.70	0.45	0.00
Medicine Bow/Routt	2.38	2.02	0.75	1.52		2.26	1.44	0.08
Rio Grande	0.28	0.24	0.97	0.23		0.20	0.17	0.07
San Juan	0.40	0.34	0.97	0.33		0.32	0.26	0.07
Shoshone	2.13	1.81	1.00	1.81		2.13	1.81	0.00
White River	1.95	1.66	0.82	1.35		1.95	1.35	0.00
Region 2 Totals	9.57	8.13		6.90		8.95	6.44	0.45
Kaibab	0.20	0.17	0.86	0.15		0.20	0.15	0.00
Lincoln	0.33	0.28	0.99	0.28		0.24	0.20	0.08
Region 3 Totals	0.53	0.45		0.42		0.44	0.35	0.08
Ashley	1.00	0.85	1.00	0.85		1.00	0.85	0.00
Boise	4.14	3.52	0.83	2.93		0.40	0.28	2.64
Bridger-Teton	0.60	0.51	1.00	0.51		0.60	0.51	0.00
Caribou	2.12	1.80	0.74	1.33		1.46	0.92	0.41
Dixie	8.31	7.06	0.70	4.97		7.89	4.72	0.25
Fishlake	4.06	3.45	0.87	3.01		4.06	3.01	0.00
Humbolt-Toiyabe	0.40	0.34	0.59	0.20		0.20	0.10	0.10
Manti-Lasal	6.62	5.63	0.96	5.41		3.96	3.24	2.17
Payette	10.90	9.27	0.87	8.11		8.73	6.49	1.61
Targhee	1.00	0.85	1.00	0.85		0.00	0.00	0.85
Uinta	0.95	0.81	0.99	0.80		0.88	0.74	0.06
Region 4 Totals	40.10	34.09		28.96		29.18	20.86	8.10

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<b>Table A9. Continued</b>	<b>Planned</b>	<b>85% of</b>	<b>TSPIRS</b>	<b>Estimated</b>		<b>Planned</b>	<b>Reduced</b>	<b>Allowed</b>
	<b>Ave. Ann.</b>	<b>Planned</b>	<b>96-99</b>	<b>Harvest</b>		<b>Ave. Ann</b>	<b>Harvest</b>	<b>Harvest</b>
	<b>Offer</b>	<b>Offer</b>	<b>Average</b>	<b>from</b>		<b>Offer in IRAs</b>	<b>Under</b>	<b>Under</b>
	<b>in IRAs</b>	<b>in IRAs</b>	<b>Percent</b>	<b>IRAs</b>		<b>Needing Roads</b>	<b>Final Rule</b>	<b>Final Rule</b>
	<b>MMBF</b>	<b>MMBF</b>	<b>Sold</b>	<b>MMBF</b>		<b>MMBF</b>	<b>MMBF</b>	<b>MMBF</b>
Klamath	1.49	1.27	0.97	1.23		1.04	0.86	0.37
Mendocino	0.24	0.20	1.00	0.20		0.24	0.20	0.00
Shasta-Trinity	3.68	3.13	0.97	3.02		2.88	2.37	0.66
Six Rivers	1.09	0.93	0.71	0.66		0.54	0.33	0.33
Region 5 Totals	6.50	5.53		5.12		4.70	3.76	1.36
Gifford Pinchot	0.55	0.47	0.90	0.42		0.48	0.37	0.05
Okanogan	2.57	2.18	0.82	1.78		2.49	1.73	0.06
Rogue River	3.32	2.82	0.81	2.29		2.60	1.79	0.50
Siskiyou	1.00	0.85	1.00	0.85		0.70	0.60	0.26
Siuslaw	0.40	0.34	1.00	0.34		0.08	0.07	0.27
Umatilla	1.66	1.41	0.90	1.27		0.00	0.00	1.27
Umpqua	0.06	0.05	1.00	0.05		0.00	0.00	0.05
Wallowa-Whitman	0.80	0.68	1.00	0.68		0.80	0.68	0.00
Wenatchee	1.65	1.40	0.82	1.14		0.00	0.00	1.14
Willamette	5.34	4.54	0.98	4.43		5.34	4.43	0.00
Region 6 Totals	17.35	14.75		13.27		12.49	9.67	3.60
Chattahoochee/Oconee	0.23	0.20	0.85	0.17		0.11	0.08	0.09
Cherokee	0.32	0.27	0.81	0.22		0.08	0.06	0.17
GW/Jefferson	1.00	0.85	0.94	0.80		0.60	0.48	0.32
Mississippi	0.60	0.51	0.84	0.43		0.57	0.40	0.02
NC Forests	0.21	0.18	0.79	0.14		0.13	0.09	0.05
Ozark-St. Francis	3.56	3.03	0.94	2.85		3.56	2.85	0.00
Region 8 Totals	5.92	5.03		4.60		5.05	3.96	0.65
Allegheny	0.06	0.05	0.81	0.04		0.06	0.04	0.00
Chequamegon/Nicolet	4.82	4.10	0.99	4.07		3.32	2.80	1.27
Green Mountain	0.20	0.17	1.00	0.17		0.00	0.00	0.17
Hiawatha	0.20	0.17	0.98	0.17		0.18	0.15	0.02
Monongahela	3.60	3.06	0.92	2.82		3.25	2.55	0.27
Superior	5.22	4.44	0.91	4.05		5.22	4.05	0.00
White Mountain	1.60	1.36	0.92	1.25		0.65	0.51	0.74
Region 9 Totals	15.70	13.35		12.56		12.68	10.09	2.47
Tongass	107.80	102.41	0.79	80.90			23.00	57.90
National	220.46	198.17		166.09		80.41	83.47	82.62

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<b>Appendix Table A10. Employment and Income Effects from Harvest Reductions</b>						
<b>in Inventoried Roadless Areas</b>						
			(Based on a weighted average of key forests)			
	MMBF		JOB EFFECTS		INCOME EFFECTS	
	ANNUAL		Shaded = Jobs/MMBF		Shaded = '97 M\$/MMBF	
	AVE.		Direct	Total	Direct	Total
<b>REGION 1</b>			9.4	26.7	285.2	801.9
Low Harvest Effect	3.14		29	84	895	2,518
Medium Harvest Effect	4.39		41	117	1,252	3,520
High Harvest Effect	5.34		50	143	1,523	4,282
<b>REGION 2</b>			5.8	13.0	124.5	293.0
Low Harvest Effect	3.79		22	49	472	1,111
Medium Harvest Effect	5.30		31	69	660	1,553
High Harvest Effect	6.44		37	83	802	1,887
<b>REGION 3</b>			9	18	235.7	471.4
Low Harvest Effect	0.21		2	4	49	99
Medium Harvest Effect	0.29		3	5	68	137
High Harvest Effect	0.35		3	6	82	165
<b>REGION 4</b>			6.1	10.4	352.2	591.6
Low Harvest Effect	12.27		75	128	4,321	7,259
Medium Harvest Effect	17.12		105	178	6,029	10,128
High Harvest Effect	20.86		128	217	7,346	12,341
<b>REGION 5</b>			7.0	11.0	357.0	561.0
Low Harvest Effect	2.21		15	24	789	1,240
Medium Harvest Effect	3.10		22	34	1,107	1,739
High Harvest Effect	3.76		26	41	1,342	2,109
<b>REGION 6</b>			8.7	14.0	262.9	415.6
Low Harvest Effect	5.69		50	80	1,496	2,365
Medium Harvest Effect	7.97		70	112	2,095	3,312
High Harvest Effect	9.67		85	135	2,542	4,019
<b>REGION 8</b>			7.6	18.9	388.8	790.8
Low Harvest Effect	2.33		18	44	906	1,843
Medium Harvest Effect	3.26		25	62	1,268	2,578
High Harvest Effect	3.96		30	75	1,540	3,132
<b>REGION 9</b>			6.2	10.0	365.1	584.2
Low Harvest Effect	5.94		37	59	2,169	3,470
Medium Harvest Effect	8.30		52	83	3,030	4,849
High Harvest Effect	10.09		63	101	3,684	5,894
<b>REGION 10</b>			5.0	8.0	229.8	367.7
Low Harvest Effect	16.90		85	135	3,884	6,214
Medium Harvest Effect	22.70		114	182	5,217	8,347
High Harvest Effect	23.00		115	184	5,286	8,457
<b>NATIONAL</b>			(Sum of Regions)			
Low Harvest Effect	52.48		333	607	14,981	26,118
Medium Harvest Effect	72.43		461	841	20,725	36,163
High Harvest Effect	83.47		537	986	24,147	42,286

## **APPENDIX A11. EFFECTS OF THE ROADLESS RULE ON UNDISCOVERED OIL AND GAS RESOURCES**

Undiscovered oil and gas resources may occur beneath inventoried roadless areas. The USGS data displayed in Table 18 indicate that two USGS regions (Colorado Plateau/Basin and Range and Rocky Mountains/Northern Great Plains) are likely to contain substantial oil and gas resources. These regions also have a relatively large share of inventoried roadless areas, compared to other regions of the United States.

These two USGS regions encompass Forest Service Regions 1 (Northern Region), 2 (Rocky Mountain Region), and 4 (Intermountain Region). Forest Service geospatial data on the location of inventoried roadless areas were overlain on USGS DDS 35 geospatial vector data of oil and gas play areas<sup>12</sup>. Based on these overlays, a total of 208 play areas were identified within these USGS regions, of which 116 contain inventoried roadless areas. The acreage of the entire play area and the acreage of inventoried roadless area within each play area were also calculated (Advanced Resources International 2000b).

The primary source of information for estimates of undiscovered oil and gas resources was the USGS data from DDS 30, which contains tabular data of estimates of undiscovered oil and gas resources by play area. Other data were used to supplement the USGS estimates where it was clear that significant new activity has taken place, or important new information had become available since the USGS collected their data in 1993. These supplemental data were used in five of the 116 play areas, four of which are in the most significant gas-bearing play areas. In the Montana fold belt, six major geologic structures have been identified through seismic imaging since the USGS assessment. Therefore, estimates from the Potential Gas Committee's 1998 report were used (Potential Gas Committee, 1998). In the Green River Basin, Advanced Resources International has conducted original research for the Department of Energy into the potential of two unconventional gas formations, the Mesaverde and the Frontier. This includes a township level estimate of the richness of the resource, based on natural fracture systems and other information and allows a more precise match of resource to surface locations. In Utah, recent activity in the coal bed methane play area is captured by data from the Utah Geologic Survey. These are the only four of the top nine play areas for which data other than USGS were used to estimate the amount of resource that may underlie inventoried roadless areas.

The estimates of undiscovered natural gas and oil resources that potentially underlie inventoried roadless areas are shown in Table A11-1. The data presented fall within a wide range because of the uncertainty surrounding estimates of undiscovered resources. The low estimate represents a 95 percent probability that at least that amount of resource exists, while the high estimate represents a 5 percent probability that at least that amount of resource exists. The estimated mean undiscovered oil and gas resources underlying inventoried roadless areas account for about 7% of undiscovered oil resources and 3% of undiscovered natural gas resources estimated to occur within the Rocky Mountain area.

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<sup>12</sup> Play areas are geologically defined areas with oil and gas potential.

**Table A11-1. Estimates of Undiscovered Natural Gas and Oil Resources Associated with National Forest System Inventoried Roadless Areas**

	Natural Gas (trillion cubic feet)			Petroleum (million barrels)		
	High	Mean	Low	High	Mean	Low
Inventoried Roadless Areas	23.1	11.3	3.5	1,212	550	119
Rocky Mountain Area	641	323	119	17,574	8,218	1,456

Source: Advanced Resources International, 2000b.

The majority of the undiscovered natural gas resources that are estimated to underlie inventoried roadless areas fall within nine play areas (Table A11-2). About 83% (9.3 trillion cubic feet) of the total estimated natural gas resource underlying inventoried roadless areas falls within these nine play areas. The inventoried roadless areas within these nine plays sum to about 2.7 million acres, which is about 14% of the inventoried roadless acres in the three Forest Service regions in the Rocky Mountains (Advanced Resources International, 2000b).

**Table A11-2. Estimated Undiscovered Natural Gas Resources within Inventoried Roadless Areas in the Nine Play Areas With Greatest Resources**

USGS Province	Play Area	Code	IRAs (acres)	Natural Gas (mean bcf)
Montana Thrust Belt	Imbricate Thrust Gas	2701	1,1912,787	1,618
Wyoming Thrust Belt	Moxa Arch Extension	2301	206,303	1,568
Wyoming Thrust Belt	Northern Thrusts	3603	749,469	1,508
Uinta-Piceance Basin	Uinta Basin-Emery	2052	60,882	1,159
Southwestern WY	Greater Green River Basin – Mesaverde	3741	65,322	950
Uinta-Piceance Basin	Tight Gas Uinta Tertiary West	2016	12,194	789
Uinta-Piceance Basin	Tight Gas Piceance Mesaverde Williams Fork	2007	208,522	642
Southwestern WY	Greater Green River Basin – Cloverly- Frontier	3740	105,206	566
Uinta-Piceance Basin	Piceance Basin –Western Basin Margin	2054	113,576	545
<b>TOTALS</b>			<b>2,724,260</b>	<b>9,346</b>

Source: Advanced Resources International, 2000b.

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The resource estimates were made assuming that the resources are homogeneously distributed across play areas, which is generally not the case with oil and gas resources<sup>13</sup>. Most oil and gas resources are found in basinal areas, and most inventoried roadless areas in the Rocky Mountains are mountainous (National Petroleum Council 1999). Therefore, there is smaller probability of these resources occurring in mountainous inventoried roadless areas. The analysis made an adjustment to attempt to partially account for these terrain differences. Areas that overlapped inventoried roadless areas were subdivided into areas with less than 30% slope and greater than 30% slope to account for access limitations and reduced geologic potential (Advanced Resources International 2000b).

The availability of natural gas resources in this area is of particular interest given recent increases in natural gas prices. The Rocky Mountains and the Gulf of Mexico are the two regions of the U.S. considered to have the most potential for future natural gas production. Resources within the Gulf of Mexico are estimated at about 400 trillion cubic feet of natural gas resources. The Rocky Mountains and Gulf of Mexico account for about half of the nation's 1,309 trillion cubic feet of natural gas resources (National Petroleum Council 1999).

Activity in the Rocky Mountains is an important and growing source of natural gas production. Production doubled between 1990 and 1999, from 1.5 trillion cubic feet to 3.3 trillion cubic feet. The National Forest System produced about 0.4% (76.4 billion cubic feet) of the nation's natural gas supply in 1999, primarily from the Forest Service regions covered in this analysis. Production from national forests in those regions has been stable in the last five years, with a slight increase in 2000. Exploration and drilling activity in the area has also been increasing, which is necessary to replace current sources of production and increase natural gas reserves. Development of tight gas resources in the Green River Basin and coalbed methane drilling in the Powder River Basin are current areas of activity. Few inventoried roadless areas are located in these areas, so the Roadless Rule will have little impact on continued exploration and development in these areas.

The natural gas resources estimated to occur within inventoried roadless areas in the Rocky Mountain area account for 3% of total estimated resources. About 728,000 acres of high potential oil and gas areas are already under lease in Forest Service Regions 1, 2, and 4 for oil and gas and will be excepted from the road prohibitions. Some oil and gas resources may be accessible without road construction, using techniques such as off-site slant drilling. No surface occupancy stipulations are commonplace on oil and gas leases within national forests in the Rocky Mountain region. Many inventoried roadless areas are not currently available for leasing as a result of congressional or agency management decisions, including areas within the nine play areas described previously. For example, most inventoried roadless areas within the Montana Thrust Belt are currently unavailable for oil and gas leasing. Although the Roadless Rule would preclude development indefinitely, current access restrictions would make many of these resources unavailable in the near future. In addition, the steep terrain that is typical of many inventoried roadless areas often makes these areas difficult to access for environmental and/or economic reasons.

The natural gas estimates presented in Tables A11-1 and A11-2 are estimates of technically recoverable resources. Economically recoverable resources are a subset of that total, and will vary depending on current prices and technology cost for exploration, extraction, and product conveyance.

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<sup>13</sup> The exception to the homogeneous assumption is in the Mesaverde and Frontier plays of the Green River Basin, where natural gas potential was estimated at the township level.

Using a range of natural gas prices, recovery rates for different types of natural gas resources were estimated to range from 63% to 78% (Table A11-3). Recovery factors varied depending on type of natural gas resource (conventional, coalbed methane, and tight gas), and expected changes in technology. Economically recoverable resources within inventoried roadless area are estimated to range from 7.7 to 8.5 trillion cubic feet (Advanced Resources International 2000a). At the assumed prices, the value of these resources would range from \$23 to \$34 billion dollars, which would be realized over a number of years.

**Table A11-3. Estimates of Economically Recoverable Natural Gas Resources Associated with National Forest System Inventoried Roadless Areas (trillion cubic feet).**

Resource Type	Technically Recoverable Resources	Economically Recoverable Resources			
		\$3 per thousand cubic feet		\$4 per thousand cubic feet	
		Recovered Portion	Recovery	Recovered Portion	Recovery
Conventional	5.3	70%	3.7	78%	4.1
Coalbed Methane	2.2	71%	1.6	77%	1.7
Tight Gas	3.8	63%	2.4	70%	2.7
Total	11.3	68%	7.7	75%	8.5

Source: Advanced Resources International, 2000a.

These figures assume that resources within inventoried roadless areas would be accessible for development. Where accessible, exploration and development of these resources would likely take about 5 to 10 years before production would begin. Even if all the economically recoverable resources were developed, they would account for less than a six month's supply of natural gas. The combination of current access restrictions and the difficulty of accessing inventoried roadless areas with steep terrain will likely result in the Roadless Rule having a minor effect on the availability of oil and gas. Although production could continue to increase in the future, inventoried roadless areas are not expected to be an important source of oil and gas production, even in the absence of the Roadless Rule.