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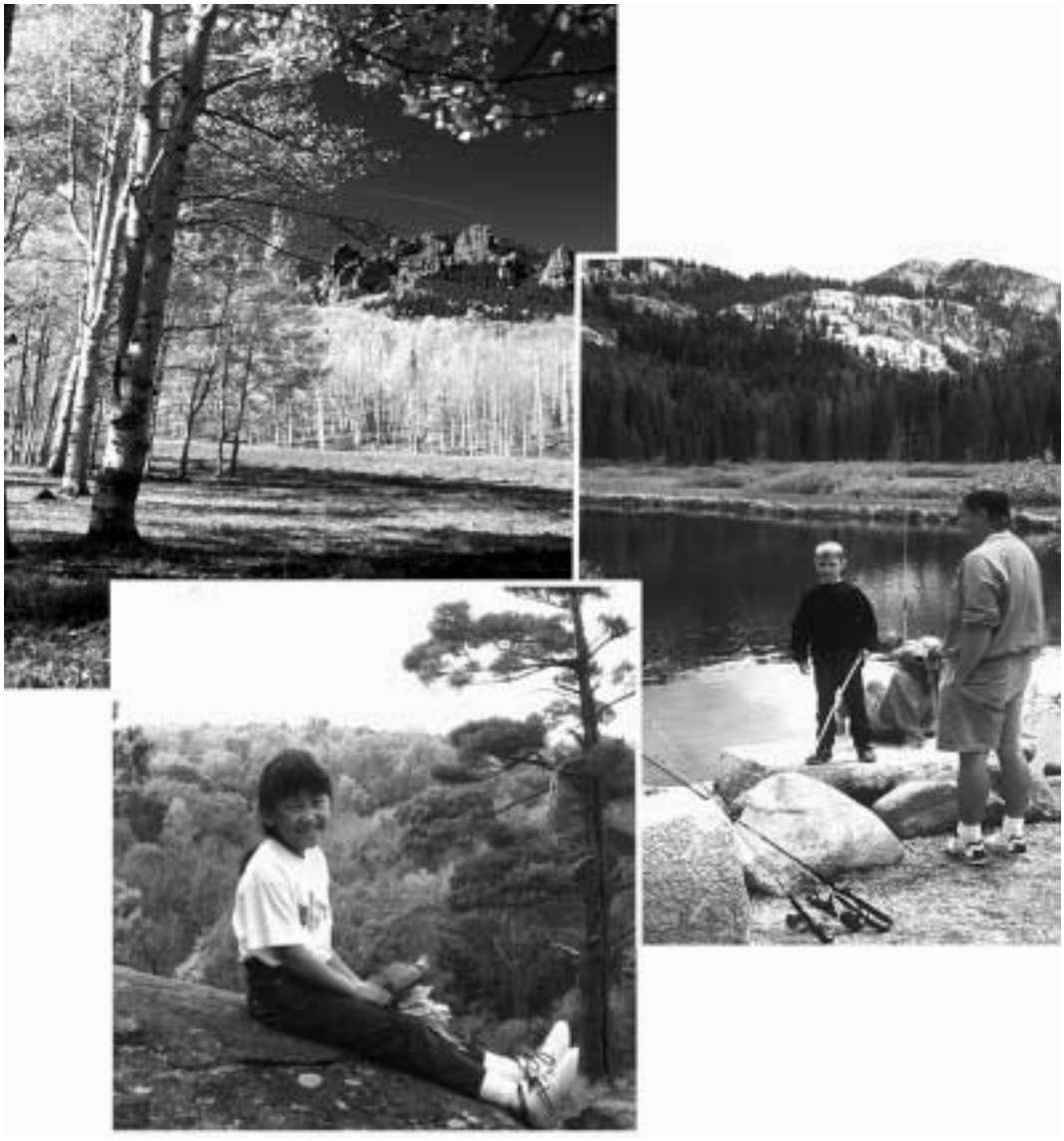
Forest Service
Roadless Area Conservation

Final Environmental Impact Statement

Socioeconomic Specialist Report



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ABSTRACT

The Socioeconomic Specialist Report for the Roadless Area Conservation Final Environmental Impact Statement (FEIS) provides more detailed background information on the affected environment, data used in the analysis, and the methodology for selected sections of the Social and Economic Factors portion of the FEIS. Additional information is provided on the social and economic context, hunting and fishing, livestock grazing, non-timber forest products, timber, energy and non-energy minerals, and socio-economic cumulative effects. Data that was revised for the FEIS is reported in more detail for timber and energy and non-energy minerals. This report is intended as supplementary information, and does not contain all of the text from the FEIS.

SUMMARY OF CHANGES BETWEEN DRAFT AND FINAL SOCIOECONOMICS SPECIALIST REPORT

- The introduction to Chapter 3 of the FEIS was revised to include an expanded discussion of demographic trends and land conversions from rural to urban uses. Two new sections were added, one on balancing commodity and non-commodity demands and one on active and passive approaches to forest management. The specialist report provides additional background information on these topics under the social and economic context heading.
- The effects of road construction and timber harvest on fishing and hunting have been revised in response to revisions in the Ecological Factors section of the FEIS.
- The section in the draft environmental impact statement and draft specialist report on Wildland Values was replaced with a section on Non-Commodity Values. The information in the FEIS is complete, and no additional information is provided in the final specialist report.
- The background information on each of the resource areas covered in the specialist report have been revised to reflect changes between the DEIS and FEIS, and to incorporate additional material from an extended literature search.
- Revisions to the section on timber include forest-level detail on the updated data from the national forests and grasslands used in the FEIS.
- Revisions to the section on energy and non-energy minerals include additional background information and effects related to coal, phosphate, and oil and gas resources.
- The dependent communities section has been revised to reflect input from the public comment period, agency input, and data updates. A new section on impacts to mining-dependent communities was added in the FEIS and the specialist report.

SOCIAL AND ECONOMIC CONTEXT

Chapter 3 of the FEIS contains three sections that precede the effects analysis and provide a social and economic context to frame the discussion of the effects of the prohibition alternatives. These include an expanded version of the Demographics section that appeared in the DEIS, and two new sections: one on balancing demands for the commodity and non-commodity benefits that National Forest System (NFS) lands provide, and one on active vs. passive forest management. These sections were expanded or added in response to public comment received on the DEIS. Public comment made it clear that these are important social issues, and that peoples' views on these issues help to shape their responses to the alternatives. By providing discussion of and background on these topics, these sections aim to provide a social and economic setting within which analysis of the biological, physical, and socioeconomic effects of the alternatives can be understood.

With regard to Demographic Trends, it is recognized that population growth, population composition, and the geographic distribution of the population all influence human uses of, values towards, and demands for products from the national forests and grasslands. Land conversion from wild or rural to developed classifications also affects the value people place on relatively undisturbed, natural landscapes such as roadless areas. Several members of the public requested additional discussion of the relationship between population and development trends, and the management of NFS lands, including the conservation of roadless areas. The material in this section of the specialist report expands on the revised discussion that appeared in the FEIS.

The debate about roadless area conservation reflects the broader question of how demands for the many values that national forests and grasslands provide should be met. Much of the public comment on the Roadless Area Conservation DEIS was rooted in the more fundamental issue of how NFS lands should be managed, and how to balance their commodity and non-commodity values. For this reason, a section on Balancing Demands was added to the FEIS. It is reproduced here in its entirety. The results of polls and surveys conducted to assess how members of the public believe NFS lands should be managed are included in the discussion. When undertaken in a scientifically rigorous and objective way, polls and surveys can provide valuable information regarding public attitudes and values as they relate to public lands and their management. However, poll and survey data also have limitations. A discussion of these limitations is included in this section. Poll and survey results were not used to develop the alternatives considered, or the preferred alternative.

Another fundamental issue that helped to shape many commentators' views on the Roadless Area Conservation rulemaking was that of whether the Forest Service should take an active or passive role in managing the national forests and grasslands. Those who believe an active management approach is preferable also tend to believe that road construction and timber harvest should be permitted in inventoried roadless areas to facilitate management actions. Questions of whether and when management interventions should occur, what these should be, and how they should be conducted, have an impact on roadless area management. Therefore, a section on Active and Passive

Forest Management was included in the FEIS to provide background information on this issue. That section is reproduced here.

Demographic Trends

The number of people in the United States has grown about 1% per year since 1980, and it continues to increase at a steady rate. In 2000, the United States population is estimated at 278.5 million (USDC Bureau of the Census 2000). This is an increase of 10.4% from the 252.3 million persons recorded by the 1990 U.S. Census. Table 1 shows past and projected United States population figures for 10 geographic regions of the country, illustrated in Figure 1.

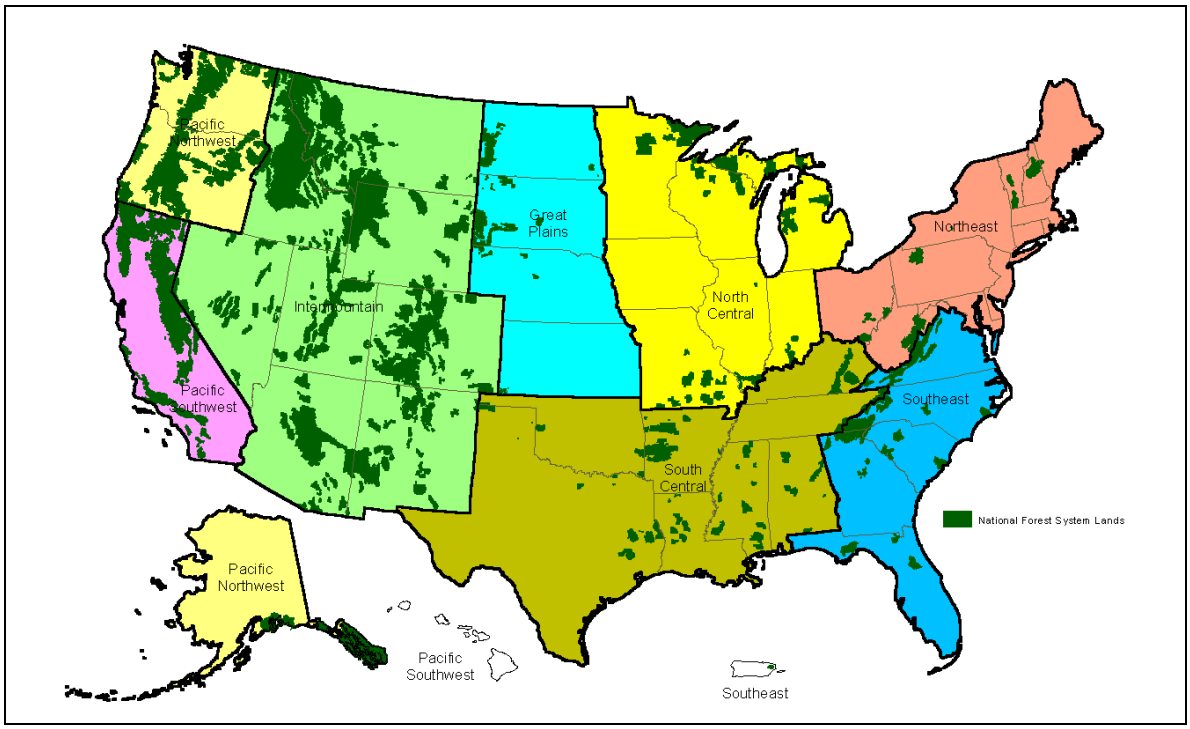


Figure 1. Multi-State Forest Service Regions of the U.S. Used for Population Analysis

The multi-state regions used for population analysis in this section are based on the geographic sub-regions used for analysis in the Resources Planning Act assessments conducted by the Forest Service. Alaska is considered separately because of its unique population characteristics. Puerto Rico is included because it contains NFS lands.

Table 1. Past and projected United States population, in millions, by multi-State regions of the United States.

Region	1980 population	1990 population	2000 population	2005 population	2020 population	Population increase 1980-2020	2040 population[a]
Northeast	67.3	69.5	71.8	72.8	77.2	9.9	
North Central	42.8	43.4	46.4	47.4	50.0	7.2	
Southeast	29.6	35.7	41.7	44.3	51.0	21.4	
South Central	38.4	41.9	47.5	49.9	56.7	18.3	
Great Plains	5.3	5.4	5.8	6.0	6.5	1.2	
Intermountain	11.4	13.7	17.7	19.2	22.0	10.6	
Pacific Northwest	6.8	7.7	9.3	9.9	11.6	4.8	
Pacific Southwest	24.6	30.9	33.8	35.8	47.0	22.4	
Alaska	0.4	0.6	0.7	0.7	0.8	0.4	
Puerto Rico	3.2	3.5	3.8	4.0	4.3	1.1	
Total	**229.4**	**252.3**	**278.5**	**290.0**	**327.1**	**97.3**	**377.4**

(USDC Bureau of the Census 2000)

[a] The U.S. Census Bureau does not project population estimates by State beyond the year 2025.

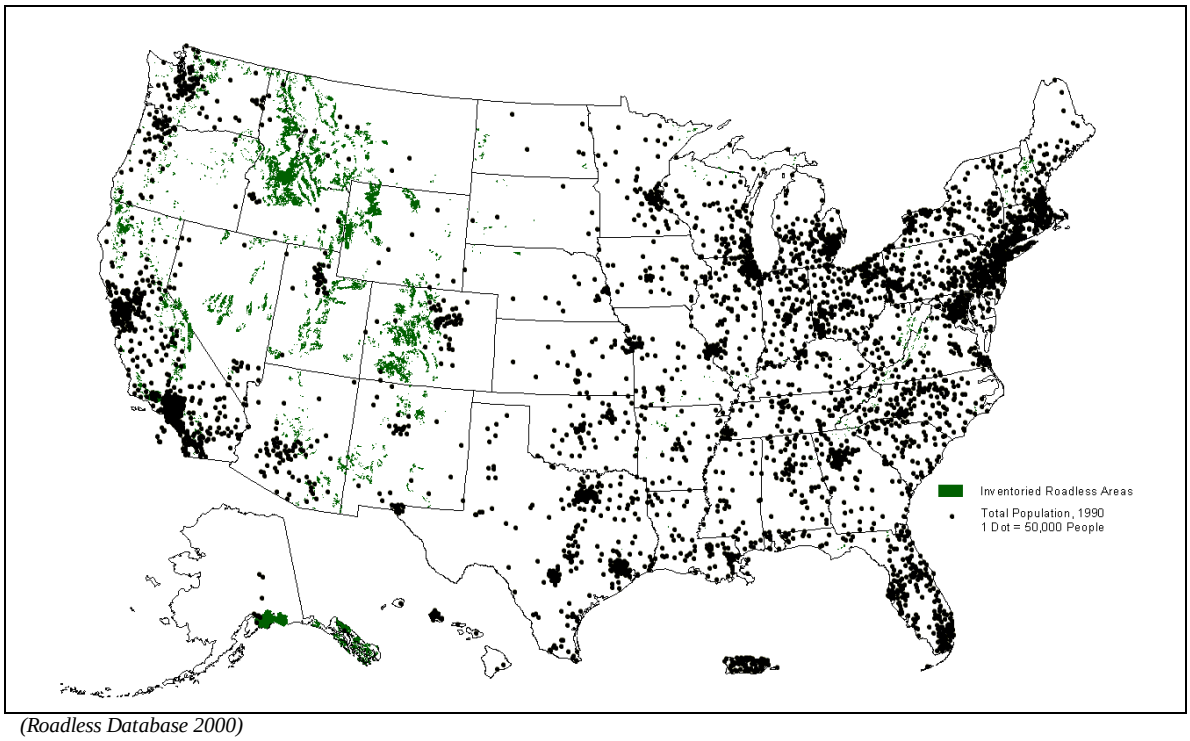
Population growth in the United States has not been evenly distributed across the country. Over the last two decades, overall population growth has been greatest in the Southeast and Pacific Southwest. Population in the South Central United States is also increasing rapidly. However, eight of the 10 States with the fastest percent increase in population between 1990 and 1998 are in the West. They are Nevada, Arizona, Idaho, Utah, Colorado, Washington, Texas, and Oregon (USDC Bureau of the Census 1999). Projections show that six states are expected to grow more than 50 percent in population between 1990 and 2025: Washington, Nevada, Colorado, Arizona, New Mexico, Utah, and Florida. Except for Florida, these states all have extensive inventoried roadless areas.

Between 2000 and 2005, the United States population is expected to increase by 4.2%; between 2000 and 2020, it is expected to increase by 17.5%; and, between 2000 and 2040, the United States population is expected to increase by 37.4%, to a total of 377.4 million people. This represents an average annual population growth rate of 0.8 % between 2000 and 2040. While the population will continue to increase steadily over the next 40 years, the rate of increase is expected to be slightly lower than it was during the preceding two decades.

The composition of the population will also change in the future. The average age in the United States is increasing. By 2030, 20% of the American population will be over 65,

compared to 12% in 1990 (USDA Forest Service 1999b). The ethnic diversity of the American population is also increasing as minority populations grow, largely because of immigration. By 2050, racial and ethnic minorities will comprise nearly 50% of the United States population, compared to 18% in 1999 (USDA Forest Service 1999b).

Figure 2 shows the distribution of the United States population in 1990 in relation to inventoried roadless areas. Table 2 compares the estimated 2000 United States population to the acreage of inventoried roadless areas by the multi-State regions of the United States illustrated in Figure 1. In general, the regions with the highest populations and/or densities have the least amount of inventoried roadless area. The most noteworthy include the Northeast, North Central, Southeast, and South Central regions, and Puerto Rico.



(Roadless Database 2000)

Figure 2. Distribution of the 1990 U.S. Resident Population in Relation to Inventoried Roadless Areas.

Most of the United States population is concentrated in urban areas. Urban areas, as defined by the U.S. Census Bureau, are areas comprising all territory, population, and housing units in urbanized areas, or places of 2,500 or more persons outside of urbanized areas. An urbanized area comprises one or more central places and the adjacent densely settled surrounding territory that together have a minimum of 50,000 persons. Between 1950 and 1990, the percent of the United States population residing in urban areas rose from 64% to 75.2%, while the percent of rural residents fell from 36% to 24.8% (USDC Bureau of the Census 1996). This shift was the result of population migration to urban

Table 2. Estimated 2000 United States population relative to inventoried roadless areas by geographic region.

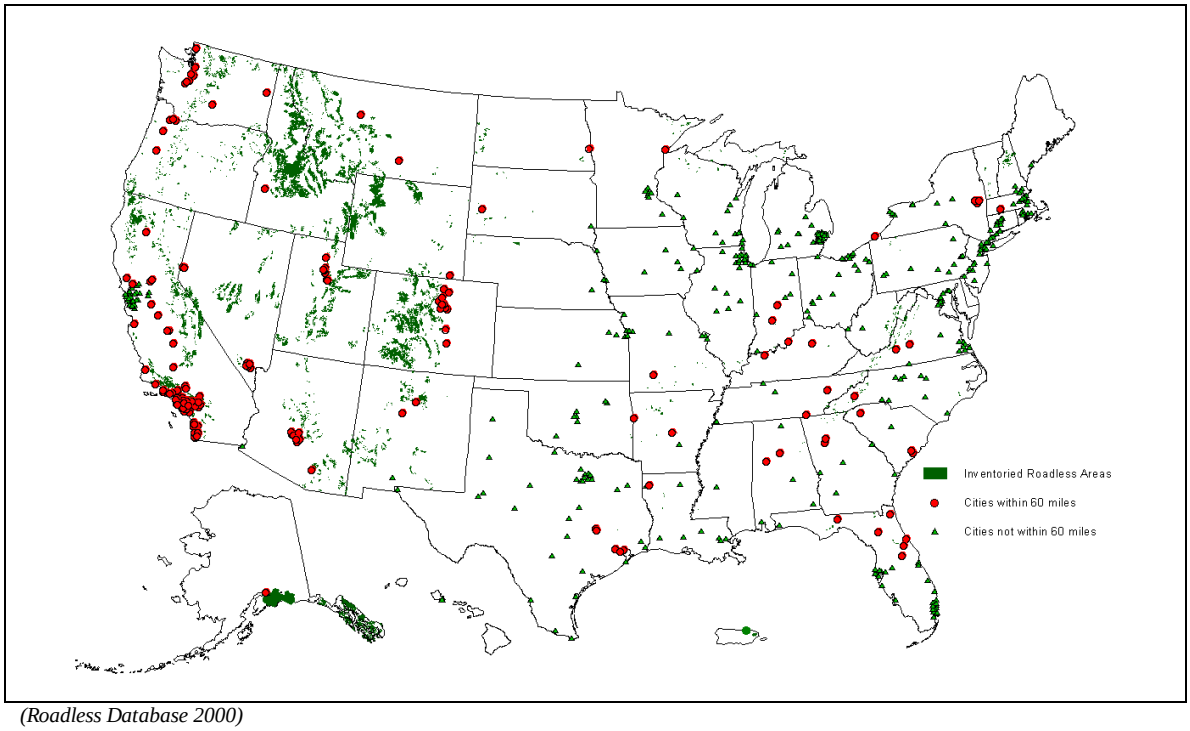
Region	Total population (millions)	Average population density (people/sq mile)	Inventoried roadless areas (acres)
Northeast	71.8 (26%)	299	493,000 (0.8%)
North Central	46.4 (17%)	113	191,000 (0.3%)
Southeast	41.7 (15%)	178	687,000 (1.2%)
South Central	47.5 (17%)	78	223,000 (0.4%)
Great Plains	5.8 (2%)	19	346,000 (0.6%)
Intermountain	17.7 (6%)	20	33,379,000 (57%)
Pacific Northwest	9.3 (3%)	56	3,980,000 (6.8%)
Pacific Southwest	33.8 (12%)	211	4,416,000 (7.5%)
Alaska	0.7 (<1%)	1	14,779,000 (25.2%)
Puerto Rico	3.8 (1%)	1,125	24,000 (0.04%)
Total	**278.5 (100%)**	**77**	**58,518,000 (100%)**

(USDC Bureau of the Census 2000; Roadless Database 2000)

areas, and land conversion in rural areas, causing some rural land to become reclassified as urban.

The percent change in urban population was greater between 1950 and 1970 than between 1970 and 1990. In the year 2000, 80% of the United States population is estimated to live in urban or suburban areas (USDA Forest Service 1999b). Urban growth has been most pronounced in Alaska, the Intermountain West, the Southeast, the South Central, and the Great Plains regions. The Bureau of the Census does not project future urban vs. rural population growth. However, if past trends continue, the percentage of the American population living in urban areas will keep growing. As urban centers expand in response to population growth and urbanization, surrounding private forestlands will come increasingly under pressure for conversion to more urban and developed uses (Cohen 1999).

Many large population centers in the west are already within an easy drive of many national forests and grasslands and large inventoried roadless areas. According to 1990 census data, 192 of the 555 cities in the United States having 50,000 people or more (slightly less than 35%) are within 60 miles of an inventoried roadless area (Figure 3). However, only 10% of the 2,827 inventoried roadless areas fall within this radius. These 192 cities contain approximately one-third of the nation's urban population. Thus, a small percentage of inventoried roadless areas are likely to receive a disproportionate level of use. Inventoried roadless areas that are closest to large urban populations occur in California, the Pacific Northwest, along the front range of the Rocky Mountains, near Phoenix, AZ and near Salt Lake City, UT.



(Roadless Database 2000)

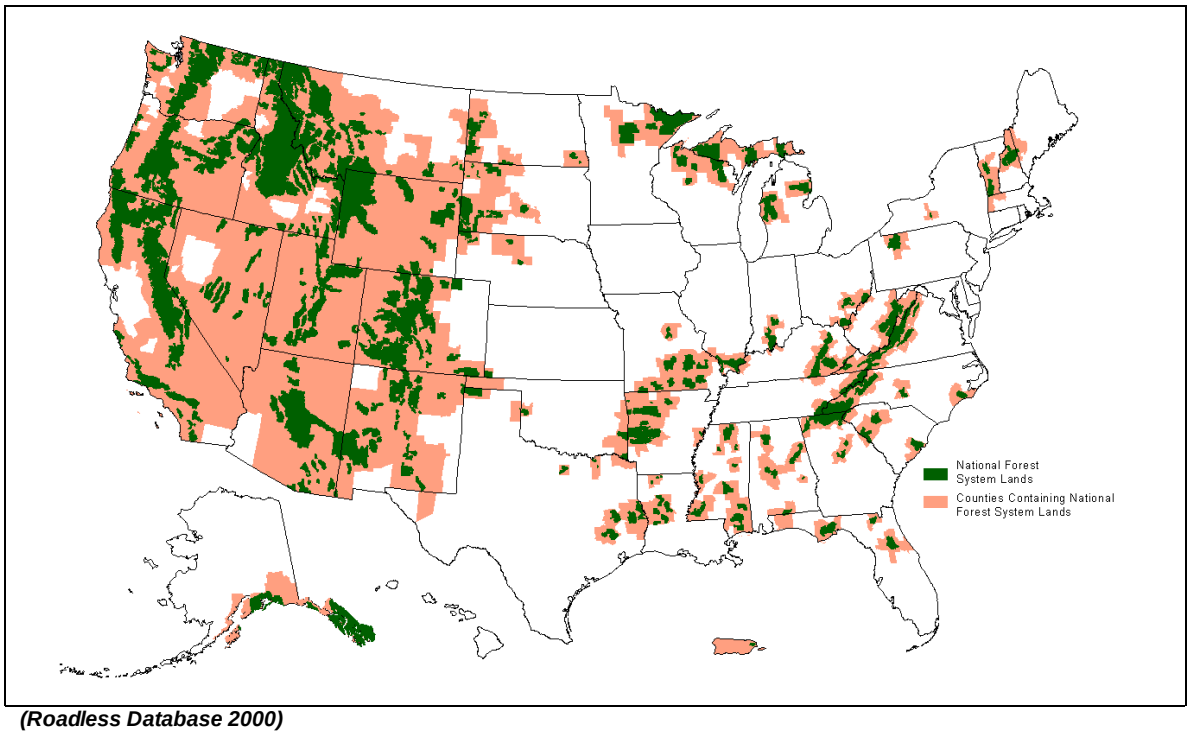
Figure 3. Cities With More Than 50,000 People Within 60 Miles of an Inventoried Roadless Area.

Although the percentage of rural populations has been declining overall, many rural Counties containing NFS lands have been increasing in population. This is particularly true in the West. Table 3 compares population increase in counties containing NFS lands with population increase in counties that do not contain NFS lands, by region. Approximately one-third of the total population increase that occurred in the United States between 1980 and 1999 occurred in Counties that contain NFS lands. This trend is expected to continue. One explanation for the large population increase in counties that contain NFS lands is the fact that most counties in the west contain NFS lands (Figure 4).

Table 3. Population Growth in National Forest System Counties by Region, 1980-1999.

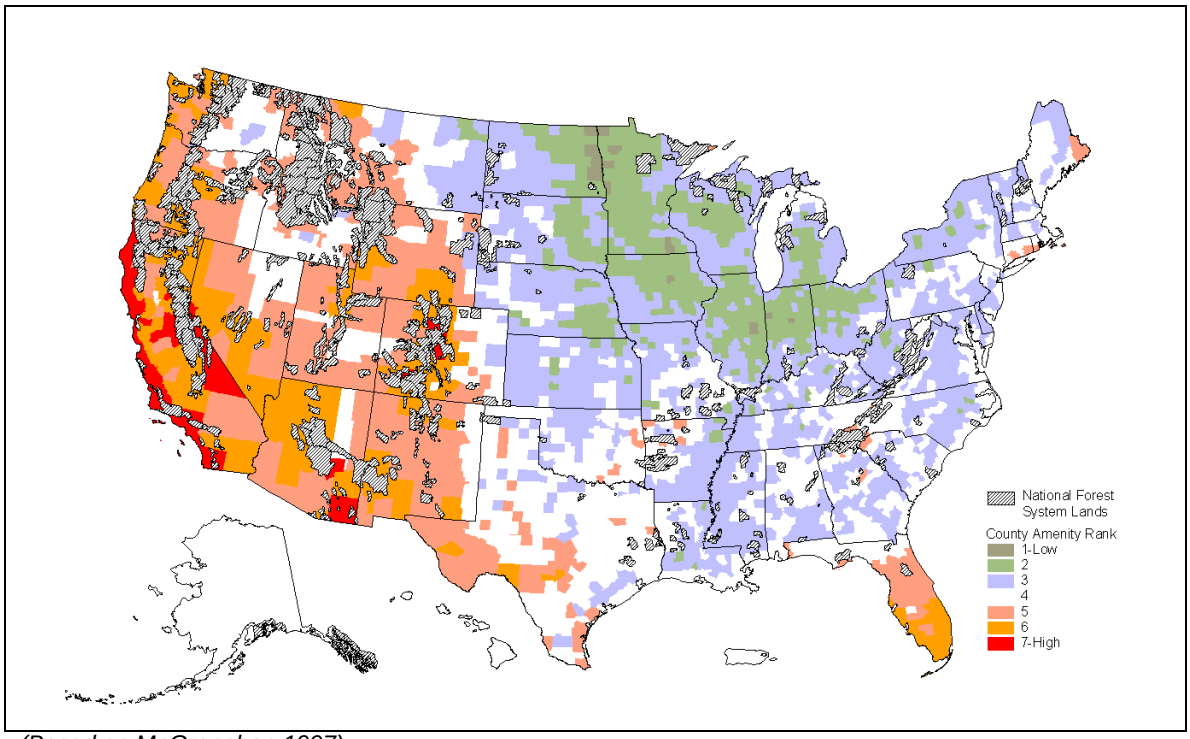
Region	Total Population in NFS Counties, 1980 Millions	Total Population in non-NFS Counties, 1980 Millions	Total Population in NFS Counties, 1999 Millions	Total Population in non-NFS Counties, 1999 Millions	Total Regional Growth in NFS Counties Percent
Northeast	1.9	65.4	2.0	69.4	1%
North Central	2.5	40.3	2.8	43.4	8%
Southeast	4.5	25.1	5.9	35.1	13%
South Central	5.2	33.3	5.9	41.0	9%
Great Plains	0.3	5.0	0.3	5.4	3%
Inter-mountain	9.3	2.1	14.4	2.7	90%
Pacific Northwest	5.5	1.3	7.3	1.9	76%
Pacific Southwest	16.4	7.3	23.2	9.7	72%
Alaska	0.3	0.1	0.4	0.2	61%
USA	45.8	179.8	62.2	208.8	35%

Rapid population growth in rural areas close to NFS lands is due in large part to the fact that these areas contain many natural amenities. Natural amenities are physical -- as opposed to social or economic -- attributes that enhance a location as a place to live (McGranahan 1999). McGranahan ranked rural counties in the contiguous 48 states in terms of their desirability as a place to live based on natural amenity criteria relating to climate, topography, and proximity to surface waters. The counties that contain national forests and grasslands had some of the highest natural amenity rankings in the country, particularly those in the west (Figure 5). Many of the counties having high amenity values doubled their population over the last 25 years. Population growth in these counties was linked, in many cases, to their appeal as retirement and recreation destinations.



(Roadless Database 2000)

Figure 4. U.S. Counties Containing National Forest system Lands.



(Based on McGranahan 1997)

Figure 5. National Forests in Relation to County Natural Amenity Rank

Over the last decade, urban residents of all ages have been moving to or building second homes in rural communities in the West that are high in natural amenities (McGranahan 1999; Thrush 1999). These migrants are seeking a better quality of life in a physically attractive environment. Three factors behind this trend are the retirement of baby boomers, technological advances that enable people to work remotely, and economic diversification in rural communities, meaning that jobs are increasingly available (Thrush 1999). This phenomenon is also taking place in the Northeast (Egan and Luloff 2000). These data suggest that NFS lands contribute to the desirability of the counties in which they are located, and that population in these counties will continue to grow rapidly in the future. New residents of these counties can be expected to place increasing demands on NFS lands for recreational and amenity values.

Meanwhile, as urban populations grow, forest, pasture, rangeland, and cropland continue to be converted to urban and developed areas, and rural infrastructure (such as roads, airports, and railways). Table 4 indicates the amount of non-Federal land that was developed between 1982 and 1997. An average of 3.2 million acres per year were developed between 1992 and 1997. In comparison, 1.4 million acres per year were developed between 1982 and 1992. The rate of land development between 1992 and 1997

Table 4. Amount of non-Federal land, in millions of acres developed between 1982 and 1997. [a]

Region	Total surface area [b]	Total non-Federal land 1997	1982	1987	1992	1997	1982 to 1997	Non-Federal developed land 1997 (%)
Northeast	159.3	147.7	14.3	15.5	16.6	20.3	6.0	13.7
North Central	267.1	247.6	14.9	15.8	16.6	18.7	3.8	7.6
Southeast	156.0	134.1	11.5	13.1	15.2	19.0	7.5	14.2
South Central	398.0	370.9	16.1	17.7	19.2	22.8	6.7	6.2
Great Plains	196.8	187.8	5.6	5.7	5.9	6.3	0.7	3.4
Intermountain	552.7	283.5	5.9	6.6	7.2	8.3	2.4	2.9
Pacific Northwest	106.2	60.6	2.6	2.7	3.0	3.5	0.9	5.8
Pacific Southwest	105.7	56.6	4.3	4.6	5.2	5.9	1.6	10.4
Total	**1,941.8**	**1,488.9**	**75.2**	**81.7**	**89.0**	**104.8**	**29.6**	**7.0**

(Natural Resources Inventory, Natural Resources Conservation Service)

a Data unavailable for Alaska or Puerto Rico.

b Excludes surface water.

was more than twice the rate in the previous decade, while the population growth rate remained constant. This rapid development expansion can be explained by the unprecedented growth of the United States economy that occurred in the 1990s.

As with population growth, land conversion from undeveloped to developed uses has not been distributed evenly across the United States. Figure 6 shows the geographic distribution of land development in the United States between 1982 and 1997. Most of this development has been concentrated in the Eastern United States. The Northeast, Southeast, and South Central regions have experienced the most rapid land development in the country. However, the Northeast, Southeast, and Pacific Southwest have undergone the highest percentage of change in land development. While the Southeast and South Central Regions are also undergoing relatively rapid population growth, land conversion trends do not necessarily correspond geographically to population growth trends.

Population growth, combined with economic growth, leads to increasing demands for natural resources. Economic growth has outpaced population growth in the last decade. Between 1970 and 1995, per capita disposable income grew by 50%, while population grew by 28% (Cinnamon and others 1999). As a result, there is more income to spend on goods and services. Disposable income and gross domestic product are both projected to increase more rapidly than population growth in the future.

The demand for goods and services continues to increase as population and income grow. The United States accounted for about one-third of total world materials consumption (by weight) in 1995, although the United States population accounts for only 5% of total world population. World consumption grew at nearly double the rate of United States consumption (Cinnamon and others 1999). In the future, the growing population will demand more goods that depend on natural resources such as timber, minerals, water, and other forest products. At the same time, demand for recreation, open space, scenic quality, clean air and water, and biological diversity is also increasing. These demands must be met from a finite land base.

Conversion of non-Federal undeveloped lands to developed uses reduces the non-Federal land base available to meet growing demands for forest and rangeland resources, amenity uses, and other values. These conversions have been concentrated in areas with a relatively small Federal land base (the Eastern half of the United States) and are increasing the importance of Federal lands in these areas.

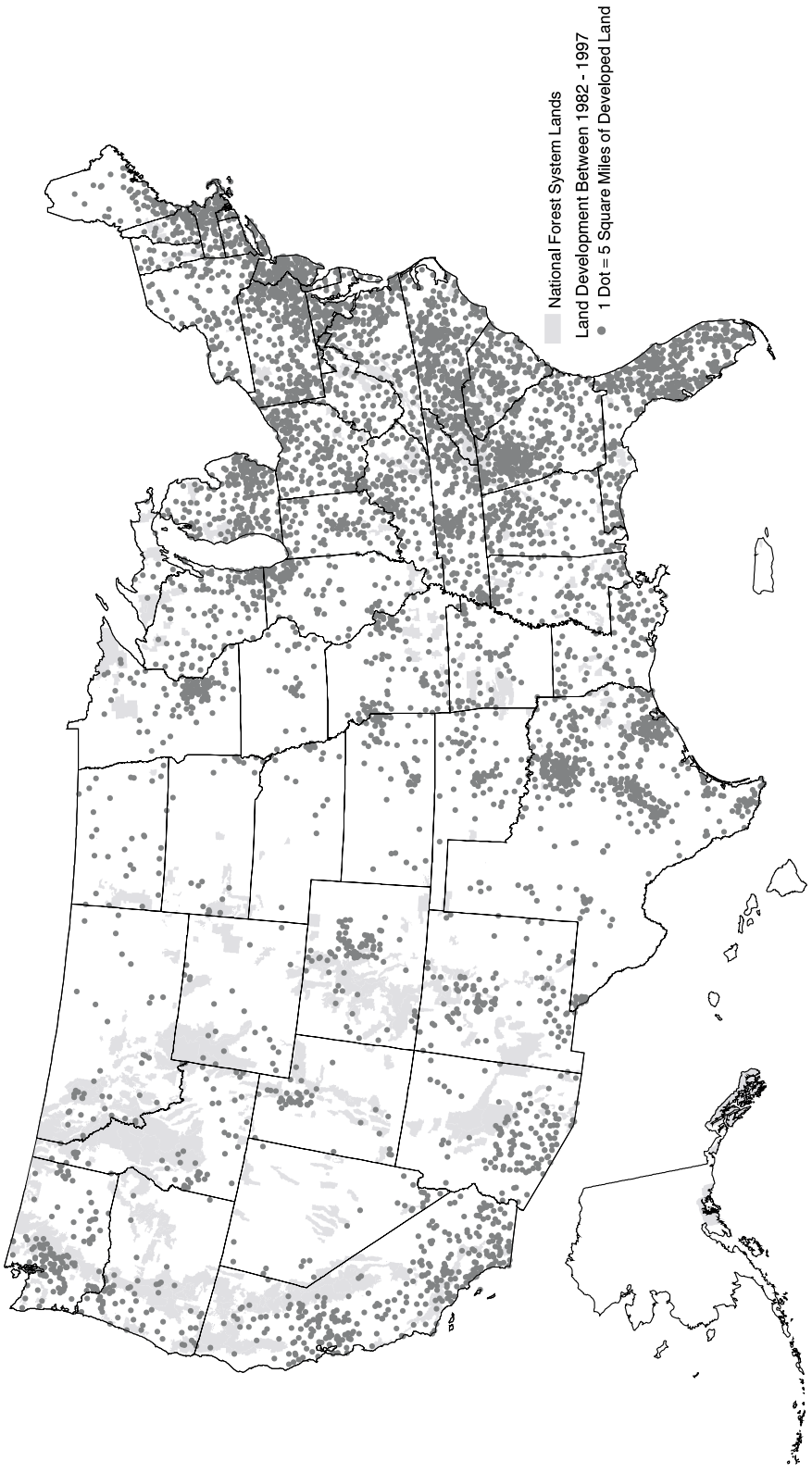


Figure 6. Geographic distribution of land development in the United States between 1982 and 1997. *(Source - Natural Resources Inventory, Natural Resources Conservation Service)*

At the same time that demands are increasing for most natural resources, some people do not want to see resources from public lands used for commodity purposes. The increasing value placed on the non-commodity benefits provided by NFS lands (such as recreation, ecosystem services, scenic quality, and wildlife habitat) are viewed by some as more important than commodity uses, which are often viewed as being harmful to other forest and rangeland values. This view is often strongly held for roadless areas. However, if resources are not obtained from NFS lands, they will be obtained from other ownerships in the United States or in other countries, since demand for these products continues to increase. If commodity production continues to decline on NFS lands, there will be displacement effects on non-NFS lands. These effects are addressed in the Timber Harvest and Energy and Non-energy Minerals sections of the Final Environmental Impact Statement.

Implications of Demographic Trends

Changes in the demographic composition of the U.S. population will affect demands on resources on NFS lands. For example, the growing percentage of senior citizens will likely demand developed recreational opportunities, amenities, and services associated with roads (Ewert 1999). Also, the growth in the population of ethnic minorities will likely result in increased demands for the kinds of uses preferred by them, such as the harvest of non-timber forest products, subsistence hunting and fishing, and developed recreation (Cinnamon and others 1999; USDA Forest Service 2000).

Population growth and the spatial distribution of the United States population are important variables that will affect the use and management of roadless areas. The Northeastern and Southeastern regions of the United States (Figure 1) have a high population density, a small amount of public land, and only about 2% of the inventoried roadless areas. These regions are also experiencing the highest rate of land conversion from rural to urban uses in the United States. As a result, one can expect high demand for the variety of benefits provided by roadless areas in the East, which are not readily available in alternate locations. Conversely, the Western States (including Alaska) have a relatively low population density (with the exception of California), a high percentage of public land, and 96.4% of the inventoried roadless areas. The supply of roadless areas in the West is high relative to the demand for the benefits they provide.

Urban population growth means that demand for recreation in forested areas close to cities will be increasing at the same time that land conversion adjacent to cities is increasing. Time and money are the two most limiting factors to outdoor recreation participation (Cordell and others 1999). Because local forests are close, accessible, and low cost, urban forests will see increasing use (Ewert 1999). The result is likely to be increasing pressure for both developed and primitive recreational opportunities on NFS lands close to urban areas.

Because the United States population is largely urban, urban values regarding forest use and management often predominate. Specifically, urban dwellers tend to prefer management of Federal lands for ecological, recreational, and spiritual and aesthetic values, rather than for the uses that are valued by rural people who engage in commodity production (i.e., logging, grazing, and mining) (Vaske and Donnelly 1999; Ewert 1999).

In rapidly growing rural areas, the immigration of exurbanites that bring urban environmental values with them is likely to cause tension with historic residents that depend on extractive industries for employment.

The expansion of urban areas into adjacent forested lands, combined with migration to rural areas containing NFS lands, leads to the spread of development around NFS boundaries. Increasing development at the wildland-urban interface can lead to high levels of congestion and high natural resource impacts on and around NFS lands (Ewert 1993). It also creates challenges for fire management, including increased risk of fires, increased threats to people and damage to structures, and growing challenges for fire protection (Chase 1993). People living at the wildland-urban interface also tend to value preservation and recreation as forest management priorities. High recreation impacts on NFS lands are particularly evident in this zone. As population numbers increase at the wildland-urban interface, there will be increasing demands on an increasingly limited and impacted resource.

Balancing Demands

One of the central questions that frame the debate over roadless area management is how commodity and non-commodity uses of these lands should be balanced. Since the earliest days of land management, the Forest Service has managed NFS lands according to the principle of multiple use. However, this management approach was not codified into law until 1960, with the passage of the Multiple-Use Sustained-Yield Act (Public Law 104-333). This Act specified that the national forests should be managed for a variety of purposes, including outdoor recreation, range, timber, watershed, and fish and wildlife (16 U.S.C. 528). Under the Act, the Forest Service was to manage resources to best meet the needs of the American public, with flexibility to respond to changing needs and conditions (Snow 1997).

The balance of multiple uses and the emphasis on commodity versus non-commodity uses on NFS lands has shifted over time in response to changing public values. There has been an evolution in the public's conception of the purpose of national forests in America over the last century. Whereas many people once valued national forests primarily as sources of commodities, such as timber, minerals, water, and rangeland, the majority now values them for their recreational, ecological, and scenic values (Hays 1998; Shands 1988).

Commodities produced from NFS lands provide benefits to society in a variety of products. These include lumber, minerals, beef, gasoline, heating oil, herbs, decorative boughs, and other greens. NFS lands also provide a variety of non-commodity benefits to society. Ecosystem services, recreation opportunities, and biodiversity protection are examples. While individuals recognize and enjoy a range of values associated with NFS lands, there is often disagreement over how the various uses should be managed.

Some people believe that commodity production is appropriate on NFS lands, and that it is not detrimental to protecting the non-commodity values associated with these lands. Many of these people appreciate both the commodity and non-commodity values of NFS

lands. They recognize humans as users of the land, trying to make use of natural resources on a sustained yield basis to meet their needs (Grumbine 1999). They view NFS lands as providing goods and services for people.

Commodity use was embodied in the "wise use" conservation vision espoused by Gifford Pinchot, founder of the Forest Service. Pinchot emphasized three principles of conservation: development (the use of natural resources for the benefit of people), prevention of waste, and the conviction that natural resources should be developed and conserved for the benefit of the greatest number of people (Cawley 1993). Pinchot believed that this conservation philosophy would bring about economic prosperity. The concept of sustained yield accompanies the commodity use orientation: maximize the stream of outputs of renewable resources to the extent possible, without compromising long-term resource productivity (Kennedy and others 1998). The belief that resources should be protected for future generations accompanies the sustained yield management philosophy.

Non-commodity values can be grouped into three general categories, following Bengston and others (1999): recreation values, ecological values, and spiritual and aesthetic values. Recreation values are associated with developed and primitive, motorized and non-motorized uses of the natural forests and grasslands. People who hold these values appreciate the recreational and tourism opportunities that NFS lands provide, and their associated social and personal benefits. People who hold ecological values view NFS lands as valuable because of the life-supporting environmental functions and services they provide. Spiritual and aesthetic values toward forests include the belief that NFS lands have intrinsic value, and a right to exist; that current generations have an obligation to pass on healthy wild lands to future generations; that forests have heritage and cultural values; that forests are sacred; that forests have spiritual value; and that they have scenic and aesthetic values. People also have personal emotional attachments to NFS lands, and value them for this reason (Bengston and others 1999). Most people share a mix of values and perspectives and do not fall into any one category. Again, many people believe that both commodity and non-commodity values can be accommodated on NFS lands. Others, however, view them as being mutually exclusive.

The following paragraphs report the results of surveys concerning the management of NFS lands that were conducted by academic researchers and people working for or on behalf of the Forest Service. An attempt was made to obtain surveys sponsored by interest groups having a stake in the management of NFS lands as well. However, this effort yielded few results. It was decided to report the findings of surveys conducted by academics and the Forest Service only under the assumption that these contain the most objective findings.

When done well, polls and surveys can provide valuable information on public attitudes, beliefs, and values regarding a variety of issues, including the management of public lands. However, polls and surveys may have shortcomings that can bias their results. What questions are asked, how they are asked, and whom they are asked to may be problematic. For example, the particular questions chosen for inclusion in a survey may introduce bias at the outset. These questions may be inappropriately worded, or they may not be the best questions to elicit the information desired. The way a question is asked

may encourage a specific response. Response options may be limited or biased. Some legitimate response options may not be included, forcing the respondent to choose an answer he or she is not fully comfortable with. Different people may interpret the wording of a question differently. The survey may have cultural biases inherent in it. The sample size or sampling frame may be inadequate. All of these potential limitations must be borne in mind when using poll and survey results.

Research, polls, and surveys indicate that the American public cares about ecologically sound management of NFS lands and in general supports multiple-use management of these lands. Most studies indicate that the majority of the American public places a higher priority on non-commodity uses than on commodity uses of public lands. Nevertheless, commodity uses are an important component of public land management to many members of the public.

In 1994, a random sample of the American public was questioned about their views concerning NFS lands management (Hammond 1994). This poll found that the over-riding concern of the public was that the Forest Service maintains healthy public forests and grasslands. The public also felt strongly that creating recreation opportunities on NFS lands was important, and that the Federal government should balance the wilderness and recreation uses of public land with logging, mining, and grazing. Respondents thought the Forest Service should increase regulation of commercial uses, and ensure that the long-term health of the forests is not sacrificed for short-term natural resource demands. They also believed that the consumer needs of the American public should not be satisfied at the expense of forest and grassland health. There was low support for the statement that natural resources on NFS lands should be made available for commodity production.

In 1991, Cramer and others (1993) conducted a survey of Forest Service line officers (forest supervisors and district rangers) that asked them to rank what they thought the priorities of the public were regarding the multiple-use management of NFS lands. Line officers perceived the public's priorities as follows, on a scale of 1 to 10 (with 10 being the highest priority): recreation - 9, wildlife habitat - 8.7, water - 7.6, timber - 4.8, grazing - 2.8.

Bengston and others (1999) have used content analysis of the news media to examine how frequently different forest values are expressed in news stories. This method hasbeen shown to produce results very similar to attitude surveys and opinion polls. These researchers found that during the 5-year period 1992 through 1996, non-commodity benefits and values of forests were expressed in news media stories 68% of the time nationwide, and commodity values were expressed 32% of the time. Of the non-commodity values, recreation benefits and values of forests were expressed most frequently, and increased in frequency over time from about 30% to 42%. Ecological benefits accounted for about 22% of the total and showed no trend over time. Spiritual and aesthetic forest values were expressed in news stores least often (about 10% of the time), increasing only slightly over time. Commodity values declined in frequency from about 38% to 23% during the 5-year period.

A social assessment conducted by the Forest Service for the Ozark-Ouachita Highlands in Missouri, Oklahoma, and Arkansas summarizes the findings of opinion surveys regarding public attitudes, values, and opinions towards land and resource management in that region (USDA Forest Service 1999d). The assessment found that most people believe forests should be managed for multiple uses, and to provide a range of goods, services, experiences, and values. They also believe that forest benefits should not come at the expense of long-term forest health and environmental quality. Some surveys found that 40% to 50% of respondents did not support timber cutting for commodity purposes on public lands. Timber harvest on public land for stewardship purposes, or with environmental protection measures accompanying it, was supported by as many as 70% of the respondents in other surveys. A study from Missouri found however that 40% to 50% of the population might be opposed to logging, regardless of how or where it occurs (USDA Forest Service 1999d).

A survey of environmental attitudes toward forests that administered to residents of the Southern Appalachian region as part of a Forest Service-sponsored social assessment found that 72.1% of those surveyed believed that there should be no more timber harvesting on national forests (Southern Appalachian Man and the Biosphere 1996). Furthermore, 72.5% of the respondents believed that land that provides critical habitat for plant and animal species should not be developed. Finally, 68.6% of the population believed that more land that is public should be set-aside as Wilderness.

In the Pacific Northwest, a study of forest values among the Oregon public found that the majority of people did not believe that Federal forests should be used primarily for the production of timber and wood products, or products that are useful to humans (Steel and others 1994). Research from this region reported in FEMAT (1993) indicated a consistent pattern of support for environmentally oriented management policies, and a consistent lack of majority support for commodity-based policies. However, people from this region are also concerned about protecting forest-dependent communities. An overview of surveys on environmental values conducted in the Western States indicated that most people in the West care about environmental protection and commodity production, in addition to developed recreational use on public lands, and believe that these uses can co-exist; they support multiple use (Nie 1999).

These studies indicate that there is a wide range of opinion on NFS land management, although the multiple-use concept is generally supported. Some individuals believe that commodity production is inappropriate on Federal lands in general, or in roadless areas specifically; others believe that management of NFS lands has over-emphasized non-commodity values. This chapter provides the relevant ecological, social, and economic information necessary for evaluating an analyzing the potential effects of protecting roadless areas of NFS lands.

Active and Passive Forest Management

Another question that is central to the debate over roadless area management is that of whether roadless areas should be managed at all. Road construction provides access to

NFS lands so that management activities to promote protection of forest health, fire prevention, habitat improvement, and ecosystem restoration can be carried out. Stewardship timber harvest might be an integral component of these strategies.

Some members of the public believe that the Forest Service should take a passive approach to land management; in other words, it should let nature manage itself, and not intervene. They believe that nature knows best. Some believe that even if "natural" and more sustainable conditions can be achieved through the active management of a disturbed forest in the short term, the forest will get to its natural condition on its own over the long term. People of this opinion believe that society should take the long view in this regard, and think beyond the human life span as their period of reference. People who support the passive management approach are likely to support a prohibition on road construction and timber harvest in roadless areas.

The passive management view is rooted in a belief that undisturbed nature is good. Historically, many ecologists believed that undisturbed nature would achieve balance, constancy, and stability and, that human beings interfere with and destroy this balance of nature (Botkin 1990). Today, most ecologists accept the view that nature is dynamic and changing. However, those who favor passive management assume that even if undisturbed nature changes, it will change for the best, achieving its natural and best state on its own. If nature is disturbed, it will return to a condition that represents its natural and ecologically desirable state once the disturbance is removed. Nature functions perfectly well without human intervention. This view requires that people have no preconceived notions about what they want nature to look like, and that they be willing to accept the outcome of passive management, no matter what happens (Botkin 1990).

Other members of the public believe that the Forest Service should actively manage NFS lands to maximize environmental health, and to promote the most desirable conditions of these lands. For example, some people argue that NFS lands are not in a natural state due to a century of aggressive fire suppression. The result is forests that are unnaturally dense, have a disproportionate number of small trees, and are insect and disease prone. Many of these people believe that roads are needed for conducting management activities and that sufficient scientific knowledge exists to achieve the intended management outcomes. They are concerned that a prohibition on road construction or timber harvest in roadless areas would make it impossible to undertake beneficial management activities, and are opposed to national level prohibitions on road construction and timber harvest for this reason.

The active management view is rooted in the belief that management might be necessary to achieve the outcomes we want (Botkin 1990). Tinkering with nature might enable us to improve upon it, or to return it to its natural state if it has been disturbed. Many people who support active management believe that there is no place on earth that is truly "wild" or "natural", independent of human influence, as people have been interacting with and changing the natural environment for millennia (Cronon 1996a; Botkin 1990). Therefore, active management is consistent with a human history of influence over environmental conditions. People should take an active role in conservation. Furthermore, resource harvest for utilitarian purposes might serve the interest of conservation, and the goals of resource utilization and conservation might be met through one active management

approach. Active management requires that people develop a vision of what state they want nature to be in, a desired future condition, that serves as their management goal (Botkin 1990).

The Forest Service has stated that its goals for roadless area management are to protect and enhance the characteristics of these areas, which are listed at the beginning of Chapter 3. The Forest Service recognizes that some management activity may be needed to achieve the most desirable ecological conditions in roadless areas. However, management activities can be achieved in the absence of roads.

One common goal of land management is to achieve environmental conditions that are "natural" and/or desirable to human beings. The question of what is natural and what is desirable is complex, provokes disagreement, and determines the goals of either an active or a passive management approach. Nature is always culturally constructed in this regard (Cronon 1996b). People must choose the kind of environment they want, which might be one that has been altered through management (Botkin 1990). One poll conducted for the Forest Service found that 75% of the respondents believed that human intervention is necessary to maintain the health of public lands (Hammond 1994).

Whether nature should be actively or passively managed is not necessarily an either/or question. For some areas, active management might be most appropriate; for others, a passive approach might be most desirable. When active management is favored, there are many tools to achieve it, and many do not require road construction, though costs might increase without it. Clearly, people have different views about what kind of natural environment they want to see maintained on public lands. These views shape their opinion of what management approach to take towards roadless areas, which in turn has implications for whether or not they support a prohibition on road construction and/or timber harvest in these areas.

HUNTING AND FISHING

Methodology

The impacts of the alternatives on hunting and fishing on NFS lands were analyzed on the basis of a literature review. The analysis was limited by the absence of any quantitative estimates of the effects of the alternatives on fish and game species populations on NFS lands, and in the absence of quantitative data on hunting and fishing participation and harvest levels for inventoried roadless areas of NFS lands. As a result, the effects analysis is qualitative.

Affected Environment

Recreational, subsistence, Tribal treaty rights, and commercial hunting and fishing occur on and around NFS lands throughout the United States. Hunting and fishing on NFS lands are regulated by individual States, although the Forest Service can close areas for public health and safety purposes or to protect certain species. As human populations increase and land conversion from rural to urban uses continues on private lands surrounding NFS lands, public and private lands that contain open space will become increasingly important as places that provide quality hunting and fishing opportunities. In addition, fishing and hunting activities on NFS lands provide national, State, and household economies with important sources of jobs, income, food, and other benefits. Inventoried roadless areas provide important habitat for fish and game species, and management of these areas has direct consequences for hunting and fishing.

Recreational Fishing

Recreational fishing takes place on NFS lands throughout the United States. 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% and participation days of fishing increasing 27% by 2050. The largest increases are expected to occur in the Rocky Mountains (Bowker and others 1999). This growth in participation will result from population growth. The percentage of the total United States population that is participating in recreational fishing is actually declining (Loftus and Flather 2000).

In 1996, the year for which the most recent data are available, 29.7 million U.S. residents aged 16 or over participated in freshwater fishing, for a total of 515 million fishing days and 420 million trips (USDI Fish and Wildlife Service and USDC Bureau of the Census 1997). Freshwater anglers spent $24.5 billion on equipment and fishing trips in 1996. Approximately 9% (47 million) of the total United States freshwater fishing participation days in 1996 occurred on NFS lands, mostly on inland waters (Loftus and Flather 2000; Maharaj and Carpenter 1999; USDI Fish and Wildlife Service and USDC Bureau of the Census 1997). Of the total national expenditures on recreational fishing, about 12% ($2.9 billion) were associated with activities on NFS lands.

Table 5 compares freshwater fishing participation nationwide and on NFS lands during 1991 and 1996. Although the number of days and expenditures increased over that time period, the number of freshwater fishing participants remained relatively constant. Consistent with national trends, the number of days fishing and expenditures for recreational freshwater fishing on NFS lands also increased. The percentage of recreational freshwater fishing that took place on NFS lands during 1991 and 1996 remained fairly constant. Expenditures relating to fishing on NFS lands also remained about the same in both years.

Table 5. Participation in Recreational Freshwater Fishing Nationwide and on NFS Lands, 1991 and 1996. [1]

Activity	Nationwide, 1991	On NFS Lands, 1991	Nationwide, 1996	On NFS Lands, 1996
Number of Fishing Days	440 million	37 million	515 million	47 million
Total expenditures	$13.4 billion	$1.8 billion	$24.5 billion	$2.9 billion

Between 1991 and 1996, the total number of freshwater fishing days that took place on NFS lands increased by 26% (Maharaj and Carpenter 1999). This increase occurred in all NFS Regions with the exception of Region 1, where participation declined 4.4%. The greatest number of participation days took place in Region 9, reflecting the large number of anglers in the region and the abundance of fishing opportunities. The lowest number of freshwater fishing participation days occurred in Region 10, primarily reflecting low population density in Alaska.

Demand for all types of recreational fishing (warm water, freshwater, and salt water) is expected to increase in the future. Recent estimates project that the number of participants will increase by 36% by 2050, while days of fishing will increase 27%. The largest increases are expected to occur in the Rocky Mountain region (Bowker and others 1999). Demand for coldwater fishing is likely to increase more rapidly than fishing in general, a type of fishing experience often found on NFS lands. Earlier projections indicated that demand for coldwater fishing could double between 1989 and 2040 (Flather and Hoekstra 1989).

Although demand for freshwater fishing is predicted to increase in the future, the supply of desirable native and nonnative fish will be affected by human-induced aquatic habitat degradation and competition with undesirable nonnative species (Flather and Hoekstra 1989). Adequate data do not exist for most fish species for assessing population trends. Insufficient aquatic resource information for NFS lands makes it difficult to determine whether the supply of angling opportunities is meeting demand (Loftus and Flather

[1] National figures are drawn from USDI Fish & Wildlife Service and USDC Bureau of the Census 1993 and 1997; NFS figures are taken from Maharaj & Carpenter 1999. Expenditures shown in 1996 dollars.

2000). It is expected that a gap between the supply of and demand for fishing opportunities will develop, increase over time, and be particularly large for coldwater fishing (Flather and Hoekstra 1989). This implies an increased density of use and decreasing catch rates, which may degrade the quality of the recreational fishing experience for some participants and put further pressure on fish populations. However, research indicates that time, interest level, and family and work obligations are the most common limiting factors on fishing participation (Loftus and Flather 2000). While crowding and competing uses of water resources are also factors, the condition of aquatic resources does not currently appear to be limiting fishing participation (Loftus and Flather 2000).

Commercial Fishing

In 1986, some 239,000 people engaged in commercial fishing nationwide, harvesting roughly 6 billion pounds of fish worth $2.8 billion (Flather and Hoekstra 1989). Commercial fishing activity is influenced by the availability of fish stocks and the demand for fish consumption. 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). Commercial fishing in the United States supports more than 30,000 full time jobs (Loftus and Flather 2000).

NFS lands support commercial anadromous fisheries based on fish species that spawn in rivers and streams. The most important commercial fish species supported by NFS lands are salmon and steelhead trout, which occur primarily in Alaska and the Pacific Northwest (including northern California). Federal lands in these three States support 259 of the 314 anadromous fish stocks at risk (FEMAT 1993). In 1998, almost 19 million lbs. of salmon were landed offshore of the Pacific Coast States (Washington, Oregon, and California), having a value of $15.3 million dollars (USDC National Marine Fisheries 2000). In 1994, 284 million lbs. 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). However, reduced Pacific salmon stocks have caused a substantial reduction in commercial fishing opportunities in the Pacific Northwest (Loftus and Flather 2000).

Recreational Hunting

Recreational hunting is another socially valued and economically important activity in the United States, though not as many people participate compared with fishing. In 1996, 14 million U.S. residents aged 16 or over went hunting, for a total of 257 million participation days, and 223 million trips (USDI Fish and Wildlife Service and USDC Bureau of the Census 1997). Approximately half of these trips were to hunt big game. Another 28 percent were trips taken to hunt small game. Twelve percent of the trips taken were for migratory bird hunting, and the remaining 10 percent were directed at other animals. Hunters spent a total of $20.6 billion on trips and equipment during 1996.

Table 6 compares hunting participation days and expenditures nationwide with hunting participation days and expenditures on NFS lands. Overall, the number of hunting

participation days on NFS lands increased by 25% between 1991 and 1996 (Maharaj and Carpenter 1999). Hunting on NFS lands represented 9 percent of the national total in 1991, and 11 percent of the national total in 1996. Expenditures associated with hunting on NFS lands increased 89% between 1991 and 1996. Hunting on NFS lands generated about 10% of the total national expenditures in both 1991 and 1996.

Table 6. Participation in Recreational Hunting Nationwide and on NFS Lands, 1991 and 1996. [2]

Activity	Nationwide, 1991	On NFS Lands, 1991	Nationwide, 1996	On NFS Lands, 1996
Number of Participation Days	236 million	22 million	257 million	28 million
Total expenditures	$10.9 billion	$1.1 billion	$20.6 billion	$2.1 billion

The increase in recreational hunting activity on NFS lands occurred in all regions except Region 1, where it declined 10.6% between 1991 and 1996 (Maharaj and Carpenter 1999). Region 9 received the most recreational hunting in 1996, followed by Region 8. The lowest amount of hunting participation occurred in Regions 3 and 10. The greatest amount of hunting participation occurs in the eastern U.S., where NFS lands make up a small portion of the land base. Hunting in the eastern U.S. occurs primarily on private land.

Hunting trends appear to be mixed. Recent trends reflect an overall increase in hunting participation days (Maharaj and Carpenter 1999). Big game hunting has been increasing since the 1960s, and it is predicted to continue to increase on NFS lands through 2040 (Flather and Hoekstra 1989). NFS lands provide much of the big game habitat in the West. Migratory bird hunting had been declining, but increased slightly between 1991 and 1996 (USDI Fish and Wildlife Service and USDC Bureau of the Census 1993, 1997). Most migratory bird hunting occurs near wetland habitats, where waterfowl occur. In general, big game populations have increased substantially nationwide since 1975 (Flather and others 1999). Duck, geese, and swan populations are also on the rise (Flather and others 1999).

In contrast, small game hunting has been declining, and it is predicted to continue to decline through 2040 (Flather and Hoekstra 1989). The decrease is due in part to declining populations of some small game species, reduced access to hunting areas on private lands, and declining numbers of rural residents (Flather and others 1999). Small game populations associated with rangeland and agricultural habitats have been declining, while those associated with forest habitats have shown mixed trends throughout the country (USDA Forest Service 2000). The overall number of hunters is

[2] National figures are drawn from USDI Fish and Wildlife Service and USDC Bureau of the Census 1993 and 1997; NFS figures are taken from Maharaj and Carpenter 1999. Expenditure data shown in 1996 dollars.

projected to decline about 11% by 2050, although the number of days should remain stable (Bowker and others 1999).

Game species that adapt well to human activity or that are highly valued and therefore carefully managed are expected to continue to do well in the future (USDA Forest Service 2000). Game species that require large, undeveloped landscapes or special habitats that are vulnerable to development pressure may not do as well (USDA Forest Service 2000). Although hunting activity is expected to increase on NFS lands in the future, the greatest amount of hunting participation takes place in the Eastern United States and occurs on private land (Maharaj and Carpenter 1999).

Subsistence Hunting and Fishing [3]

The majority of subsistence hunting and fishing on NFS lands occurs in Alaska. Localized activity occurs in the contiguous United States where American Indian populations are concentrated, such as the Pacific Northwest, California, the Southwest, and the Rocky Mountains. 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, rural Alaskan residents have 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).

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 lbs. of usable weight annually (Alaska Department of Fish and Game 1998). This total represents 375 lbs. per person per year for rural residents and 22 lbs. per person per year for urban residents. Sixty-two percent of this total is comprised of fish, 36% is comprised 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 substantial economic importance, with a replacement value of $131.1 to $218.6 million annually.[4] In addition, subsistence hunting and fishing play a central role in the culture, traditions, and social fabric of many cultural groups in Alaska. The Alaska case illustrates the importance of subsistence hunting and fishing to those who participate in it. Inventoried roadless areas may support limited and localized subsistence hunting and fishing activity, especially in Alaska.

[3] 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 1997).

[4] Replacement value = the amount of money that would have to be spent to buy food substitutes.

Treaty Hunting and Fishing

Off-reservation hunting and fishing rights vary depending on treaty language, subsequent legislation, and court decisions. Some Tribes believe that the Federal government is obligated to manage wildlife and fish habitats to protect the Tribes' treaty rights. In some treaties in the Pacific Northwest, the Federal government is obligated to protect the Tribes' rights to access "usual and accustomed grounds and stations" (where those grounds and stations are on Federal lands).

Public Comment

Many members of the public who commented on hunting and fishing during the scoping period for the Notice of Intent and on the DEIS supported a prohibition on road construction and reconstruction in inventoried roadless areas (Content Analysis Enterprise Team 2000a,b). Some people perceive that hunting success always decreases because of additional roads. Others feel that the quality of the hunting experience is greater in roadless areas than in roaded areas. Still others enjoy the outdoor experience they have when hunting or fishing in an undisturbed natural setting. One person noted that roads increase hunting pressure on wildlife species and are therefore undesirable. Some respondents believe that logging destroys wildlife habitat and leads to reduced hunting success. Some people believe that game species leave roaded areas due to increased traffic.

Some respondents commented that although inventoried roadless areas are generally positive for wildlife, there are certain species that depend on the edge effect of roads. Some stated that certain timber harvesting practices are essential, as they create forage for some game species. Additional comments were received that expressed concern over the fact that clearings, which had been created by fires or timber harvesting, were disappearing and that multiple levels of forests or a mosaic were needed to provide habitat for all wildlife species, including game species. There was also concern that a decline in revenue and wildlife conservation dollars would occur if hunting becomes more difficult because of poor access, and forests become too dense to support deer and other wildlife.

Other commentators believe that hunting and fishing should be prohibited in inventoried roadless areas to protect fish and game species. These respondents believe roadless areas provide habitat with a high level of ecological integrity and should be protected to conserve and enhance species populations. Many other commentators noted the importance of maintaining healthy ecosystems to support the commercial fishing industry and tourism, which is based on recreational hunting and fishing.

Tribes expressed different viewpoints about whether road construction in inventoried roadless areas would be desirable with regard to subsistence hunting and fishing. In some locations, they do not support a prohibition on road construction and reconstruction. They desire improved access to existing hunting and fishing locations. In other locations, Tribal members expressed the view that road construction was a major cause of

ecological degradation. These respondents support a prohibition on road construction, believing it would protect subsistence and treaty rights resources.

In December 1999, the Theodore Roosevelt Conservation Alliance surveyed 600 hunters and anglers to solicit their opinions regarding road management in existing inventoried roadless areas of NFS lands (Theodore Roosevelt Conservation Alliance 1999). Eighty-six percent of the anglers and 83% of the hunters surveyed supported a policy to prevent future road construction in inventoried roadless areas. These hunters and anglers highly value many attributes of NFS lands, including the habitat they provide for endangered species, the protection of water quality, the opportunity to experience solitude and nature, and the hunting and fishing opportunities in remote places having few roads and people.

Hunting, Fishing, Roads, and Timber Harvest

Roads provide hunters and anglers with increased roaded access to hunting and fishing sites on NFS lands, including sites located within inventoried roadless areas. In light of projected increases in hunting and fishing activity on NFS lands, road construction in inventoried roadless areas could redistribute use from more crowded sites near currently roaded areas to less crowded sites in inventoried roadless areas, decreasing overall user density in the short-term. However, this redistribution would depend on a number of factors including access management strategies, State fish and game regulations and strategies, and whether the new roads would lead to areas with high fish and game population densities that would draw hunters and anglers to them.

To the extent that new roads increase access to hunting and fishing sites, they could also introduce more hunters and anglers to both roaded and roadless areas, causing increased crowding. This could increase the potential for conflict within and between user groups. Road construction in inventoried roadless areas would reduce the area available for primitive, dispersed hunting and fishing opportunities.

Additional roaded access to inventoried roadless areas would make it easier to conduct some fish and wildlife management activities. Roads also provide easier access for habitat restoration and enhancement projects. In some instances, where access is provided to fishing and hunting areas, associated law enforcement activities would also be facilitated, helping to manage species populations.

The Aquatic Animal Habitat and Species section of the FEIS indicates that road construction, maintenance, use, and the presence of roads can adversely affect aquatic systems and the species they support. Timber harvest can also adversely affect aquatic habitat, although stewardship timber harvest may potentially provide some beneficial effects to some species. Some of the resultant effects to fish species include loss of spawning and rearing habitat, increased mortality of eggs, increased mortality and reproductive failure, barriers to fish passage, higher vulnerability to disease and predation, greater likelihood of nonnative species introductions, and increased susceptibility to over harvest.

Because of this potential for adverse effects to fish species, road construction and timber harvest also have potential adverse effects to recreational, commercial, treaty rights, and subsistence fishing because they could cause declines in the populations of desirable fish species. For example, roads have been linked to the decline of salmonid populations in the Pacific Northwest, which are important to all fisheries in this region. If fishing success rates decline, the quality of the recreational fishing experience could also decline. However, this would likely be a long-term rather than short-term effect to recreational fishing because the condition of the fishery is not currently a limiting factor on fishing participation for most recreational anglers (Loftus and Flather 2000). Reduced catches could have important short- and long-term effects on subsistence and treaty rights fishing. A reduction in per capita harvests and consumption could negatively affect the health, economy, and culture of American Indians and Alaska Natives, in particular. Declines in anadromous fish populations dependent on NFS lands could also reduce the allowable catch by commercial anglers, having negative economic consequences, and potentially threatening livelihoods.

The Terrestrial Animal Habitat and Species section of the FEIS indicates that road construction and timber harvest can have mixed habitat-related effects on game species populations. Game populations are significantly influenced by changes in their habitat. For example, elk and bighorn sheep can exhibit strong road avoidance in some areas. Inventoried roadless areas provide the large, high quality core habitat required by game species such as elk and black bear. Road construction and timber harvest cause habitat fragmentation and disturbance that can be detrimental to these species. When timber harvest activities and road densities are poorly planned and managed, habitat quality or habitat loss can be negatively affected. However, timber harvest activity that results in the creation of a mix of habitats and a variety of age classes is generally beneficial to most game species. Deer and elk populations, for example, can benefit from improved forage conditions created by some timber harvest activities.

The impacts of road construction and timber harvest on habitat change, and consequently on the game species associated with those habitats, will depend on species needs, and the extent, duration, timing, and intensity of timber harvest and road construction activity. Thus it is difficult to generalize about the effects of road construction and timber harvest on species population trends, and their associated impact on hunting success rates. For game species that benefit from the habitat pattern changes associated with timber harvest and associated roads, encounter rates and hunting success rates could potentially increase, heightening the quality of the recreational hunting experience. For species that are disturbed or displaced by these ground-disturbing activities, encounter rates could decline, potentially reducing hunting success rates and the quality of the recreational hunting experience. Increases in hunting success would be beneficial for subsistence and treaty rights hunters. Declines in hunting success would decrease per capita game harvests by subsistence and treaty rights hunters, with negative consequences for the health, economy, and culture of American Indians and Alaska Natives in particular.

By providing additional access for hunters, roads facilitate the illegal poaching of many big game species such as caribou, pronghorn, mountain goat, bighorn sheep, deer, and elk. In addition, roads increase the incidence of species mortality from road kills.

The Tongass National Forest

Recreational Hunting and Fishing

Recreational hunting and fishing represent a large proportion of the total recreational activity that takes place on the Tongass (USDA Forest Service 1997). Trout, steelhead, and salmon are the most important recreational fish species. Sport fishing user days increased from 60,000 in 1979 to nearly 150,000 in 1994, reflecting a strong upward trend in participation. Nonresident fishermen have generated much of this growth. Sitka black-tailed deer and brown bear are popular game species on the Tongass. Recreation visitor days for hunting increased from roughly 75,000 in 1984 to 120,000 by 1995, another substantial increasing trend in participation.

Hunting and fishing tend to be highly valued in Alaska because of the pristine environments and high quality recreational experiences found there. Alaska's low population density combined with the high travel costs of visiting the state result in a low user density relative to fishing and hunting locations in the lower 48 states. The Tongass land management plan ensures that these opportunities will remain available.

The Effects of the Tongass National Forest Alternatives section of the FEIS states that many important subsistence, commercial, and recreational fish and game species on the Tongass are integrally linked to the habitat qualities provided by unroaded areas on the Forest, including the ecological integrity of old-growth and riparian habitats. These species include Sitka black-tailed deer, marten, wolf, brown bear, and salmon. Road construction and reconstruction and timber harvest are likely to result in habitat loss and fragmentation, threatening species viability; 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, commercial, and subsistence hunting and fishing.

Subsistence

Deer comprise the vast majority of the meat harvested by subsistence hunters on the Tongass, and salmon species comprise a substantial portion of the subsistence fishing catch (Turek and others 1998). Any reduction in the populations of these species 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. It could also escalate conflicts over resource access and use between subsistence hunters and fishers, recreational hunters and fishers, and commercial fishermen.

Road building has additional impacts on subsistence hunting and fishing. One study on the relationship between roads and subsistence in Alaska found a significant association between the presence of roads and reduced subsistence productivity (Wolfe and Walker 1987). This study found that subsistence harvests in rural communities located along road networks or marine highway systems were 69% lower than those of communities

located off the road network. Reduced harvests are associated with new settlement that takes place along roads. Some migrants who moved to southeast Alaska to take advantage of timber employment have settled along roads built for harvesting timber, and now engage in hunting and fishing around these settlements. Roads built in rural areas also draw urban residents who use them to gain access to new areas for recreational hunting and fishing. For example, residents of Ketchikan utilize timber roads built on Prince of Wales Island on the Tongass for deer hunting. Reduced subsistence harvests in rural communities stem from increased competition for fish and game with new residents and non-local recreational users (Ellanna and Sherrod 1987, Turek and others 1998).

Road construction for timber harvest on the Tongass has also caused a shift in traditional subsistence patterns in surrounding Native communities (Ellanna and Sherrod 1987, Turek and others 1998). What was traditionally a marine-oriented subsistence economy based on fishing and hunting along beaches from boats, has shifted to a more land-based subsistence economy. Many Alaska Natives now use cars or trucks to hunt deer from roads.

Commercial Fishing

The seafood industry – comprised of commercial fishing and seafood processing – was the largest private industry in southeast Alaska in 1994, having an average of 3,500 employees (USDA Forest Service 1997). Commercial salmon fishing comprises the majority of Southeast Alaska's fishing industry. Eighty percent of the salmon in Southeast Alaska are estimated to originate on the Tongass National Forest, meaning 80% of the commercial salmon fishing industry in Southeast Alaska is also dependent on Tongass salmon (USDA Forest Service 1997). Since 60% of all seafood processed is salmon, 48% of the seafood processing employment in Southeast Alaska depends on Tongass salmon. Any management actions that affect salmon species on the Tongass are likely to have an impact on the commercial fishery of southeast Alaska.

LIVESTOCK GRAZING

Methodology

The effects of the alternatives on livestock grazing were assessed on the basis of a literature review. Data on the number of grazing allotments located within inventoried roadless areas of NFS lands, and on the number of livestock grazed in inventoried roadless areas, were not readily available. Thus the analysis is qualitative in nature.

Affected Environment

Forest and rangelands in the United States provide forage and browse for more than 100 million cattle and 8 million sheep (USDA Forest Service 2000; Joyce 1989). About 20% of all beef cattle and 50% of all sheep in the United States are located in 11 Western States (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) (Council for Agricultural Science and Technology 1996; Field 1990). About half of these beef cattle and sheep rely on land managed by the Forest Service and the Bureau of Land Management for grazing (Harris and others 1996). Some 80% to 85% of all Federal lands in the West are grazed by livestock (Harris and others 1996, Council for Agricultural Science and Technology 1996). Although only a small percentage of the national forage supply for livestock is produced on public lands, some Western livestock operations are highly dependent on Federal-land grazing because a high percentage of rural land in the West is publicly owned.

In 1998, about 92 million acres of NFS lands were in grazing allotments, 84 million of which were actively in use. Some 2,114,000 cattle and sheep grazed on NFS grazing allotments in 1998 (Herman, personal communication). On NFS 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 permittees using NFS lands, as compared with 9,126 in 1990 (see Table 7). Approximately 81% of Forest Service permittees run small- to medium-sized family ranch operations specializing in beef cattle production (Council for Agricultural Science and Technology 1996). Cow-calf and cow-calf-yearling operations are the most common of these. Although the number of permittees has decreased over the last decade, this trend is affected more by the consolidation of permits than by declining use.

Table 7. Trend in Number of Grazing Permittees and Authorized Use on National Forests and Grasslands, 1990-1998

Year	Number of permittees	Authorized Use (000s AUMs)
1990	9126	8107
1991	9692	7429
1992	9510	7718
1993	9940	8695*
1994	9019	8095
1995	9011	8095
1996	8588	7559
1997	8536	7745
1998	8395	7835

Source: USDA Forest Service, Range Management Staff
AUM is an animal unit month
*Authorized use in 1993 was measured in head months instead of AUMs

Although the per capita consumption of beef and veal has been and should continue declining, total demand for beef is expected to increase due to population growth. The annual increase in demand through the year 2020 is expected to be less than 0.5% (USDA Forest Service 2000). Livestock grazing on public and private forest and rangelands is expected to decline, especially in the West (Van Tassell and others 1999). The Forest Service projected a decline in grazing on NFS lands in the West by 2030 (Council for Agricultural Science and Technology 1996). This decline is expected to result from changing land management policies that respond to public demands for other uses such as recreation and the protection of wildlife and habitat. The supply of private grazing land will also decline due to the conversion of rural land to urban uses, and the sub-division and development of private ranches. Nevertheless, forage production on private lands is expected to compensate for the loss of public land grazing through increased production made possible by range improvement.

Ranching is a way of life that is deeply rooted in the West. One survey of Western ranchers found that individual ranchers had spent an average of 31 years on the same ranch, and had come from families that had ranched for an average of 78 years (Fowler and others 1994). Despite the fact that ranch families generally depend on a combination of farm and non-farm employment to remain economically viable, preserving the ranching lifestyle is important to many. Ranchers often value the rural way of life, having an agricultural occupation, feeling close to the natural world, their independence, and other associated social and psychological benefits of their occupation (Ruyle and others 2000). American Indians in the Southwest depend on livestock for their subsistence and market values, ceremonial and ritual purposes, crafts, gifts and exchanges, and for raising and educating children (Brugge and Gerow 2000). Ranching also plays an important role in the social and cultural systems of Hispanic communities in the Southwest (Raish 1996; Raish in press). Because of the dependency of some Western ranchers on Federal grazing allotments, Forest Service lands can play an important part in maintaining the society and culture of ranchers in the West.

Western American Indian Tribes have treaties that provide for pasturing animals on off-reservation land. The allocation of grazing permits on NFS lands depends on the treaty language. The Regional Forester may authorize treaty-based grazing under a Memorandum of Understanding. Tribal governments are exempt from the Forest Service policy against issuing term grazing permits to governments. Treaty grazing permits are free of charge.

Public Comment

Public comments received in response to the Notice of Intent and the review of the Draft Environmental Impact Statement expressed a variety of viewpoints regarding grazing in and near inventoried roadless areas (Content Analysis Enterprise Team 2000a,b). Some individuals stated that grazing is one of the multiple uses that is appropriate on NFS lands, and should be continued. Several people wanted current roaded access to allotments protected so that permittees could engage in range management activities and infrastructure maintenance. Others pointed out 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 NFS lands.

In contrast, other people believe that grazing is environmentally destructive, and that it undermines the ecological integrity of inventoried roadless areas. They believe, therefore, that it should be eliminated, 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 inventoried roadless areas. Some people believe that no new roads should be built to accommodate grazing on NFS lands in the future. Several sets of comments underscored the point that livestock are grazed on Federal lands for lower than market value, and want to see this issue addressed.

Roads, Timber Harvest, and Grazing

Roads provide ranchers with motorized access to their allotments, which is important for transporting livestock and for maintaining fences and water developments. Allotments located in roadless areas are usually reached on horseback or by OHV. The roads used by ranchers are usually constructed for other purposes; seldom are roads built on NFS lands for the primary purpose of providing access to grazing allotments.

NFS roads have both positive and negative effects on range forage quality. Because roads have largely replaced stock driveways as the means of getting livestock to grazing allotments, driveways that were historically used for moving livestock have dramatically improved in health (Gucinski and Furniss 2000). However, roads also introduce unpalatable, nonnative, invasive plant species that reduce overall forage quality.

Timber harvest activities, like fires, often increase the forage supply for livestock by opening the forest canopy and increasing the production of understory vegetation. These increases are temporary, lasting up to 10 to 20 years (Council for Agricultural Science

and Technology 1996). This effect is particularly evident in habitats dominated by ponderosa pine, which are widespread on NFS lands (Daryl Herman, personal communication).

NON-TIMBER FOREST PRODUCTS

Methodology

The analysis of the impacts of the Roadless Area Conservation Rule on non-timber forest products is based on a literature review. This section of the specialist report provides additional background material on non-timber forest products that supplements the affected environment section of the FEIS.

Affected Environment

There are five broad categories of non-timber forest products: 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). Woody materials, such as firewood, poles, and boughs, are included in this discussion because they, too, are commonly used non-timber forest products. Data on the distribution and abundance of non-timber forest products, and on their biology, ecology, and productivity are inadequate (Molina and others 1997; von Hagen and Fight 1999). They are gathered on both private and public lands. Public lands in the Pacific Northwest are believed to be the most heavily used public lands in the country for the harvest of floral greens and botanicals (Molina and others 1997). The role of NFS lands as a source for non-timber forest products varies regionally, but is particularly important in the Pacific Northwest and in the northern Rocky Mountains (Weigand Personal communication).

Non-timber forest products have three main kinds of social value: 1) livelihood (both market and non-market), 2) cultural, and 3) recreational (Emery 1999). For example, in parts of California and in the Southwest, many rural Hispanic communities depend on gathering firewood from NFS lands for both cooking and heating (Raish in press). In Southern California, Asian Americans gather bracken ferns on NFS lands for food, basket-making, dyes, astringents, soaps, medicine, and other uses that are important to their cultural traditions (Chavez and Gill 1999). Many recreational users, such as amateur mushroom collectors, also gather non-timber forest products (Fine 1998). The size, structure, and dynamics of the non-timber forest products sector remain poorly understood (Jones and others 2000; von Hagen and Fight 1999).

The traditional way of life of many American Indian and Alaska Native Tribes involves gathering and using products from their natural surroundings. In some treaties, these rights were included under the term “gathering rights.” In negotiating treaty terms, many Tribal governments reserved off-reservation rights to gather miscellaneous forest products such as berries, roots, bark from trees, mushrooms, basket making materials, tepee poles, cedar for totem poles, and medicinal plants. The availability of these materials, and discretion about how they are grown (such as without pesticides) or raised, and the conditions under which they are gathered are important to American Indians.

In addition to their treaty, subsistence, and recreational values, non-timber forest products have gained increasing commercial importance since the mid-1980s. The number of requests to harvest non-timber forest products on public and private lands for commercial use has risen exponentially in the last two decades (Jones and others 2000). 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 Furniss 2000). Knowledge of the commercial role of non-timber forest products in the United States is sketchy, though the following statistics allude to their importance.

The market for herbal products in the U. S. was about $2.5 billion in 1996, and it has been growing at a rate of 13% to 15% annually (von Hagen and Fight 1999). More than 50% of the 25 top selling botanicals in the United States come from native plant species. American ginseng (*Panax quinquefolius*), goldenseal (*Hydrastis canadensis*), Echinacea species, and common St. Johns Wort (*Hypericum perforatum*), all found on NFS lands, are major contributors to this herbal and botanical industry (USDA Forest Service 2000h).

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 more than $41 million to the regional economy of the Pacific Northwest, employing more than 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 lbs. annually. The sale of permits and leases to collect non-timber forest products on NFS lands in fiscal year 1998 generated $2,977,626 (Table 8) (USDA Forest Service 1999a). Growing markets for non-timber forest products make it safe to assume that demand for these products will continue to rise in the coming years, increasing harvest pressure on NFS lands.

Table 8. Sold Value of Special Forest Products from NFS Lands, Fiscal Year 1998. [5]

Product	Sold Value (actual dollars)
Christmas Trees	$1,324,325
Transplants (wildlings)	39,829
Limbs and Boughs	172,718
Foliage	2,674
Bark	766
Cones, Green	4,329
Cones, Dry	9,888
Seed	661
Nuts and Seed	2,010
Fruits and Berries	934
Tree Sap	920
Roots	145
Mushrooms	155,275
Fungi	155
Mosses	13,157
Herbs	50
Ferns	50
Wildflowers	2,838
Grass	54,710
Aquatic Plants	10
Other Plants	57,636
Miscellaneous	1,134,546
Total	**$2,977,626**

The harvest of non-timber forest products for both personal use and commercial sale is a traditional activity that has taken place for generations by American Indians and rural people living in locations throughout the United States, such as in the Appalachians, the Ozarks, Michigan's upper peninsula, and the Pacific Northwest. Participants in the timber industry have also long-gathered non-timber forest products to supplement their incomes (Freed and Davis 1997). Non-timber forest products provide opportunities for some people who live in rural communities characterized by instability to diversify their household livelihood strategies by serving as subsistence resources, as well as a source of cash income (Emery 1999). They provide insurance against economic hard times, and help to supplement household incomes as necessary. Edible, ceremonial, and medicinal products are especially valuable as subsistence goods, while products used for crafts and decoration are important for their market value (Emery 1999).

Beginning 10 or 20 years ago, people from a wide variety of ethnic backgrounds (many of them recent immigrants) started harvesting non-timber forest products, and relying on them as their sole source of income. For example, Hispanics and Southeast Asians are

[5] From USDA 1999.

active producers in the Pacific Northwest (Love and Jones 1997). Evidence suggests that a disproportionate number of harvesters and processors are members of the rural and urban poor, and that a large percentage of participants in the industry are women, children, and elderly people (von Hagen and others 1996).

Where non-timber forest products have considerable market, subsistence, or cultural value, people have traditionally developed tenure regimes that regulate access to and use of them (Freed and Davis, 1997, von Hagen and others 1996). With the recent entry of large numbers of newcomers into this sector, customary property rights over non-timber forest products have been threatened and undermined. On public lands, the imposition of regulations by Agencies lands may also conflict with and undermine customary tenure arrangements. The result is conflict between user groups.

Until relatively recently, the Forest Service has not fully addressed the management of many non-timber forest product species (von Hagen and Fight 1999). In response to their increasing commercial value and harvest demand for them, the Forest Service has begun to issue new regulations regarding their harvest, and to enforce old ones. Regulation generally takes place by issuing special use permits for their collection. These permits are either free or are sold, depending upon whether or not the intended use is commercial. Permits may restrict the time and place of harvest, and the species and quantities to be harvested. The number of harvesters may also be limited. Another regulatory mechanism used by the Forest Service is to lease specific forest areas to individual harvesters, giving them preferential and sometimes exclusive rights to specific resources or harvest areas. Federally recognized tribes are permitted to collect non-timber forest products on NFS lands for cultural purposes under their treaty rights.

Regulations regarding the harvest of non-timber forest products on NFS lands are difficult to enforce, and illegal collection is widespread. While individual National Forests keep track of the number of special use permits they issue for non-timber forest products, they do not necessarily track actual harvest quantities, nor do they inventory and monitor all non-timber forest product species. Thus it is difficult to know whether the harvests of many species on Forest Service lands are sustainable.

In 1999, Congress passed legislation requiring the Secretary to establish a 5-year pilot program to monitor and assess fees for the harvest of forest botanical products on NFS lands (Section 339 of the Department of the Interior and Related Agencies Appropriations Act 2000, Public Law 106-113 – Appendix C, 113 Stat. 1501A-199). The legislation also requires the Secretary to manage non-timber forest-product species on a sustainable basis. Under the pilot program, the Secretary must collect fair market value for forest botanical products and must recover all costs to the Department associated with granting, modifying, or monitoring the authorization for harvest of forest botanical products, including the costs of any environmental or other analysis (the Secretary may waive these charges). The Forest Service is currently assessing how-to implement the law. This legislation will lead to increase future management of non-timber forest-product species on NFS lands.

Because non-timber forest products are economically valuable, and can generally be extracted from forests while leaving the forests structurally and functionally intact, these

types of products have the potential to provide opportunities for the sustainable economic use of forests. Such opportunities may be particularly important for residents of forest-dependent communities who have suffered lost jobs and revenues due to declining timber sales on public forest lands. However, because non-timber forest-product industries are seasonal, cyclical, and competitive, with generally low rates of return to producers, few individuals previously employed in the timber industry have diversified into the non-timber forest-product sector to date (von Hagen and Fight 1999). Non-timber forest products are better viewed as a supplementary source of income, than as a substitute for employment in the timber industry (von Hagen and others 1996).

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 (Content Analysis Enterprise Team 2000a,b). They believe they should be allowed to continue to gather non-timber forest products in inventoried 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 edible plants and fuel wood. Some commentators asserted that the production of non-timber forest products from NFS lands was of much greater economic value than the production of timber. Other people feared that the negative ecological impacts of road construction could threaten some species. Several people felt that inventoried roadless areas should be protected because they may contain species that could prove valuable for medicinal or other purposes in the future.

Non-Timber Forest Products, Roads, and Timber Harvest

Roads and timber harvest create openings and disturbance that benefit some populations of non-timber forest products, and harm others. For example, one assessment found that 30% of non-timber forest products in Oregon occur in openings and along roadsides (Gucinski and Furniss 2000). In contrast, road construction and timber cutting harms some species, such as wild gingers (*Asarum* spp.), pitcher plants (*Sarracenia* spp.), and shade-loving mosses that require undisturbed forest. Some non-timber forest products species that are highly sensitive to harvest pressure are threatened in areas close to roads where they are easily accessible.

Timber harvest and road construction alter the opportunities available to harvest different species. Depending upon the species of interest to a particular person, roads and timber harvest may be viewed as either ecologically (and economically) beneficial, or detrimental. Biological evidence suggests that managing forests for joint production of timber and non-timber forest products is economically and ecologically viable for North American forests, though more research is needed (Von Hagen and others 1996).

Roads may degrade those populations of non-timber forest products growing along them, because of pollution or herbicide and pesticide spraying (though this is rarely done along roads on NFS lands). Of more concern, roads can promote the spread of invasive weeds,

which are often more competitive and drastically reduce native species valued as non-timber forest products. Nevertheless, some invasive species are also valuable non-timber forest products.

People who harvest non-timber forest products use roads built for other purposes, mainly timber harvest, to access non-timber forest-product species (Gucinski and Furniss 2000). Some products, such as firewood, are not usually harvested far from roads because of their weight. Other products can be gathered away from roads, but the time and labor investment increases. Some people use OHVs to harvest these products, which offsets this increase.

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, harvest areas away from roads may be worth using if product quality and net returns are better. Using areas distant from roads is not feasible for all products or all individuals. For example, American Indian elders who are traditional healers may not be able to collect traditional cultural non-timber forest products away from roads because of difficulty walking long distances. While roads facilitate the illegal taking of non-timber forest products, they also facilitate the monitoring and enforcement of harvest activities by Forest officials.

TIMBER

Affected Environment

The U.S. has approximately 747 million acres of forestland (Smith 1999). About 52 million acres of U.S. forestland are reserved from timber harvest in wilderness, parks, and other classifications (USDA Forest Service 2000). About 504 million acres of U.S. forestland are classified as timberland (forests capable of producing 20 cubic feet per acre of industrial wood annually and not reserved from timber harvest).

About 147 million acres of the 192-million acre National Forest System (NFS) is forestland. This accounts for almost 20% of total U.S. forestland and 54% of all federally owned forestland (Smith 1999). About 93 million acres of NFS forestland are timberland (USDA Forest Service 2000).

Total U.S. timber removals from growing stock inventory in 1996 totaled over 16 billion cubic feet (roughly 80 billion board feet). Almost 64% of all removals came from the South, which has continued to increase its share of timber harvest as harvest levels in public forests in the West decline. In 1996, 16% of removals came from Pacific Coast forests, 17% came from the North, and 3% came from the Rocky Mountain region (see Appendix Table A1 for description of Resources Planning Act (RPA) Assessment regions and Forest Service administrative regions) (Smith 1999).

Timber removals continue to be concentrated on private ownerships. Industrial forests accounted for 30% of removals in 1996, while non-industrial private owners accounted for 59% (Smith 1999). The relative role of national forests in providing timber has declined in the last decade. The national forests provided 16.6% of total timber production in 1987, the highest percentage historically. By 1997, the relative contribution had declined to 4.2%.

Harvest volume from the national forests has declined from 12 billion board feet in 1989 to 2.9 billion board feet in 1999. Total harvest is expected to remain between 3.0 and 4.0 billion board feet annually in the near future. If harvest remains relatively constant, the contribution of NFS volume to overall timber production in the U.S. will continue to decline.

Forest Products in the U.S. Economy

Significant changes have occurred in the timber industry in the last two decades. Economic recessions in the 1970s and 1980s affected the structure and composition of U.S. regional production of timber and forest products. Restructuring following the 1982 recession was particularly profound for the softwood lumber industry and for employment.

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. Regional harvest on private industrial lands in the 1980s exceeded sustainable levels (Niemi and others 1999).

Lumber and wood products employment steadily decreased in the PNW in the 1980s. Timber employment declined by more than 27,000 between 1979 and 1989, and by another 21,000 by 1996. The wages paid to timber workers also decreased in the 1980s as payroll per employee fell 18%. 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 mills are locating near large markets with large pools of qualified workers. (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. In the Southern Appalachian region, the share of total economic output contributed by primary and secondary wood processing industries stayed about the same between 1977 and 1991. The share of employee compensation increased, while the share of employment decreased. This change reflects the increasing importance of pulp-using industries. Solid-wood products provide more income and jobs, while pulpwood production provide fewer jobs per unit of harvest, but at higher wages. Employment per harvest is about twice as high for the solid wood industries as for pulpwood using industries. Pulp-using industries are concentrated in a few locations, while solid-wood industries are spread throughout rural areas. Since pulpwood travels greater distances to fewer mills, increases in paper manufacture would concentrate employment and income at the few locations with paper mills. As a result, employment and income would decrease in smaller and more remote communities (Southern Appalachian Man and the Biosphere 1996).

Timber-related manufacturing (Standard Industrial Classification codes 24 and 26) accounted for slightly more than 1 percent of total U.S. GDP in 1996. Total employment related to forest products increased about 5% between 1992 and 1996 (Table 9). Gains in employment were primarily in the eastern U.S., which accounts for over 75% of total wood products jobs. The contribution of NFS harvest to wood products 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 NFS, as total production increases on other lands, the share of jobs from NFS harvest will continue to decline.

Table 9. Employment in the wood products sector in the total U.S. and associated with NFS timber harvest by Resources Planning Act Assessment Region, 1992 and 1996.

Region	Total Wood Products Sector Jobs, 1992	NFS Related Wood Products Sector Jobs, 1992	Total Wood Products Sector Jobs, 1996	NFS Related Wood Products Sector Jobs, 1996
North	350,358	6,079	375,987	5,032
South	396,868	8,628	414,752	6,865
Rocky Mountain	56,637	14,675	62,535	4,163
Pacific Coast	176,194	29,668	172,762	11,724
US Total	980,057	59,050	1,026,035	29,426

The U.S. is a net importer of wood products, measured in both volume and value terms. Canada is the source of over 75% of U.S. imports, which consist mainly of newsprint, pulp, softwood lumber, and oriented strand board (OSB). The reductions in NFS harvest over the last decade have been replaced primarily by Canadian imports of softwood lumber. The reduction in NFS timber harvest has been offset by an increase in Canadian imports of softwood lumber and harvesting on private industrial and nonindustrial forestland. Between 1991 and 1996, softwood lumber imports from Canada increased from 11.4 billion board feet to 17.6 billion board feet, and U.S. consumption of Canadian imports increased from 27% to 35% (Martin and Darr 1997).

Prior to the development of OSB and other engineered wood products, such as I-joists, the large, old growth timber harvested on National Forests was in high demand. Globalization of the forest sector is increasing the number of sources of wood fiber available to meet U.S. demands. The comparative advantage of the National Forests of having large, high quality trees for sales has not been entirely diminished, but has been greatly lessened. There will likely continue to be niche markets for high-quality products from large trees, but other types of wood must be sold in an increasingly competitive market (Martin and Darr 1997).

Per capita consumption of roundwood used for wood products has been relatively stable to increasing over the past two decades. Total roundwood consumption has increased as a result of increasing populations. Much of the growth in consumption has been for pulp-based products (Haynes and others 1995).

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, woodpulp 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.

Tongass National Forest

The entire decade of the 1990s was a decade of significant change for the Alaska-based timber industry. Over the period 1990-1996, harvest of timber from National Forests in Alaska declined by nearly 70%. By the end of the decade, Alaska producers were facing increased competition, weak prices, and high costs.

A few years ago, the economy of southeast Alaska was found to be 23 percent resource dependent (Allen and others 1998, USDA Forest Service 1997). Of this, the wood products industry accounted for 24% of direct employment, or about 5.5% of the regional economy. Logging accounts for about half of this employment or about 2.7% of the regional economy, followed by pulp production, then sawmill employment. The level of economic dependence on the wood products industry has decreased in the last few years, with the much lower timber harvests that occurred in 1999 and planned for 2000. At the same time, employment in tourism and recreation has increased substantially.

The most important changes that have affected the Alaska wood products industry are 1) a prolonged recession in the largest single market – Japan, 2) structural change in the Japanese housing market (favoring kiln-dried material), 3) increased competition in the Japanese market, especially from producers in Europe, and 4) closure of the pulp mills (affecting demand for low grade timber as well as markets for residues)(Brooks and Haynes 1997).

The Japanese market has been an important segment of demand for Alaska wood products. New suppliers have emerged as competitors to Alaska and other parts of North America for the Japanese market since 1990. The primary factor contributing to these market changes is increasing prices, which bring new suppliers into the market. Also, projections of future Japanese lumber consumption are lower than previous estimates, resulting in less demand from Japan (Brooks and Haynes 1997).

Harvest declines in the Pacific Northwest have resulted in higher stumpage prices in the region and in competing regions such as Alaska. However, reductions in total harvest in the Pacific Northwest have not eliminated that region as a competitor to Alaska for both domestic and foreign markets. Canada also remains a significant competitor. Canadian lumber exports to Japan more than offset the decline from the Pacific Northwest region from 1989-1995. At the same time, lumber shipments from Alaska fell by nearly 90%. Steady production in British Columbia and increasing lumber production in eastern Canada have helped to increase Canada's share of both the Japanese and U.S. market, and to moderate price increases, especially for middle and lower grade lumber. As a result, the prospective advantage Alaska might have experienced from declines in PNW harvest were not realized because of higher costs, new competitors, and uncertainty in the level and dependability of supplies from Alaska. The closure of the last pulp mill also had an effect (Brooks and Haynes 1997).

The Alaska forest sector also has changed in the last decade. One pulp mill closed in 1993, while the second pulp mill closed in 1997, which changed the structure and scale of the forest products industry in southeast Alaska. Prices for manufacturing residues also declined. The loss of local markets for manufacturing residues is problematic, since

revenue from residues contributes to the profitability of timber sales (Brooks and Haynes 1997).

Because of these changes, Brooks and Haynes (1997) concluded that future demand for Alaska National Forest timber will depend on markets for sawn wood and the ability to export manufacturing residues and lower grade logs. They assumed that timber sales and harvest will continue to include the lower grade material that accounts for 30 to 40% of Alaska's timber inventory, but the projections also take into account the fact that existing mills may not be able to profitably use the low-grade sawlog and utility volume. The future demand will be influenced by the ability of the timber sector to increase their share of the export market, the ability of the industry to increase technical efficiency to be competitive, future lumber from Japan, and wood product prices.

The Tongass has special legislative requirements to consider in evaluating the effects of the proposed roadless area conservation rule. Section 101 of the Tongass Timber Reform Act amended the ANILCA (P.L. 96-487) by changing Section 705 (a) to now read that the Secretary (of Agriculture) "shall to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest, and (2) meets the market demand from such forest for each planning cycle."

As a result, the Forest Service is in the process of developing guidelines for setting short-term timber goals for the Tongass. Currently there is great uncertainty associated with predicting market conditions, since Alaska is undergoing a structural transformation. It also takes several years for a national forest to prepare timber for offer, so immediate responses to market conditions are not possible. The basic approach used is to allow the industry to accumulate an adequate volume under contract, then to monitor industry behavior and adjust timber program levels to keep pace with harvest activity.

With the closure of the two pulp mills in Southeast Alaska, and the consequent cancellation of long-term contracts, and the change in the Reform Act that no longer mandates a timber supply, the Tongass timber program is now comparable to other national forests. Given Alaska's small population base, distance from markets, and relatively high operating costs, success in the wood products industry remains a challenge.

While Forest Service management policy with regard to timber harvest has a direct effect on people employed in the wood products sector in southeast Alaska, it is not the only influence. Between 1983 and 1995, 45 percent of the regional timber harvest in southeast Alaska came from the Tongass National Forest, with another 52 percent coming from Native Corporation lands (USDA Forest Service 1997). The timber supply on Native Corporation lands has been declining. During the 1990s, employment in the wood products industry in southeast Alaska declined 41 percent (representing a loss of nearly 1500 jobs) (Allen and others 1998). Much of this decline took place in sawmill and pulp mill employment due to the closure of the area's two pulp mills and their economically integrated sawmills. The closures of the pulp mills have reduced demand for timber harvest on Forest Service lands. Native corporation timber has generally been exported

in the round. Timber from the Tongass National Forest must be processed before it can be exported. The reduced mill capacity for processing logs reduces the market for timber harvested from the Tongass. [6]

Alaska Natives are more actively involved in the wood products industry generated by harvests from Native corporation lands than from federal lands. [7] Alaska Natives did not become involved in the commercial timber industry in Alaska until the 1970s and 1980s. Their involvement has been more in the support sector (ie. long-shoring, road-building) than in actual logging (Ellanna and Sherod 1987).

Most of the timber harvest and processing from the Tongass has been done by loggers and mill workers who moved to Alaska in the 1970s and 1980s for the purpose of finding timber jobs. Many came from the Pacific Northwest. In the past, when timber employment has declined in southeast Alaska, displaced workers have either left the area, or have remained, perhaps purchasing land in rural communities made available through state land disposals, and made a transition to other means of making a living. However, because logging and mill jobs are high paying relative to many other jobs in the region, it can be difficult for displaced workers to find equivalent employment. [8]

Baseline for the Analysis

The no action alternative is based on a continuation of current management policies. For the no action alternative, a baseline was estimated for total NFS timber harvest, timber related jobs and income, timber receipts, timber-related payments to states, and net revenues from the timber sales program. The economic effects of other alternatives were compared to this baseline.

Timber harvest baseline

In the no action alternative, we assumed that the timber program on NFS lands will remain stable at levels achieved in the late 1990s. Harvest volume in fiscal years 1996-1999 was used in developing the baseline for the no action alternative. Harvest volumes are used in the baseline, since economic effects are a result of harvest, rather than volume offered or sold. The regional harvest volumes for fiscal years 1996-1999 are shown in Table 10, as well as the average annual harvest volume used as the baseline for the analysis of effects.

[6] Personal communication, Robert Schroeder, USDA Forest Service Pacific Northwest Research Station, March 2000.
[7] Personal communication, Robert Schroeder, USDA Forest Service Pacific Northwest Research Station, March 2000.
[8] Personal communication, Robert Schroeder, USDA Forest Service Pacific Northwest Research Station, March 2000.

Table 10. NFS Timber Harvest, Fiscal Years 1996-1999, and Baseline Harvest under the No Action Alternative (million board feet).

Region	FY 1996 Harvest	FY 1997 Harvest	FY 1998 Harvest	FY 1999 Harvest	Baseline Harvest
Northern (1)	342.6	316.7	362.7	256.5	319.6
Rocky Mountain (2)	154.5	123.6	154.4	141.3	143.4
Southwestern (3)	46.3	83.2	93.5	83.6	76.6
Intermountain (4)	264.9	221.2	169.5	141.8	199.4
Pacific Southwest (5)	548.1	505.1	462.2	451.3	491.7
Pacific Northwest (6)	775.8	768.0	662.1	569.5	693.8
Southern (8)	847.5	571.9	636.8	594.6	662.7
Eastern (9)	621.2	587.1	622.1	553.8	596.0
Alaska (10)	123.5	108.9	121.2	146.2	124.9
National	3724.4	3285.4	3284.4	2938.6	3308.2

Source: TSPIRS Reports for 1996 and 1997, draft TSPIRS report for 1998, 1999 data from Washington Office Forest Management Staff

Timber-Related Jobs and Income Baseline

The estimate of jobs and income associated with NFS timber harvest is based on response coefficients from the IMPLAN model. IMPLAN (Impact Analysis for Planning) is the input-output model used by the Forest Service to estimate economic effects by tracing the interrelationships between producers and consumers in an economy. Employment and income measures 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 (e.g. loggers, sawmill workers). Indirect effects include jobs and associated with industries that supply inputs to the harvesting and processing sector (e.g. saw blade manufacturers). Induced effects include jobs and income associated with spending in the economy from the salaries created by the direct and indirect effects.

The baseline estimate was calculated using regional total job and income response coefficients calculated from regional data reported in TSPIRS in fiscal years 1996 to 1998. These figures include direct, indirect, and induced effects. The total income associated with timber harvest in fiscal years 1996-1998 was adjusted to 1997 dollars. The sum of total income (in 1997 dollars) and total employment for those three years was divided by the sum of harvest volume from the same years to calculate a volume-weighted average for total income and total employment per million board feet harvested (Table 11). The regional income and jobs data from TSPIRS for Region 1 was adjusted because of methodology differences. Region 1 data included job and income effects associated with Forest Service employment and effects from payments to states. The analysis for the FEIS did not include those effects in the timber analysis.

Table 11. Baseline total income per million board feet harvested and total jobs per million board feet harvested (1997 dollars).

Region	Average Income per MMBF	Average total jobs per MMBF	Baseline Harvest	Baseline Total Income ($000)	Baseline Total Jobs
Northern (1)	$864,738	28	319.6	$276,369	8,950
Rocky Mountain (2)	369,750	14	143.4	53,037	2,008
Southwestern (3)	471,260	18	76.6	36,117	1,380
Intermountain (4)	869,943	15	199.4	173,397	2,990
Pacific Southwest (5)	528,360	11	491.7	259,767	5,409
Pacific Northwest (6)	402,586	14	693.8	279,347	9,714
Southern (8)	598,784	19	662.7	398,821	12,591
Eastern (9)	649,751	11	596.0	387,284	6,556
Alaska (10)	362,992	8	124.9	45,832	1,000
National			**3,308.2**	**1,907,970**	**50,596**
Source: TSPIRS Reports for 1996 and 1997, draft TSPIRS report for 1998					

The average total income and jobs per million board feet harvested was applied to the baseline harvest described above to create the baseline for total income and total jobs associated with timber harvest (Table 11). Direct effects are not reported separately in TSPIRS. Therefore, Forest Service economists were queried to develop a regional estimate of direct timber jobs per million board feet harvested. The resulting estimates are shown in Table 12. The ratio between total jobs and direct jobs (shown in Table 11) was used to estimate direct income effects as well (Table 12).

Table 12. Baseline direct timber jobs per million board feet harvested and direct income per million board feet harvested. (1997 dollars)

Region	Direct Jobs per MMBF	Ratio of Total to Direct Jobs per MMBF	Baseline Harvest	Baseline Direct Jobs	Baseline Direct Income ($ 000)
Northern (1)	10	2.8	319.6	3,196	99,493
Rocky Mountain (2)	6	2.3	143.4	861	22,730
Southwestern (3)	9	2.0	76.6	690	18,059
Intermountain (4)	9	1.7	199.4	1,794	104,038
Pacific Southwest (5)	7	1.6	491.7	3,442	165,306
Pacific Northwest (6)	8	1.7	693.8	5,551	159,627
Southern (8)	10	1.9	662.7	6,627	208,853
Eastern (9)	7	1.6	596.0	4,172	246,453
Alaska (10)	5	1.6	124.9	625	28,645
National			**3308.2**	**26,957**	**1,053,204**

Timber-Related Receipts and Payments to States Baseline

A portion of receipts from NFS timber sales are returned to the states based on congressionally determined formulas. Receipts from timber sales historically have been the largest source of payments to states from the Forest Service. The baseline receipts is a three-year average of National Forest Fund (NFF) receipts from 1996-1998 (Table 13). Payments to states are 25% of NFF receipts, as shown in Table 13. The baseline payments to states do not include owl guarantee payments made to Regions 5 and 6 in those years.

Table 13. Timber National Forest Fund Receipts, 1996-1998, Baseline Receipts per thousand board feet, and Baseline Payments to States (1997 dollars).

Region	FY 1996 Timber Receipts ($000)	FY 1997 Timber Receipts ($000)	FY 1998 Timber Receipts ($000)	Average Receipts per MBF	Baseline Receipts ($000)	Baseline Payments to States ($000)
Northern (1)	$68,145	$56,914	69,583	$192	$61,369	$15,342
Rocky Mountain (2)	21,695	23,284	24,487	164	23,524	5,881
Southwestern (3)	3,152	5,859	5,211	65	4,982	1,245
Intermountain (4)	40,295	35,158	20,978	146	29,105	7,276
Pacific Southwest (5)	87,283	73,972	59,664	219	107,678	26,919
Pacific Northwest (6)	149,337	161,981	132,611	203	140,847	35,212
Southern (8)	114,249	89,591	101,507	152	100,727	25,182
Eastern (9)	59,000	59,637	65,073	102	60,795	15,199
Alaska (10)	22,141	3,751	6,084	88	10,995	2,749
National	**565,298**	**510,146**	**485,198**		**540,022**	**135,006**

Baseline for Net Revenue

The Forest Service spends money to prepare timber sales, do environmental analyses, and other administrative and planning activities associated with timber sales. Timber sales are offered for sale through competitive bidding, so the prices received reflect market prices. However, the Forest Service does not necessarily recover its costs from timber sales. Below cost sales have long been a controversial issue for the agency.

Examining the net revenues associated with the timber sales program provides an indicator of whether sales are financially efficient (i.e. above cost). The revenues and costs associated with timber sales are reported in TSPIRS. The costs and revenues for commodity purpose sales and stewardship purpose sales are reported separately. Stewardship sales are undertaken to accomplish ecosystem management objectives. Even though some stewardship sales are above-cost, it is more appropriate to evaluate the economic efficiency of those sales on whether they are the least-cost method of achieving the management objective.

Therefore, only commodity sales were considered in estimating net revenues. Commodity sales are undertaken to deliver fiber to the market, and therefore it is appropriate to evaluate the "profitability" of the program, even though the revenues do not remain completely with the agency. The costs and revenues of commodity sales reported in TSPIRS were summed to the regional level for fiscal years 1996 to 1998.

The sum of revenues and costs across all three years was summed, and then divided by total commodity harvest in those three years to create an average cost and revenue per million board feet of commodity harvest. The average net revenue per million board feet was then calculated for each region's timber sales program (Table 14). For the commodity portion of the timber sales program, average net revenue between 1996 and 1998 was positive in all but three regions.

Table 14. Average Annual Revenues and Costs and Average Net Revenue for Commodity Portion of Timber Sales Programs (1996-1998).

Region	Average Revenue per MBF	Average Cost per MBF	Average Net Revenue per MBF
Northern (1)	$234	$242	$-8
Rocky Mountain (2)	223	179	44
Southwestern (3)	136	314	-179
Intermountain (4)	183	176	7
Pacific Southwest (5)	260	239	21
Pacific Northwest (6)	377	300	77
Southern (8)	180	113	67
Eastern (9)	121	73	49
Alaska (10)	101	279	-178
National	**210**	**181**	**29**

Estimation of Harvest Effects from Prohibition Alternatives

Data were collected from the national forests on timber volume sold from inventoried roadless areas in fiscal years 1993 through 1999, and planned offer volume in inventoried roadless areas for fiscal years 2000 to 2004. In addition, the volume of planned offer that would require road construction was estimated.

Table 15 provides forest level data on the five-year planned offer in inventoried roadless areas and the average annual offer volume. Of the approximately 1.1 billion board feet planned for offer in inventoried roadless areas in the next 5 years, about 804 million board feet would require road construction and reconstruction for harvest. Historically, not all volume offered for sale is sold, and then harvested. Therefore, the future planned offer volume is likely to be greater than sold volume if those sales were actually offered. Adjustments from planned offer to harvest level were calculated from the average annual offer volumes shown in Table 15.

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. Data are available that compare offer targets to offer accomplishments by national forest. One drawback of this data is that salvage volumes are included that inflate accomplishments, since salvage is not included in offer targets. Nationally, accomplishments were about 85% of targets between 1996 and 1998.

Table 15. Total Planned Offer and Offer Volume Affected by Alternative in Inventoried Roadless Areas, Fiscal Years 2000-2004 (million board feet)						
	5-Year Planned Offer	Ave. Ann. Planned Offer	5-Year Affected Volume	Ave. Ann. Planned Volume	5-Year Affected Volume	Ave. Annual Planned Volume
National Forest	**No Action**	**No Action**	**Alternative 2**	**Alternative 2**	**Alternative 3**	**Alternative 3**
Bitterroot	2.0	0.4	0.0	0.0	0.6	0.1
Clearwater	14.7	2.9	4.0	0.8	5.2	1.0
Custer	1.9	0.4	0.0	0.0	1.9	0.4
Flathead	1.4	0.3	0.0	0.0	0.2	0.1
Helena	7.8	1.6	3.7	0.7	3.7	0.7
Idaho Panhandle	43.2	8.6	22.0	4.4	22.0	4.4
Kootenai	1.1	0.2	0.0	0.0	0.0	0.0
Lewis and Clark	1.3	0.3	0.1	0.0	1.0	0.2
Lolo	1.6	0.3	0.0	0.0	0.0	0.0
Nez Perce	10.0	2.0	0.0	0.0	0.0	0.0
R1 Total	84.9	17.0	29.8	6.0	34.6	6.9
Arapaho-Roosevelt	2.0	0.4	0.3	0.1	0.3	0.1
Bighorn	3.1	0.6	3.0	0.6	3.1	0.6
Black Hills	3.6	0.7	0.0	0.0	3.6	0.7
GM-Uncomp.-Gun.	3.5	0.7	2.5	0.5	3.5	0.7
Medicine Bow/Routt	11.9	2.4	6.9	1.4	11.3	2.3
Rio Grande	1.4	0.3	0.0	0.0	1.0	0.2
San Juan	2.0	0.4	0.5	0.1	1.6	0.3
Shoshone	10.7	2.1	10.2	2.0	10.7	2.1
White River	9.8	2.0	9.8	2.0	9.8	2.0
R2 Total	47.8	9.6	33.1	6.6	44.7	8.9
Kaibab	1.0	0.2	1.0	0.2	1.0	0.2
Lincoln	1.6	0.3	0.8	0.2	1.2	0.2
R3 Total	2.6	0.5	1.8	0.4	2.2	0.4
Ashley	5.0	1.0	0.0	0.0	5.0	1.0
Boise	20.7	4.1	2.0	0.4	2.0	0.4
Bridger-Teton	3.0	0.6	3.0	0.6	3.0	0.6
Caribou	10.6	2.1	5.1	1.0	7.3	1.5
Dixie	41.6	8.3	39.5	7.9	39.5	7.9
Fishlake	20.3	4.1	20.3	4.1	20.3	4.1
Humb/Toiyabe	2.0	0.4	1.0	0.2	1.0	0.2
Manti-Lasal	33.1	6.6	19.8	4.0	19.8	4.0
Payette	54.5	10.9	39.0	7.8	43.7	8.7
Targhee	5.0	1.0	0.0	0.0	0.0	0.0
Uinta	4.8	1.0	4.3	0.9	4.4	0.9
R4 Total	200.5	40.1	134.0	26.8	145.9	29.2
Klamath	7.5	1.5	0.0	0.0	5.2	1.0
Mendocino	1.2	0.2	1.2	0.2	1.2	0.2
Shasta-T	18.4	3.7	5.0	1.0	14.4	2.9
Six Rivers	5.5	1.1	0.5	0.1	2.7	0.5
R5 Total	32.5	6.5	6.7	1.3	23.5	4.7

Table 15 continued.								
	5-Year	**5-Year**		**5-Year**	**5-Year**		**5-Year**	**5-Year**
	Planned	**Ave. Ann.**		**Affected**	**Ave. Ann**		**Affected**	**Ave. Ann.**
	Offer	**Offer**		**Volume**	**Volume**		**Volume**	**Volume**
National Forest	**No Action**	**No Action**		**Alternative 2**	**Alternative 2**		**Alternative 3**	**Alternative 3**
Gifford Pinchot	2.7	0.6		1.1	0.2		2.4	0.5
Okanogan	12.9	2.6		12.3	2.5		12.5	2.5
Rogue River	16.6	3.3		13.0	2.6		13.0	2.6
Siskiyou	5.0	1.0		0.0	0.0		3.5	0.7
Siuslaw	2.0	0.4		0.4	0.1		0.4	0.1
Umatilla	8.3	1.7		0.0	0.0		0.0	0.0
Umpqua	0.3	0.1		0.0	0.0		0.0	0.0
Wallowa-Whitman	4.0	0.8		4.0	0.8		4.0	0.8
Wenatchee	8.3	1.7		0.0	0.0		0.0	0.0
Willamette	26.7	5.3		0.0	0.0		26.7	5.3
R6 Total	86.8	17.4		30.8	6.2		62.4	12.5
Chatt/Oconee	1.2	0.2		0.0	0.0		0.6	0.1
Cherokee	1.6	0.3		0.4	0.1		0.4	0.1
GW/Jefferson	5.0	1.0		3.0	0.6		3.0	0.6
Mississippi	3.0	0.6		2.5	0.5		2.8	0.6
NC Forests	1.1	0.2		0.7	0.1		0.7	0.1
Ozark/St.Francis	17.8	3.6		10.4	2.1		17.8	3.6
R8 Total	29.6	5.9		17.0	3.4		25.3	5.1
Allegheny	0.3	0.1		0.0	0.0		0.3	0.1
Chequamegon	24.1	4.8		9.7	1.9		16.6	3.3
Green Mountain	1.0	0.2		0.0	0.0		0.0	0.0
Hiawatha	1.0	0.2		0.2	0.0		0.9	0.2
Monongahela	18.0	3.6		2.0	0.4		16.2	3.3
Superior	26.1	5.2		26.1	5.2		26.1	5.2
White Mountain	8.0	1.6		1.5	0.3		3.3	0.7
R9 Total	78.5	15.7		39.5	7.9		63.4	12.7
Tongass	539.2	107.8		512.0	102.4		539.0	107.8
National	1102.3	220.5		804.6	160.9		941.0	188.2

Data were also available on volume sold in inventoried roadless areas from 1993 to 1999. Average planned volumes over the next five years are about twice the average volume sold from inventoried roadless areas between 1993 and 1999, but the change from recent trends varies regionally (Table 16). Regions 1, 2, 3, 5, and 6 are planning to offer similar or slightly higher volumes, while Regions 4, 9, and 10 account for the greatest increase in volume compared to historic trends.

The 15% adjustment factor (comparing targets to accomplishments nationally) was too low, while the 50% adjustment factor comparing planned offer to sold volume in roadless areas) includes differences between offer and sold volume that is accounted for in the next step. Therefore, a reduction of 30% was considered the most reasonable estimate to use in adjusting planned offer volume to estimate the actual volume offered for sale.

Table 16. Comparison of average annual sold volume from inventoried roadless areas compared to planned offer from inventoried roadless areas (million board feet).

REGION	Annual Average Volume Sold from Inventoried Roadless Areas, 1993-1999	Planned Annual Average Offer Volume in Inventoried Roadless Areas, 2000-2004
Northern (1)	17.3	17.0
Rocky Mountain (2)	5.3	9.6
Southwestern (3)	0.2	0.5
Intermountain (4)	14.0	40.1
Pacific Southwest (5)	7.0	6.5
Pacific Northwest (6)	18.7	17.4
Southern (8)	3.4	5.9
Eastern (9)	6.6	15.7
Alaska (10)	39.4	107.8
National	112.0	220.5

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 between 1996 and 1999. The average percent difference between volume offered and volume sold was applied by national forest. Forest-level details of the adjustment process are shown in Table 17.

Nationally, the average annual planned offer was about 220 million board feet. The estimated average annual harvest volume after the adjustment is 146.7 million board feet (Table 17). Under Prohibition Alternative 2, only volume that requires road construction and reconstruction would be foregone. Prohibition Alternative 3 results in a further reduction since only stewardship harvest that does not require roads could take place. Finally, Prohibition Alternative 4 would prohibit all timber harvest.

To estimate the average annual harvest reduction for Prohibition Alternative 2 (no road construction or reconstruction), the same adjustment factors were applied to the planned offer volume that does not require roads. Estimating the average annual harvest reduction for Prohibition Alternative 3 (stewardship harvest only) required estimating the proportion of volume that could be harvested without roads that is likely to be for stewardship purposes. Estimates of stewardship volume were based on forest-level data submitted by the national forests and grasslands for the FEIS analysis.

Table 17. Adjustment of Planned Offer to Harvest in Inventoried Roadless Areas								
	Planned Ave. Ann. Offer in IRAs	TSPIRS 96-99 Average Percent Sold	Estimated Harvest from IRAs No Action	Affected Ave. Ann Offer in IRAs Alternative 2	Reduced Ave. Ann Harvest Alternative 2	Affected Ave. Ann Offer in IRAs Alternative 3	Reduced Ave. Ann Harvest Alternative 3
National Forest	MMBF		MMBF	MMBF	MMBF	MMBF	MMBF
Bitterroot	0.4	1.00	0.3	0.0	0.0	0.1	0.1
Clearwater	2.9	0.98	2.0	0.8	0.5	1.0	0.7
Custer	0.4	1.00	0.3	0.0	0.0	0.4	0.3
Flathead	0.3	1.00	0.2	0.0	0.0	0.1	0.0
Helena	1.6	1.00	1.1	0.7	0.5	0.7	0.5
Idaho Panhandle	8.6	0.86	5.2	4.4	2.7	4.4	2.7
Kootenai	0.2	1.00	0.2	0.0	0.0	0.0	0.0
Lewis and Clark	0.3	1.00	0.2	0.0	0.0	0.2	0.1
Lolo	0.3	0.89	0.2	0.0	0.0	0.0	0.0
Nez Perce	2.0	1.00	1.4	0.0	0.0	0.0	0.0
Region 1 Totals	17.0		11.0	6.0	3.7	6.9	4.4
Arapaho-Roosevelt	0.4	0.85	0.2	0.1	0.0	0.1	0.0
Bighorn	0.6	0.87	0.4	0.6	0.4	0.6	0.4
Black Hills	0.7	0.75	0.4	0.0	0.0	0.7	0.4
GM-Uncomp.-Gunn.	0.7	0.76	0.4	0.5	0.3	0.7	0.4
Medicine Bow/Routt	2.4	0.75	1.3	1.4	0.7	2.3	1.2
Rio Grande	0.3	0.97	0.2	0.0	0.0	0.2	0.1
San Juan	0.4	0.97	0.3	0.1	0.1	0.3	0.2
Shoshone	2.1	1.00	1.5	2.0	1.4	2.1	1.5
White River	2.0	0.82	1.1	2.0	1.1	2.0	1.1
Region 2 Totals	9.6		5.7	6.6	4.0	9.0	5.3
Kaibab	0.2	0.86	0.1	0.2	0.1	0.2	0.1
Lincoln	0.3	0.99	0.2	0.2	0.1	0.2	0.2
Region 3 Totals	0.5		0.4	0.4	0.2	0.4	0.3
Ashley	1.0	1.00	0.7	0.0	0.0	1.0	0.7
Boise	4.1	0.83	2.4	0.4	0.2	0.4	0.2
Bridger-Teton	0.6	1.00	0.4	0.6	0.4	0.6	0.4
Caribou	2.1	0.74	1.1	1.0	0.5	1.5	0.8
Dixie	8.3	0.70	4.1	7.9	3.9	7.9	3.9
Fishlake	4.1	0.87	2.5	4.1	2.5	4.1	2.5
Humbolt-Toiyabe	0.4	0.59	0.2	0.2	0.1	0.2	0.1
Manti-Lasal	6.6	0.96	4.4	4.0	2.7	4.0	2.7
Payette	10.9	0.87	6.6	7.8	4.8	8.7	5.3
Targhee	1.0	1.00	0.7	0.0	0.0	0.0	0.0
Uinta	1.0	0.99	0.7	0.9	0.6	0.9	0.6
Region 4 Totals	40.1		23.8	26.8	15.6	29.2	17.1
Klamath	1.5	0.97	1.0	0.0	0.0	1.0	0.7
Mendocino	0.2	1.00	0.2	0.2	0.2	0.2	0.2
Shasta-Trinity	3.7	0.97	2.5	1.0	0.7	2.9	1.9
Six Rivers	1.1	0.71	0.5	0.1	0.0	0.5	0.3
Region 5 Totals	6.5		4.2	1.3	0.9	4.7	3.1

Table 17 continued									
	Planned	**TSPIRS**	**Estimated**		**Affected**	**Reduced**		**Affected**	**Reduced**
	Ave. Ann.	**96-99**	**Harvest**		**Ave. Ann**	**Ave. Ann**		**Ave. Ann**	**Ave. Ann**
	Offer	**Average**	**from IRAs**		**Offer in IRAs**	**Harvest**		**Offer in IRAs**	**Harvest**
	in IRAs	**Percent**	**No Action**		**Alternative 2**	**Alternative 2**		**Alternative 3**	**Alternative 3**
	MMBF	**Sold**	**MMBF**		**MMBF**	**MMBF**		**MMBF**	**MMBF**
Gifford Pinchot	0.6	0.90	0.3		0.2	0.1		0.5	0.3
Okanogan	2.6	0.82	1.5		2.5	1.4		2.5	1.4
Rogue River	3.3	0.81	1.9		2.6	1.5		2.6	1.5
Siskiyou	1.0	1.00	0.7		0.0	0.0		0.7	0.5
Siuslaw	0.4	1.00	0.3		0.1	0.1		0.1	0.1
Umatilla	1.7	0.90	1.0		0.0	0.0		0.0	0.0
Umpqua	0.1	1.00	0.0		0.0	0.0		0.0	0.0
Wallowa-Whitman	0.8	1.00	0.6		0.8	0.6		0.8	0.6
Wenatchee	1.7	0.82	0.9		0.0	0.0		0.0	0.0
Willamette	5.3	0.98	3.6		0.0	0.0		5.3	3.6
Region 6 Totals	17.4		10.9		6.2	3.6		12.5	8.0
Chattahochee/Ocone	0.2	0.85	0.1		0.0	0.0		0.1	0.1
Cherokee	0.3	0.81	0.2		0.1	0.0		0.1	0.0
GW/Jefferson	1.0	0.94	0.7		0.6	0.4		0.6	0.4
Mississippi	0.6	0.84	0.4		0.5	0.3		0.6	0.3
NC Forests	0.2	0.79	0.1		0.1	0.1		0.1	0.1
Ozark-St. Francis	3.6	0.94	2.3		2.1	1.4		3.6	2.3
Region 8 Totals	5.9		3.8		3.4	2.2		5.1	3.3
Allegheny	0.1	0.81	0.0		0.0	0.0		0.1	0.0
Chequamegon/Nicol	4.8	0.99	3.4		1.9	1.3		3.3	2.3
Green Mountain	0.2	1.00	0.1		0.0	0.0		0.0	0.0
Hiawatha	0.2	0.98	0.1		0.0	0.0		0.2	0.1
Monongahela	3.6	0.92	2.3		0.4	0.3		3.3	2.1
Superior	5.2	0.91	3.3		5.2	3.3		5.2	3.3
White Mountain	1.6	0.92	1.0		0.3	0.2		0.7	0.4
Region 9 Totals	15.7		10.3		7.9	5.2		12.7	8.3
Tongass*	107.8	0.79	76.6		102.4	72.8		107.8	76.6
National	220.5		146.7		160.9	108.2		188.2	126.4

Table 18 summarizes, by Forest Service region, the average annual volume that could not be harvested under the three prohibition alternatives.

Table 18. Average Annual Harvest Volume Reductions in Inventoried Roadless Areas Associated with National Prohibitions (million board feet).

Region	Road Prohibition	Road Prohibition and Commodity Harvest Prohibition	Road Prohibition and Timber Harvest Prohibition
Northern (1)	3.7	4.4	11.0
Rocky Mountain (2)	4.0	5.3	5.7
Southwestern (3)	0.2	0.3	0.4
Intermountain (4)	15.6	17.1	23.8
Pacific Southwest (5)	0.9	3.1	4.2
Pacific Northwest (6)	3.6	8.0	10.9
Southern (8)	2.2	3.3	3.8
Eastern (9)	5.2	8.3	10.3
Alaska (10)	72.8	76.6	76.6
National	**108.2**	**126.4**	**146.7**

Estimating Job and Income Effects

The effects on timber volume are not evenly distributed across forests within the Forest Service regions. Therefore, rather than apply the regional job and income coefficients used in calculating the baseline, a weighted average was estimated using forest-level impact coefficients from those forests that had planned offer volumes greater than 5 million board feet over the five-year period. The regional offices provided forest-level data on the job and income response coefficients used in the forest-level TSPIRS analysis to calculate job and income effects. Weighting the forest-level coefficients by the volume affected, a regional weight was developed and then applied to regional level harvest to estimate regional effects on jobs and income. The forest-level coefficients for the forests offering more than 5 million board feet and the regional weighted coefficients used to estimate regional job and income effects are presented in Table 19.

Table 19. Job and Income Coefficients for Selected National Forests and Weighted Regional Averages.				
	Direct Jobs per MMBF	Total Jobs per MMBF	Direct Income per MMBF	Total Income per MMBF
Clearwater	9.26	26.88	$272.6	$791.2
Helena	12.00	28.74	$415.6	$995.3
Idaho Panhandle	8.85	26.47	$260.8	$779.9
Nez Perce	9.60	25.79	$291.4	$782.7
REGION 1	9.36	26.71	$285.2	$801.9
Bighorn	5.80	13.26	$124.7	$247.5
Medicine Bow/Routt	5.80	12.96	$124.5	$293.0
Shoshone	5.80	13.29	$124.7	$279.8
White River	5.80	11.96	$124.7	$325.3
REGION 2	5.80	12.96	$124.5	$293.0
REGION 3	9.00	18.00	$235.7	$471.4
Ashley	6.12	10.40	$351.4	$597.3
Boise	6.76	11.50	$385.2	$654.8
Bridger-Teton	5.59	9.50	$299.8	$509.7
Caribou	6.12	10.40	$351.4	$597.3
Dixie	4.88	8.30	$261.9	$445.3
Fishlake	6.12	10.40	$351.4	$597.3
Manti-Lasal	6.35	10.80	$375.7	$638.7
Payette	6.76	11.50	$385.2	$654.8
Targhee	6.12	10.40	$351.4	$597.3
Uinta	6.12	10.40	$351.4	$597.3
REGION 4	6.12	10.41	$352.2	$591.6
Klamath	7.00	11.00	$357.0	$561.0
Shasta-T	7.00	11.00	$357.0	$561.0
Six Rivers	7.00	11.00	$357.0	$561.0
REGION 5	7.00	11.00	$357.0	$561.0
Okanogan	9.15	14.63	$264.9	$423.8
Rogue River	9.36	14.98	$260.8	$417.3
Siskiyou	9.89	15.82	$275.1	$440.1
Umatilla	5.58	8.92	$155.4	$248.7
Wallowa-Whitman	5.65	9.04	$157.4	$251.9
Wenatchee	7.49	11.98	$222.1	$355.4
Willamette	9.92	15.88	$317.0	$507.2
REGION 6	8.75	14.00	$262.9	$415.6

Table 19 continued				
	Direct Jobs	Total Jobs	Direct Income	Total Income
	per MMBF	per MMBF	per MMBF	per MMBF
GW/Jefferson	8.70	20.10	$366.8	$828.9
Ozark/St.Francis	7.30	18.60	$395.0	$780.0
REGION 8	7.61	18.93	$388.8	$790.8
Chequamegon	7.84	12.55	$498.8	$798.0
Monongahela	3.83	6.13	$89.4	$143.0
Superior	5.78	9.24	$408.1	$653.0
White Mountain	9.35	14.96	$608.1	$973.0
REGION 9	6.25	10.00	$365.1	$584.2
Tongass	5.00	8.00	$229.8	$367.7

Estimating Harvest Substitution Effects

The job and income effects of the prohibition alternatives would likely be offset to some extent by timber harvest on other ownerships. The availability of substitute harvest opportunities varies by region. Key factors include the proportion of NFS lands in the region, the type of timber being harvested from NFS lands compared to timber available on other lands, and current timber prices. The potential for substitution is highest in the eastern U.S. where NFS lands account for a small percent of timber resources. Substitution opportunities in the western U.S. are more limited. Data on total removals was used to illustrate the degree of substitution that occurred between 1990 and 1995, a period during which harvest from NFS lands declined significantly. The total removal data by RPA Assessment region and by ownership for 1990 and 1995 is shown in Table 20, as well as the percent change by ownership that is also shown in Table 3-62 of the FEIS.

Table 20. 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
Forest Industry						
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
Farmer and Other Private						
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
National Forest						
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
Other Government						
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
All Ownerships						
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

Estimating Effects on Payments to States

The effects of the prohibition alternatives to payments to states were calculated using the regional estimates of receipts per thousand board feet shown in Table 13. The receipt estimates were applied to the affected harvest volume for each prohibition alternative. Payments to states were estimated as 25% of total receipts, as shown in Tables 3-59, 3-60, and 3-61 of the Roadless Area Conservation FEIS.

At the time of printing of the FEIS, both the House and Senate had passed legislation changing payments to states. On October 30, the President signed H.R. 2389, "Secure Rural Schools and Community Self-Determination Act of 2000," which 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 prohibition alternatives are not expected to reduce payments to states in those counties where timber harvest declines occur.

Estimating Net Revenue Effects

The effects of the prohibition alternatives on the net revenues associated with harvest in inventoried roadless areas cannot be estimated with any certainty, since costs and revenue vary greatly between sales. In addition, the costs and revenues of sales within inventoried roadless areas could be quite different from average costs and revenues of the entire timber sale program. However, the average historic net revenue of the commodity portion of the timber sales program should be indicative of whether future sales are likely to be above or below cost.

Since the harvest effects are not evenly distributed across forests within Forest Service regions, the average regional net revenue described earlier (see Table G6) were not considered appropriate. Instead, average net revenue data for the national forests with reduced timber volume were used. The average net revenue for the commodity portion of the timber sale program between 1996 and 1998 was estimated, based on TSPIRS report for those years. The forest-level data is shown in Table 21. The forest-level data was aggregated to the regional level in FEIS Table 3-63.

Table 21. Estimated net revenue from commodity portion of planned offer in inventoried roadless areas (1997$)

National Forest	Reduced Commodity Harvest Alternative 2 (MMBF)	Net revenue Associated with Commodity Harvest (000 $)		Reduced Commodity Harvest Alternatives 3 and 4 (MMBF)	Net revenue Associated with Commodity Harvest (000 $)
Bitterroot	0.0	$0		0.1	-$9,324
Clearwater	0.1	$0		0.2	$0
Custer	0.0	$0		0.0	$0
Flathead	0.0	$0		0.2	-$9,462
Helena	0.0	$0		0.0	$0
Idaho Panhandle	0.0	$0		0.0	$0
Kootenai	0.0	$0		0.0	$0
Lewis and Clark	0.0	$211		0.0	$3,791
Lolo	0.0	$0		0.0	$0
Nez Perce	0.0	$0		0.0	$0
R1 Total	0.1	$211		0.5	-$14,995
Arapaho-Roosevelt	0.0	$0		0.0	$0
Bighorn	0.3	-$40,885		0.3	-$40,885
Black Hills	0.0	$0		0.4	$58,140
GM-Uncomp.-Gun.	0.3	-$8,910		0.4	-$12,210
Medicine Bow/Routt	0.6	$24,077		1.1	$41,800
Rio Grande	0.0	$0		0.1	-$14,774
San Juan	0.1	-$5,443		0.2	-$20,995
Shoshone	1.4	-$56,800		1.5	-$59,600
White River	0.7	-$34,216		0.7	-$34,216
R2 Total	3.4	-$122,177		4.7	-$82,741
Kaibab	0.0	-$13,392		0.0	-$13,392
Lincoln	0.1	-$26,410		0.1	-$55,221
R3 Total	0.1	-$39,802		0.2	-$68,613
Ashley	0.0	$0		0.7	-$11,200
Boise	0.0	$0		0.0	$0
Bridger-Teton	0.3	-$10,290		0.3	-$10,290
Caribou	0.3	$20,988		0.7	$43,560
Dixie	0.0	$0		0.0	$0
Fishlake	1.5	$32,159		1.5	$32,159
Humb/Toiyabe	0.0	$0		0.0	$0
Manti-Lasal	0.0	$0		0.0	$0
Payette	1.4	$123,975		2.0	$173,304
Targhee	0.0	$0		0.0	$0
Uinta	0.5	-$142,740		0.5	-$157,014
Wasatch-Cache	0.0	$0		0.0	$0
R4 Total	4.0	$24,092		5.7	$70,519

Table 21 continued					
	Reduced Commodity Harvest Alternative 2	**Net revenue Associated with Commodity Harvest**		**Reduced Commodity Harvest Alternatives 3 and 4**	**Net revenue Associated with Commodity Harvest**
National Forest	**(MMBF)**	**(000 $)**		**(MMBF)**	**(000 $)**
Klamath	0.0	$0		0.7	-$35,350
Mendocino	0.0	$0		0.0	$0
Shasta-T	0.5	$39,032		1.8	$143,500
Six Rivers	0.0	$810		0.2	$8,748
R5 Total	0.5	$39,842		2.7	$116,898
Gifford Pinchot	0.1	$7,972		0.3	$19,360
Okanogan	1.0	-$153,972		1.0	-$161,616
Rogue River	0.0	$0		0.0	$0
Siskiyou	0.0	$0		0.5	$92,610
Siuslaw	0.0	$0		0.0	$0
Umatilla	0.0	$0		0.0	$0
Umpqua	0.0	$0		0.0	$0
Wallowa-Whitman	0.2	-$11,928		0.2	-$11,928
Wenatchee	0.0	$0		0.0	$0
Willamette	0.0	$0		2.4	$449,631
R6 Total	1.3	-$157,928		4.3	$388,057
Chatt/Oconee	0.0	$0		0.1	-$2,401
Cherokee	0.0	$0		0.0	$0
GW/Jefferson	0.0	$0		0.0	$0
Mississippi	0.2	$26,231		0.2	$31,658
NC Forests	0.0	$0		0.0	$0
Ozark/St.Francis	1.4	$87,680		2.3	$149,760
R8 Total	1.6	$113,911		2.6	$179,017
Allegheny	0.0	$0		0.0	$9,900
Chequamegon	0.6	$9,720		1.6	$24,048
Green Mountain	0.0	$0		0.0	$0
Hiawatha	0.0	-$26		0.1	-$123
Monongahela	0.2	$27,999		2.1	$249,841
Superior	1.9	$3,863		1.9	$3,863
White Mountain	0.1	-$9,154		0.8	-$49,625
R9 Total	3.0	$32,402		6.5	$237,903
Tongass	72.8	-$12,958,400		76.6	-$13,634,800
National	86.7	-$13,067,851		103.9	-$12,808,755

Appendix Table A1. Resources Planning Act (RPA) Assessment regions and Forest Service Regions.

RPA Region	Forest Service Region
Pacific Coast	Pacific Southwest (R5), Pacific Northwest (R6), Alaska (R10)
Rocky Mountain	Northern (R1), Rocky Mountain (R2), Southwestern (R3), Intermountain (R4)
North	Eastern (R9)
South	Southern (R8)

APPENDIX A2.

Four national forests revised their estimates of the volume of timber that would be offered from inventoried roadless areas in the next five years. The updated data was not included in the FEIS analysis, although the revised data is provided on the web page. The four national forests were the Bighorn, Wasatch-Cache, Mendocino, and Monongahela. The differences between the original and revised data are presented in Table A2, as well as the differences in regional and national totals.

The revisions do not have a significant effect on planned timber offer volumes at the regional or national level. The largest differences occur in Regions 4 and 5, where the estimated 5-year planned volume would increase 2 percent. The total planned offer would decrease in Region 9, so that total national effects are less than 1 percent. These changes are well within the deviations that occur between planned offer and implementation of planned offer. As described previously, offer accomplishments were about 85% of offer targets between 1996 and 1998. The differences described here are much smaller than the 15% variation between planned goals and accomplishments. The revised volumes would not change the analysis of dependent communities.

Table A2. Comparison of original and revised data for four national forests, regional, and national summaries, for planned offer in inventoried roadless areas in the next five years.

	5-Year Planned Offer	Ave. Ann. Planned Offer		5-Year Affected Volume	Ave. Ann. Planned Volume		5-Year Affected Volume	Ave. Annual Planned Volume
National Forest	**No Action**	**No Action**		**Alternative 2**	**Alternative 2**		**Alternative 3**	**Alternative 3**
Bighorn - Original	3.1	0.6		3.0	0.6		3.1	0.6
Bighorn - Revised	3.1	0.6		2.8	0.6		2.8	0.6
Region 2 - Original	47.8	9.6		33.1	6.6		44.7	8.9
Region 2 - Revised	47.8	9.6		32.9	6.6		44.5	8.9
Wasatch-Cache-Original	0.0	0.0		0.0	0.0		0.0	0.0
Wasatch-Cache-Revised	3.5	0.7		2.5	0.5		2.5	0.5
Region 4 - Original	200.5	40.1		134.0	26.8		145.9	29.2
Region 4 - Revised	204.0	40.8		136.5	27.3		148.4	29.7
Mendocino-Original	1.2	0.2		1.2	0.2		1.2	0.2
Mendocino-Revised	2.0	0.4		2.0	0.4		2.0	0.4
Region 5 - Original	32.5	6.5		6.7	1.3		23.5	4.7
Region 5 - Revised	33.3	6.7		7.5	1.5		24.3	4.9
Monongahela-Original	18.0	3.6		2.0	0.4		16.2	3.3
Monongahela-Revised	15.0	3.0		2.0	0.4		13.9	2.8
Region 9 - Original	78.5	15.7		39.5	7.9		63.4	12.7
Region 9 - Revised	75.5	15.1		39.5	7.9		61.1	12.2
National -Original	1102.3	220.5		804.6	160.9		941.0	188.2
National-Revised	1103.6	220.7		807.7	161.5		941.7	188.3

ENERGY and NON-ENERGY MINERALS[9]

Affected Environment

Public lands, including lands managed by the Forest Service, have long been a vital source of energy and mineral resources in the United States, and this important role is not likely to change in the foreseeable future. A large share of the significant onshore undiscovered recoverable crude oil and natural gas is thought to reside under public lands. The U.S. has extensive demonstrated reserves of coal. Much of the coal in the east and Midwest is privately held, including valid and existing rights to deposits underlying some national forests. Extensive coal reserves also exist beneath the northern Great Plains. Furthermore, many tracts considered highly favorable for the occurrence of metallic mineral deposits are partially or totally under public ownership.

The level of interest in exploring for and developing energy and mineral resources on public lands is dependent upon many factors, including mineral potential, the regulatory framework (taxes, environmental regulations, etc.), and market conditions. Many mineral commodities produced from public lands are traded in competitive, international markets, so mining and energy companies operating on public lands are unable to influence the price they receive for their output.

The demand for minerals is typically derived from the demand by producers for inputs to make final goods and services for consumers. These goods are often in the consumer durable category (e.g., automobiles, houses), the demand for which can be quite sensitive to income levels and interest rates. Changes in economic conditions can, therefore, result in fairly rapid increases or decreases in the demand for minerals. In the short run, the responsiveness of minerals supply to such price changes can be constrained by existing capacity. The result may, therefore, be wider price fluctuations than would be the case if producers could adjust production levels more quickly. Since there is a strong correlation between mineral prices and exploration and development interest, these price fluctuations can cause the level of mineral activities on public lands to vary considerably from year-to-year.

U.S. Production and Consumption of Mineral and Energy Resources

A number of significant developments have occurred in mineral and energy markets over the past couple of years. The Asian economic crisis led to a drop in the demand for base metals, while, at the same time, new capacity was coming on-line. The result was a rather drastic deterioration in the price of some commodities (e.g., copper). Several U.S. copper mines have closed, and there has been a major realignment of the domestic copper industry. Phelps Dodge has acquired all the assets of Cyprus Amax, and Grupo Mexico has taken over Asarco's assets (U.S.Geological Survey 2000).

[9] Richard Marshall, Forest Service minerals economist in Missoula, Montana was the primary contributor to this chapter.

Central banks have sold sizable quantities of gold, causing the price of that precious metal to plunge about $100 per troy ounce from 1996 levels. This triggered shutdowns of mines and forced some companies into bankruptcy. On the energy side, the Organization of Petroleum Exporting Countries (OPEC) agreed in March 1999 to cut crude oil production, which, along with strong demand in the U.S. and the economic recovery in Asia, caused prices to almost triple from March 1999 to March 2000 (U.S. Department of Energy, 2000). Thus, while some mineral and energy markets have been relatively stable in recent years, others have been quite volatile.

Total U.S. energy production has remained relatively constant since 1990. Measured on a British Thermal Unit (Btu) basis, petroleum, coal, and natural gas account for more than 80 percent of domestic energy output (U.S. Department of Energy, 2000). Crude oil production in the U.S. has declined steadily since the mid-1980s. The Energy Information Administration (EIA) forecasts that U.S. energy production will increase 0.5 percent per year from 1998 to 2020, with most of the growth attributable to coal and natural gas (U.S. Department of Energy, 1999a). Crude oil production is expected to continue to decline through 2010 before rebounding slightly.

U.S. coal production rose steadily from the early 1960s through most of the 1990s. The number of operating mines fell through this period, but average production per mine increased. Coal prices declined through the 1990s and are expected to continue to decline in the near future, which will continue to limit investment in exploration and 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 to 30 years, as existing reserves are depleted (Bonskowksi 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 the Powder River Basin where low-sulfur coal can be surface mined at relatively low cost (Bonskwoski 1999). Western coal reserves are primarily found in Federal ownership. Federal coal production is concentrated in Colorado, Montana, Utah, and Wyoming, with smaller amounts of production in Alabama, Kentucky, New Mexico, North Dakota, Oklahoma, and Washington.

Domestic energy consumption rose by 1.6 percent in 1999 after expanding at a much lower rate over the 1996-1998 period (U.S Department of Energy, 2000). Most of the increase in 1999 was due to higher consumption of petroleum products, particularly in the transportation sector. EIA data shows that, in addition to more vehicles, miles driven per motor vehicle are outpacing gains in fuel efficiency (U.S. Department of Energy, 1999b). According to EIA, U.S. energy consumption is forecast to grow at an annual rate of 1.1 percent to the year 2020 (U.S Department of Energy, 2000). The gap between consumption and production will, of course, have to be met by a higher level of imports.

The value of nonfuel minerals production in the U.S. decreased for the second year in a row, totaling $39.1 billion in 1999 (U.S. Geological Survey n.d.). The higher value of industrial minerals production was not enough to offset the decline in the value of metals mine output. Lower metals prices and mine closings both contributed to the drop in

production value. Even though gold output decreased in 1999, the U.S. remained the second largest gold-producing country in the world.

Demand for phosphate in the U.S. has steadily increased since the early 1960s, primarily because 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 more than 80% of total domestic production (Jasinski 1999).

The strong performance of the U.S. economy resulted in an increase in the domestic consumption of many nonfuel mineral commodities in 1999. For example, the U.S. Geological Survey's domestic consumption estimates for copper, gold, lead, silver, and zinc were above 1998 levels (U.S. Geological Survey n.d.). Nevertheless, prices for these commodities, which are determined in international markets, all fell in 1999, indicating that global surplus capacity conditions had not improved appreciably.

Import Dependence

Net imports (i.e., imports minus exports) of crude oil and petroleum products amounted to 49.6 percent of products supplied in 1999, down from 51.6 percent in 1998 (U.S. Department of Energy 2000). In both absolute terms and expressed as the share of products supplied, net imports increased throughout most of the 1990s. OPEC was the source of 46 percent of total imports in 1999, and about 23 percent of all imports came from Persian Gulf countries. Although the share of imports originating from Persian Gulf countries has been growing since 1996, it is similar to the figures recorded in the late 1980s and early 1990s and lower than the percentages of the late 1970s. Canada and Mexico are other important sources of crude oil and petroleum product imports.

Net imports of natural gas accounted for just under 16 percent of U.S. consumption in 1999. The share of consumption met by imports has more than tripled since the mid-1980s. Over 95 percent of natural gas imports come from Canada. In contrast to the situation for crude oil and natural gas, the U.S. is a net exporter of coal.

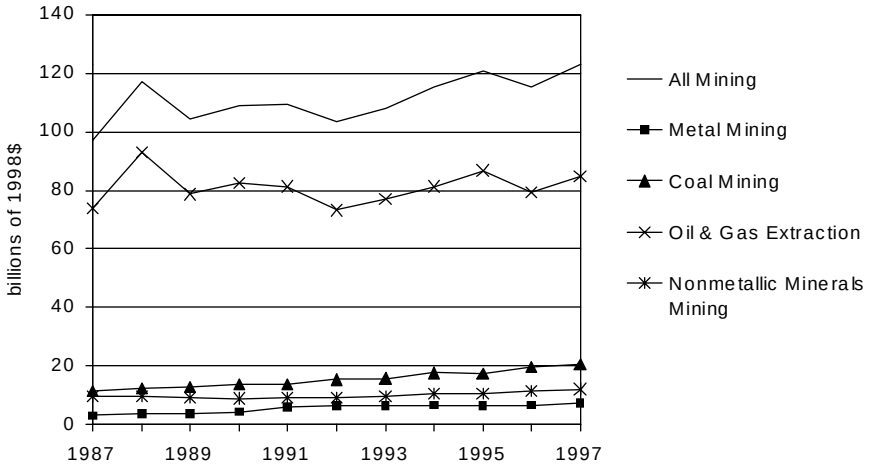
The reliance of the U.S. on imports of nonfuel minerals varies considerably by commodity. There are a number of commodities where more than 80 percent of domestic consumption comes from foreign sources. Some of these commodities and their net import reliance percentages are chromium (80 percent), fluorspar (100 percent), manganese (100 percent), and tungsten (81 percent). The U.S. is not as dependent on imports for certain other nonfuel minerals, such as copper (27 percent net import

reliance), lead (20 percent), phosphate (7 percent), silver (14 percent), and zinc (30 percent). The U.S. is a net exporter of gold and molybdenum.

Minerals in the U.S. Economy

In constant dollar terms, mining contributed more than $120 billion to gross domestic product (GDP) in 1997, compared to slightly less than $100 billion ten years earlier (Figure 7). Mining's share of total GDP is approximately 1.5 percent. The oil and gas extraction sector's contribution to GDP has fluctuated around $80 billion over the 1987-1997 period. That sector accounts for about two-thirds of mining GDP. The GDP originating from metal mining has been rather flat over the past few years, while coal mining and nonmetallic minerals have generally been trending upward.

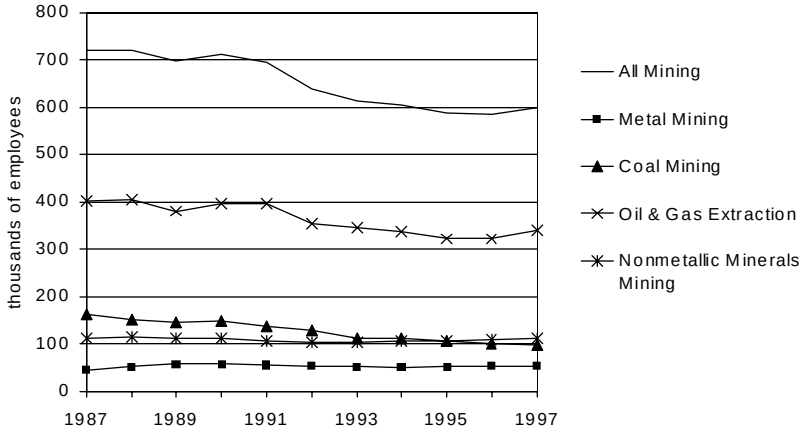
Figure 7. Gross Domestic Product of the U.S Mining Industry



Source: U.S. Department of Commerce, Bureau of Economic Analysis, Industry Economics Division, "Gross Product Originating by Industry," http://www.bea.doc.gov/dn2/gpo.htm, January 28, 2000.

Mining employment totaled 600,000 in 1997, slightly above 1995 and 1996 levels. While the number of jobs in metal mining and nonmetallic minerals mining has been relatively stable, the long-term trend in the total number of mining jobs has been downward (Figure 8). There are various reasons for this trend. Some mining sectors have become more capital intensive, so fewer workers are required to produce the same or even higher levels of output. The coal mining sector is an example of the productivity gains that have been achieved. The amount of coal produced per miner-hour rose from 1.77 short tons in 1978 to 6.04 short tons in 1997 (U.S. Department of Energy, 1999a). Coal mining productivity has increased in both underground and surface mines and in mines east and west of the Mississippi River. The most productive coal mines are surface mines west of the Mississippi, where output is 18.63 short tons of coal per miner-hour.

Figure 8. Full and Part-Time Employees in the U.S. Mining Industry



Source: U.S. Department of Commerce, Bureau of Economic Analysis, Industry Economics Division, "Gross Product Originating by Industry," http://www.bea.doc.gov/dn2/gpo.htm, January 28, 2000.

Another factor in the decrease in mining employment is the significant decline in exploration activity in some mining sectors. In 1999, 2,128 oil and gas exploration wells were drilled in the U.S., far below the 1981 peak of 17,499 wells (U.S. Department of Energy, 2000). Although exploratory and development well success rates are higher than a few years ago, crude oil discoveries have not been sufficient to prevent steadily falling production levels. U.S. natural gas output, on the other hand, has been relatively stable.

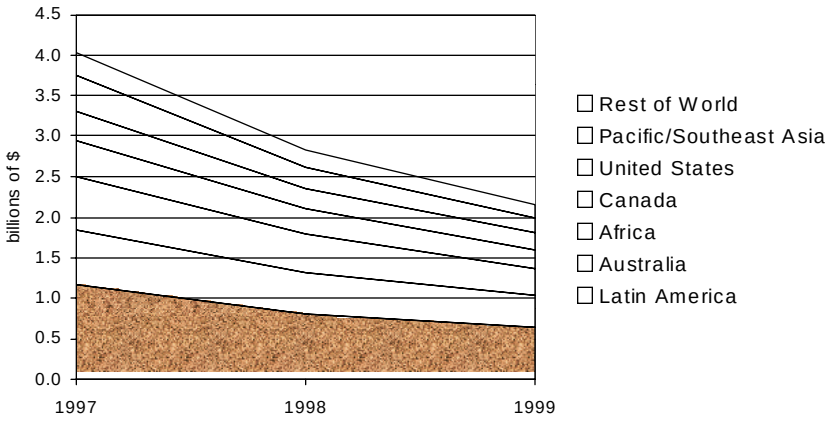
After several years of higher activity levels, worldwide exploration expenditures for nonferrous metals decreased by almost 50 percent between 1997 and 1999 (Figure 9). As Figure 9 indicates, all regions were affected by the drop-off. The employment figures shown in Figure 8 do not yet reflect this decrease in exploration or the recent shutdowns of a number of metals mines.

Even though it accounts for a relatively small share of U.S. GDP and employment, the mining industry can be very important to the local economy. Of the more than 3000 counties in the lower 48 states, mining earnings exceed 15 percent of total earnings in 109 of these. A disproportionate number of the mining-dependent counties are within or close to national forests. Of the 796 "national forest" counties, 67 have mining earnings greater than 15 percent of total earnings. These mining-dependent national forest counties are geographically dispersed throughout the lower 48 states (Figure 10).

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, 3 counties on other nonmetallic mining, and 1

county is dependent on mineral materials mining. The most mining-dependent national forest county is Eureka County, Nevada, where 87 percent of total earnings are derived from metal mining.

Figure 9. Exploration Expenditures for Nonferrous Metals, by Area



Sources: *Mining Engineerin, 1997 and 1999.*

Figure 10. NFS Counties with Greater than 15% of Earnings from Mining

Mineral Activities on National Forest System Lands

A number of mineral commodities are produced from National Forests and Grasslands, including those commodities listed in Table 22. For some of these commodities, output from National Forests and Grasslands 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. Even where the National Forest/Grassland's share of total U.S. supply is small, NFS 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 NFS lands. Figure 11 shows, for selected commodities, the percentage of U.S. mine production coming from National Forests and Grasslands.

Table 22. Energy and Mineral Outputs From National Forests and Grasslands

Energy Minerals	Base Metals	Precious Metals	Nonmetallic Minerals
crude oil	Copper	gold	sand
natural gas	Lead	silver	gravel
coal	molybdenum	platinum	crushed stone
geothermal	Zinc	palladium	dimension stone
			phosphate
			pumice
			quartz crystals

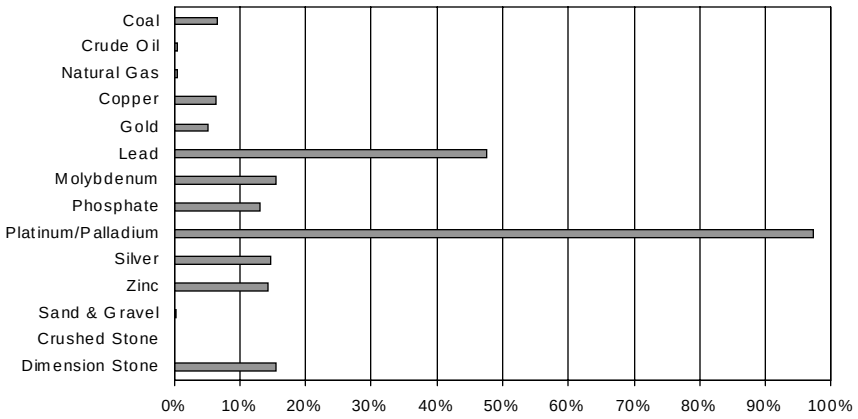
The total number of energy and non-energy operations processed by the Forest Service declined about 24 percent from 1997 to 1999. An increase in energy operations, primarily due to interest in coal bed methane, was not enough to offset the drop in non-energy activity. Prices for some metals (e.g. copper**,** 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, environmental regulations are often seen as a disincentive to exploration and development on federal lands. Recent price increases for crude oil and natural gas could result in renewed interest in NFS lands.

Oil and gas production from federal leases are an important source of U.S. production. In 1999, 36% of total U.S. gas production and about 29% of total U.S. oil production came from federal leases. About 83% of the federal production came from off-shore leases. Oil and gas production from NFS lands is entirely from federal onshore leases. In 1999, about 8.5 million barrels of oil and 76 billion cubic feet of natural gas were produced from NFS leases. This production accounted for slightly over 1% of federal production and about 0.4% of total domestic oil and gas production.

Coal production from federal lands increased between 1977 and 1992, mostly in the western U.S. Federal production accounted for about 31% of total U.S. coal production in 1998. Production from Wyoming accounted for 78% of the federal production in that year. In 1998, coal production from federal leases on NFS lands accounted for about 20% of federal production, and about 6% of total U.S. production. Although the majority of western coal is surface mined, most coal production on NFS lands comes from underground mining in Colorado (Grand Mesa-Uncompaghre-Gunnison National Forest) and Utah (Manti LaSal National Forest). In 1999, over 22 million tons of coal were produced from nine coal mines on the Manti La-Sal, accounting for 82% of total coal production in Utah. NFS production is expected to increase in the future, but its share of production is expected to decrease as output expands at a faster rate on other ownerships.

Phosphate production from NFS lands has increased since the mid-1980s, both in total quantity and as a proportion of domestic production. Western production will remain important for providing raw material for fertilizer in the western region and for production of elemental phosphorous (Jasinski 1999). The majority of western production occurs on the Caribou National Forest, accounting for about 12% of domestic production in 1999.

Figure 11. 1998 NFS Minerals Production as a Percentage of Total U.S. Production



Sources: 1. USDA Forest Service 1999c. And 1998
2. U.S. Geological Survey n.d.
3. U.S. Department of Energy, 1999.
4. Company annual reports, various dates. `
5. Securities and Exchange Commission, n.d.

Revenue Sharing From NFS Minerals Production

Mineral activities on federal lands often generate revenue to the U.S. Treasury. The Treasury receipts result from royalties (a share or percentage of the mineral value produced), rents (annual payments required to maintain lease rights), bonus payments (the cash amount of the bid winning lease rights), and other fees, such as payments to remove common variety minerals. A portion of the Treasury receipts is returned to states and counties, frequently to be used for schools, roads, or both.

As discussed above, minerals on federal lands are disposed of under a variety of authorities, and determining the percentage of mineral receipts that are returned and the recipient of the disbursements (i.e., states or counties) can be rather confusing. Depending upon the statute that applies and certain other factors (e.g., national forest vs. national grassland, acquired minerals vs. public domain minerals), states or counties usually receive either 25 percent or 50 percent of the U.S. Treasury receipts. Mineral activities on National Forests and Grasslands generated over $100 million in receipts to the U.S. Treasury in 1999, most of which is attributable to royalty payments on leasable minerals production (Table 23).

Table 23. 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
Total	**104.4**	**45.9**

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

Economic Impacts of Mineral Activities on NFS Lands

An input-output model called IMPLAN was used to estimate the number of jobs and the amount of income attributable to minerals production on NFS lands (Table 24). IMPLAN is designed to analyze the economic effects of a change in commodity output resulting from an increase or decrease in the demand for that commodity. The 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 new household income generated by the direct and indirect effects of the output changes.

Table 24 shows that there are direct impacts not just in the mining sector but also in manufacturing. This is because the further processing that takes place to recover certain mineral commodities falls into the manufacturing category. An example would be the primary smelting and refining of copper, which is classified as a manufacturing activity distinct from the mining phase. When it was possible to establish that the further processing of the NFS minerals production took place in the U.S., the change in demand was allocated to that "downstream" sector, rather than the mining sector.

Table 24. Employment and Labor Income Attributable to Minerals Production from National Forest System Lands, 1999.

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

As Table 24 indicates, over 40,000 jobs and about $1.8 billion in labor income (employee compensation plus proprietors income) were generated from minerals production from NFS lands in 1999. In addition to the sizable direct impacts on the mining and manufacturing sectors, minerals output from NFS lands has significant economic effects on other industries, particularly trade and services. Jobs and income in those sectors are largely the result of employees and business owners spending their earnings (i.e., the induced impacts).

Minerals Policy on NFS Lands

Federal law and Forest Service policy clearly support the exploration for and extraction of mineral resources from public lands. Leasable resources (metallic minerals found on acquired lands and all energy resources) are managed under the Mineral Leasing Act of 1920, as amended. Locatable minerals (primarily metallic minerals on public domain lands) are managed under the General Mining Law of 1872. Salable minerals (common varieties such as sand and gravel) are managed under the Mineral Materials Act of 1947.

Under the General Mining Law of 1872, U.S. citizens and firms have the right to explore for and stake claims to selected minerals on all public domain lands not specifically withdrawn from mineral entry. Claims are valid in perpetuity or can be converted to private property rights (that is, patented) assuming that appropriate legal requirements are fulfilled. The Forest Service cannot unilaterally deny exploration access to NFS public domain lands, although the agency does have the right to withdraw specific areas from further mineral entry. The agency cannot prevent claim-staking on these lands, and a claim holder is entitled to use the surface for activities attendant to mineral exploration, development, and extraction, within the otherwise legal patent (that is deny a claim holder the right to convert the claim to private property). The Congress can – and has – placed a moratorium on new patents, but the moratorium could be lifted in the future. In

any event, hundreds of thousands of patented and unpatented claims are already held within the administrative boundaries of the NFS.

The Forest Service has considerably more control over the location of exploration and development activities for leasable minerals than it has for locatable minerals. For national forests and grasslands with completed oil and gas leasing EISs, petroleum exploration activities are restricted to areas designated as appropriate in those documents.

The Forest Service is required by law to provide reasonable access to valid existing mineral rights, regardless of their form, whether unpatented claim, lease, or private property in the form of a patented claim or a subsurface mineral right. An unpatented claim is an implied property right than can be held, sold, or inherited and access is regulated under the Mining Law of 1872. Patented claims are private property, and access is regulated under the Alaska National Interest Land Conservation Act of 1980 (ANILCA). Coal, oil and gas, and mineral leases also offer a limited form of property right. The rights to individual energy and mineral resources may be held by different legal entities and the mineral rights may be severed from the surface, which is termed a "split estate." Access to unpatented inholdings, patented claims, leases, and severed minerals rights can be restricted, but seldom denied. Access may be accomplished by the existing road system or require new roads. The Forest Service is neither required by law nor expected by industry to build or maintain energy and mineral access roads. However, industry can use roads built by the Forest Service for other purposes. The firm is always required to maintain the road or pay for road maintenance needed for their activities.

The Forest Service can affect the location and design of roads built on NFS lands to support energy and mineral activities. The agency can also place stipulations on access by limiting road use to certain months, permitting aerial access only, or precluding surface occupancy. Constraints that are unduly expensive to fulfill or so restrictive as to make an otherwise economic mineral deposit uneconomic might be perceived as denying reasonable access.

Economic Effects

Alternative 1 – No Action

Under the No Action Alternative, forest plan and other lease, license, permit, or sales decisions would be implemented and mineral operations would be approved under existing authorities. Mineral activity on NFS lands will continue to depend upon such factors as market conditions, environmental regulations, tax policies, technological advances, and mineral potential.

Within the next 5 years, several new metal mines on NFS 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 NFS 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.

Phosphate mining is expected to continue to expand on NFS lands in southeastern Idaho. Operators of current mines all have plans to expand existing operations. These operators also own processing facilities, either for phosphate fertilizer products or elemental phosphorus production. Current production levels are expected to be maintained or possibly increase in the near future.

In 1998, coal production from federal leases on NFS 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 1999a).

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.

Alternatives 2 through 4

The economic effects focus on how the alternatives affect future exploration and development of energy and non-energy minerals. The effects would be similar under Alternatives 2 through 4. 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.

The alternatives would not affect road construction and reconstruction providing access to and development within existing lease boundaries, but the prohibition would likely prevent expansion of existing lease areas into adjacent inventoried roadless areas, except in situations where development can be done without road construction. In many cases, such expansion is more economically advantageous to the operator than developing new deposits. In addition, expansion could result in less environmental damage than beginning new development outside of inventoried roadless areas, if leasable deposits are available.

Where reserves are known to occur in inventoried roadless areas, the prohibition alternatives are likely to preclude future development. The economic effects of precluding development depend on the availability of alternate resources in areas that may be available for leasing (either on NFS lands or on other ownerships). Since mineral deposits tend to be concentrated in some geographic areas, it is likely that impacts would

also be concentrated in a few areas. The most immediate economic effects of the prohibitions are associated with current proposals to expand existing leases into adjacent inventoried roadless areas for phosphate and coal mining.

Phosphate mining on the NFS currently occurs only on the Caribou National Forest in southeastern Idaho. There are eight Known Phosphate Lease Areas[10] (KPLAs) in southeastern Idaho, totaling more than 81,000 acres. About 48% of those acres are on NFS lands administered by the Caribou National Forest Land and Resource Management Plan. Almost 60% of the KPLA lands on the Caribou National Forest are currently leased, with 26% of the leased acres within inventoried roadless areas. However, these area includes leases on areas that have already been developed and contain no more minable phosphate rock.

Three mines are currently operating on the Caribou, with a fourth operation scheduled to begin soon. One of the mines is currently operating partially within an inventoried roadless area, and accounts for about half of the phosphate rock 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 on 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 phospate mining on the Caribou.

If production is not allowed to go forward at either site, then production will be interrupted. The operator would not have sufficient time to do the required permitting and construction necessary to develop substitute reserves before reserves at the existing site 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 the possible imposition of 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 (estimated current production level) were estimated to illustrate the level of impacts that could occur if the road prohibition precludes development of reserves within inventoried roadless areas (Table 25). An interruption in supply would also affect jobs at the production facility that is owned by the mine operator, but those impacts are not included in the table.

Over the long term, phosphate leasing potential on NFS and non-NFS lands outside of inventoried roadless areas is generally limited to small areas that are contiguous to existing leases or deposits with a low development potential. More than 1,000 acres in 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.

[10] A Known Phosphate Lease Area is land known to contain phosphate deposits and is classified by the USGS as subject to competitive leasing.

The short-term effects for coal mining are linked to expanding existing mines into inventoried roadless areas. On the Grand Mesa-Uncompaghre-Gunnison National Forest, one coal mine operator is interested in expansion into surrounding 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 4 to 5 years. If production cannot be expanded into inventoried roadless areas, the mine could close when current reserves are exhausted. The potential effects on jobs and labor income of reducing production by 7 million tons per year are shown in Table 25. The impacts of a closure would be concentrated in the local communities where the workers reside (see Forest Dependent Communities section). If substitute coal development occurs within the same geographic area, then these effects could be offset.

The Manti-LaSal National Forest has identified three potential coal tracts with proven reserves that are partially within inventoried roadless areas. Even though these tracts would be mined underground, road access is often needed for pre-lease exploration drilling in order for interested bidders to gather sufficient information for bidding. Bonus bids are likely to be reduced if the tracts are offered for lease, since bidders will not have complete information about the deposits, and will be uncertain about access to portions of the reserves. Recent bonus bids for two major leases on the forest have were $16.9 and $25.2 million, for lease tracts with estimated recoverable reserves of between 60 and 63 million tons of coal. A reduction in bonus bids reduces returns to the U.S. Treasury, and the share of receipts to the states. 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 recoverable reserves, of which 50 million tons is within inventoried roadless areas. None of the tracts have been offered for lease to date. It is difficult to predict possible bonus bids, and likely future production levels.

There is interest in new natural gas development on several forests, and continuation of oil and gas leasing in other areas. Although oil and gas production on NFS lands is a minor portion of national production, it is an important source of economic activity in some communities. For example, the Little Missouri National Grasslands in North Dakota accounted for about half of total NFS production in 1999. The prohibition on road construction and reconstruction will have no effects on current leases, and therefore no short-term economic impacts are expected. If road prohibitions are implemented when leases expire, there is little likelihood that future exploration and development could occur. However, oil and gas can sometimes be produced under a lease with a no surface occupancy stipulation using technologies such as directional drilling. A number of other forests have identified areas of high oil and gas potential within inventoried roadless areas.

Table 25. Annual economic impacts of prohibitions on road construction and reconstruction in inventoried roadless areas for selected mineral commodities and national forests.

Commodity	National Forest	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.

For salable minerals, the prohibition on road construction and reconstruction would reduce the demand for mineral materials (e.g., crushed stone) used in building roads on NFS lands. The most likely reason for developing salable deposits in inventoried roadless areas for NFS administrative use is in support of road building in nearby areas and road maintenance in those areas. In the absence of road construction activities, development of these areas is unlikely for Agency use. However, there could be impacts on State and local governments and on commercial businesses that would propose development of such sites, even though transportation costs could be substantial. These effects should be highly localized, primarily in areas where substitute deposits are scarce on NFS lands outside of inventoried roadless areas or non-NFS 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.

Effects on Undiscovered Resources

The most difficult effects to assess are the effects of prohibiting road construction or reconstruction on future development of resources that have yet to be discovered[11]. The U.S. Geological Survey (USGS) has conducted assessments of undiscovered deposits of

[11] Undisovered 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. (US Geological Survey 1980)

numerous mineral resources. 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 (see maps at end of section). Tables 26 to 28 contain the results of the comparisons for gold, silver, copper, lead, zinc, oil, and natural gas. In Tables 26 and 27, the quantity and value of undiscovered resources are shown at the 50^{th} percentile, which means there is an equal (50%) 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 Table 28. The quantities and values shown in these tables are estimates within the entire region, not within inventoried roadless areas.

The data in Tables 26 to 28 indicate that there are potentially valuable mineral deposits within these permissive tracts and provinces, and therefore, valuable deposits may underlie inventoried roadless areas. However, the probability of these deposits occurring under inventoried roadless areas is unknown. In most cases, inventoried roadless areas account for a small portion of the permissive tract or province. (The maps at the end of this chapter show roadless areas overlaid on oil and gas provinces and on permissive tracts for metallic mineral deposits.) This is particularly true in the East, where NFS lands account for a small portion of the total land area, and inventoried roadless areas are a small percentage of total NFS lands. The likelihood of deposits occurring within inventoried roadless areas is higher in the Intermountain West, where many areas of inventoried roadless areas are located, and where most of existing mining activity occurs on NFS lands.

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, Alternatives 2 to 4 would reduce the investment attractiveness of conducting activities in inventoried roadless areas and cause some portion of the mineral resources to remain undeveloped. The amount of the resources that would be affected and magnitude of the related economic impacts would depend, in part, on the availability of alternative investment opportunities.

Table 26. Estimates at the 50th Percentile of Undiscovered Resources of Gold, Silver, Copper, Lead, and Zinc for Permissive Tracts Containing Inventoried Roadless Areas (metric tons).

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
Total All Regions		4,684	142,036	142,166,027	18,400,700	74,570,800

Source: U.S. Geological Survey 1996a.

Table 27. 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

Region	Number of Deposits	1998 Gross Value of Contained Metal (billion dollars)				
		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	11	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
Total All Regions	467	44.5	25.3	235.1	18.3	74.0

Source: U.S. Geological Survey 1996a.

Table 28. Mean Estimates of Undiscovered Technically Recoverable Conventional Resources of Crude Oil and Natural Gas for Provinces Containing Inventoried Roadless Areas.

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
Midcontinent	0.26	2.8	19.58	6.5
Eastern	1.47	16.0	11.54	18.4
Total All Regions	20.80	226.1	171.34	332.4

Source: U.S. Geological Survey 1996b.

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 G7. 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 period. 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, 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 29 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 resource estimates in Table 29 within inventoried roadless areas is unknown. For example, in the Powder River Basin, 87 percent of the estimated coal resources in coalfields containing inventoried roadless areas is federally-owned coal, while in the Williston Basin, only 37 percent is federally-owned.

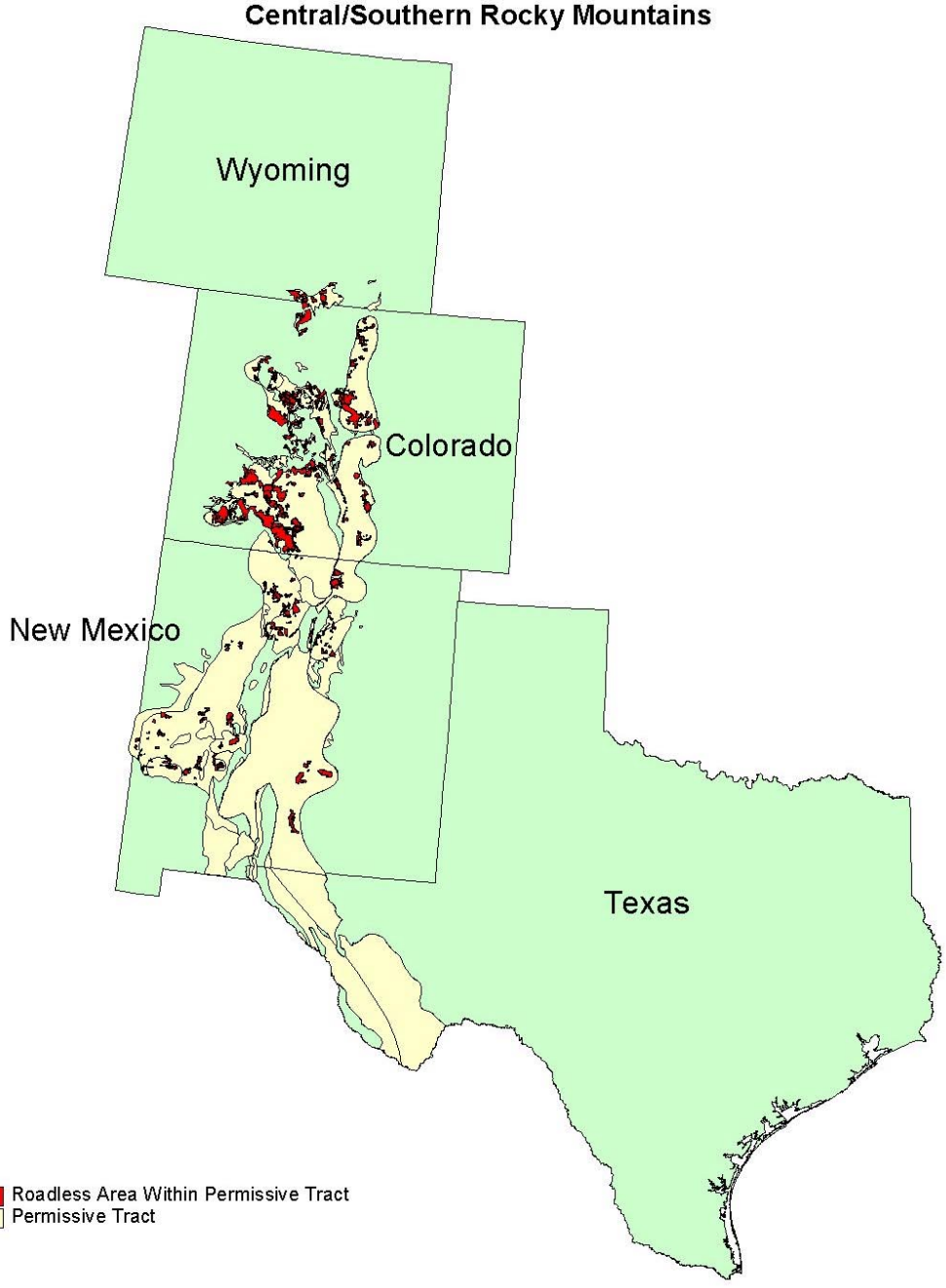
Table 29. Estimates of Coal Resources in the Northern Rocky Mountains and Great Plains Region in Counties Containing Inventoried Roadless Areas (millions of short tons).

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		
Total All Basins		78,492	299,218	377,710	6,614

Source: U.S. Geological Survey 1999.

Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Central/Southern Rocky Mountains



Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

East-Central U.S.

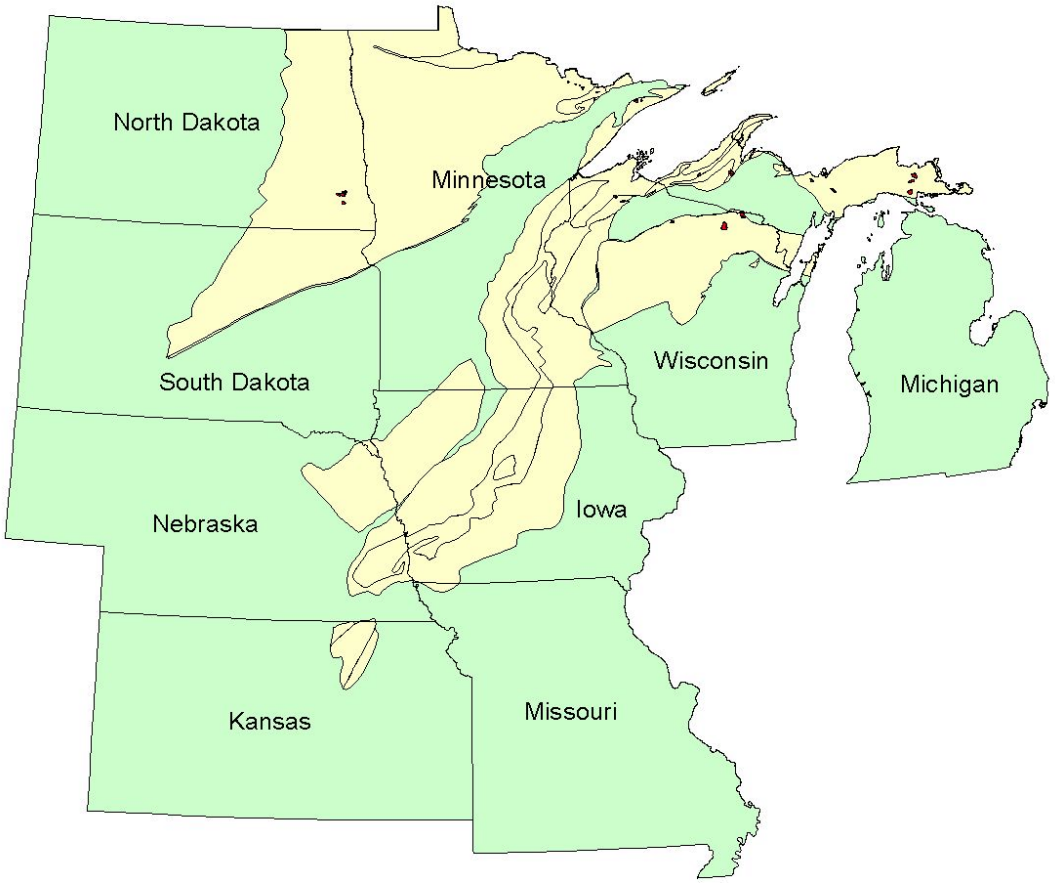
Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Great Plains

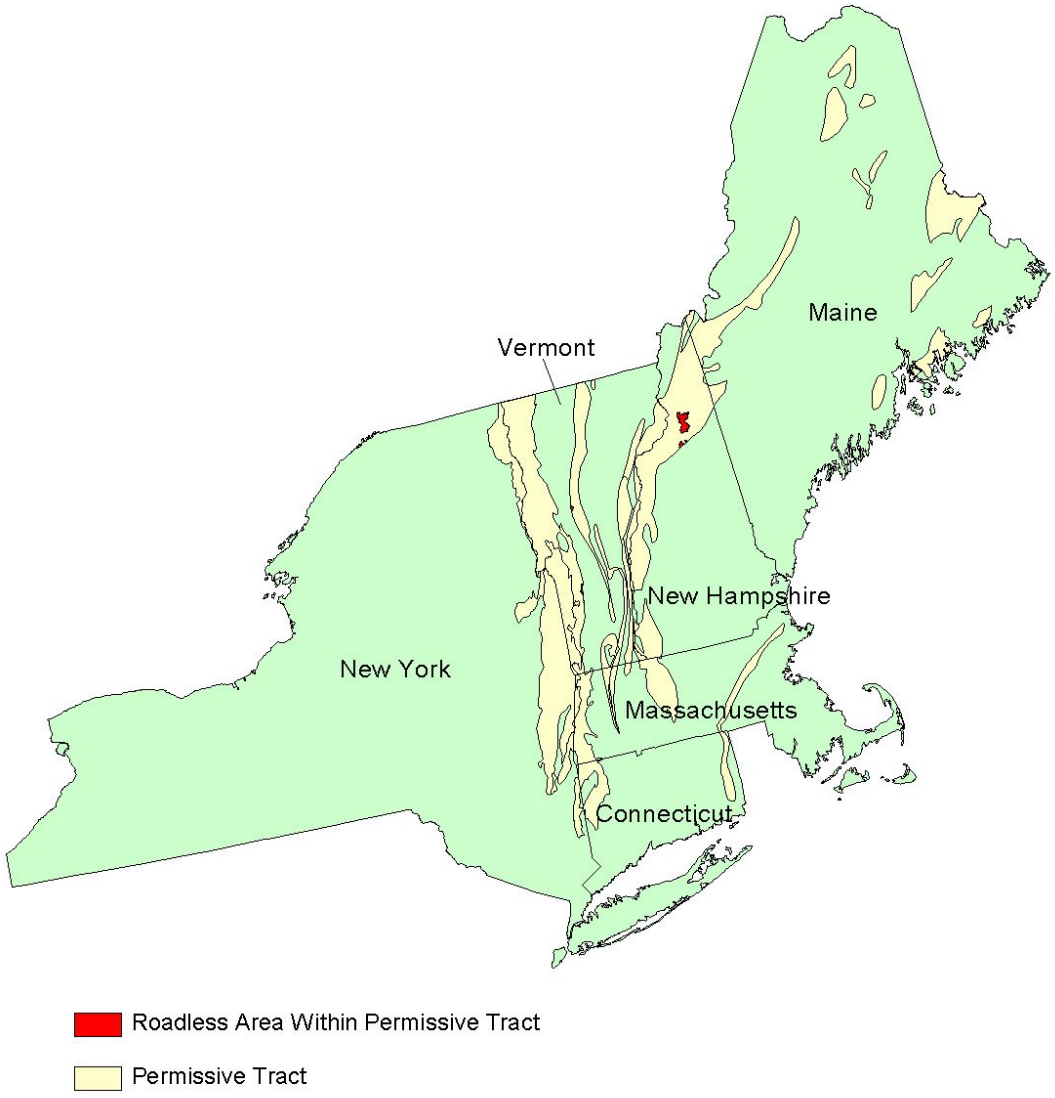
Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Lake Superior



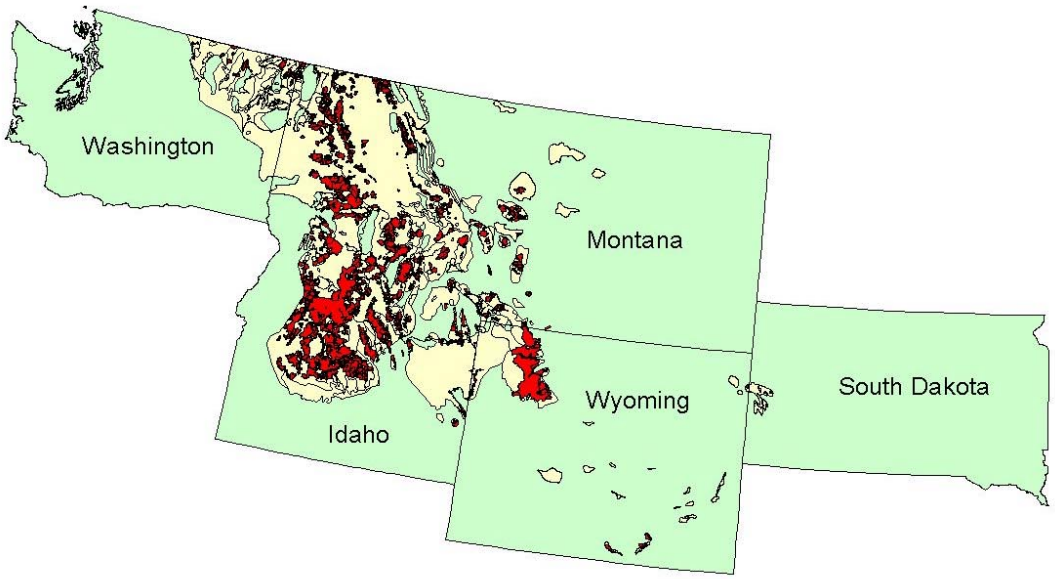
Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Northern Appalachian Mountains



Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

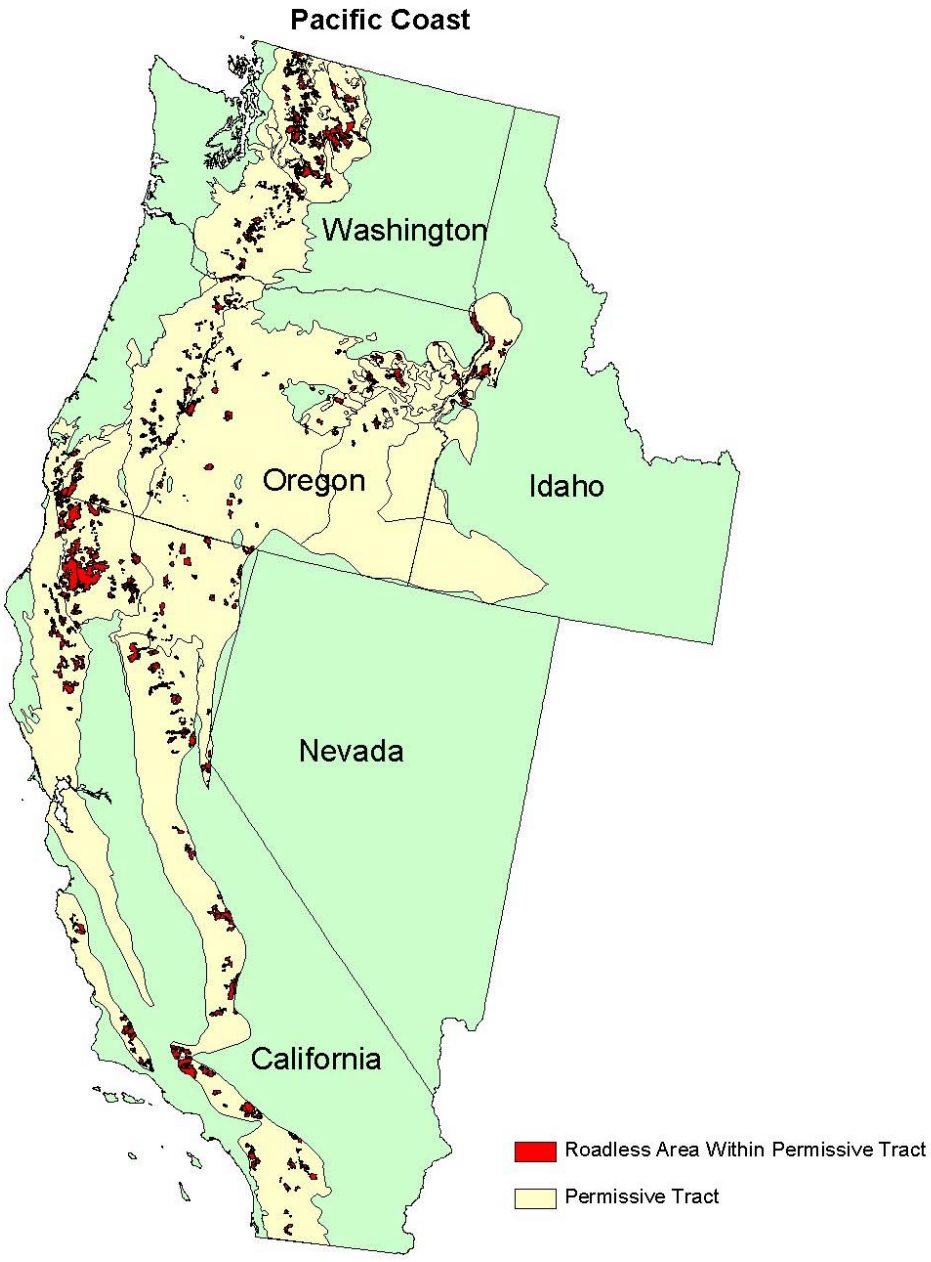
Northern Rocky Mountains



Roadless Area Within Permissive Tract

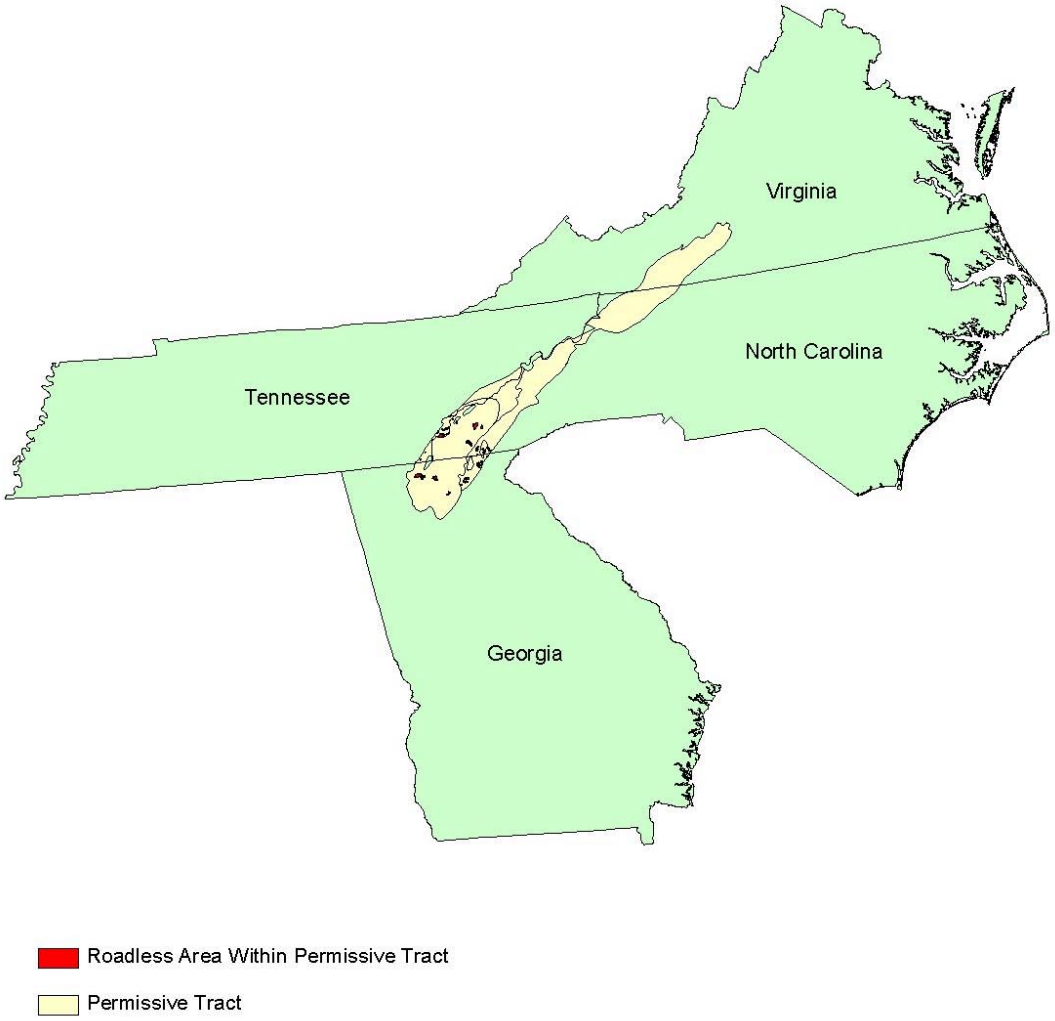
Permissive Tract

Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc



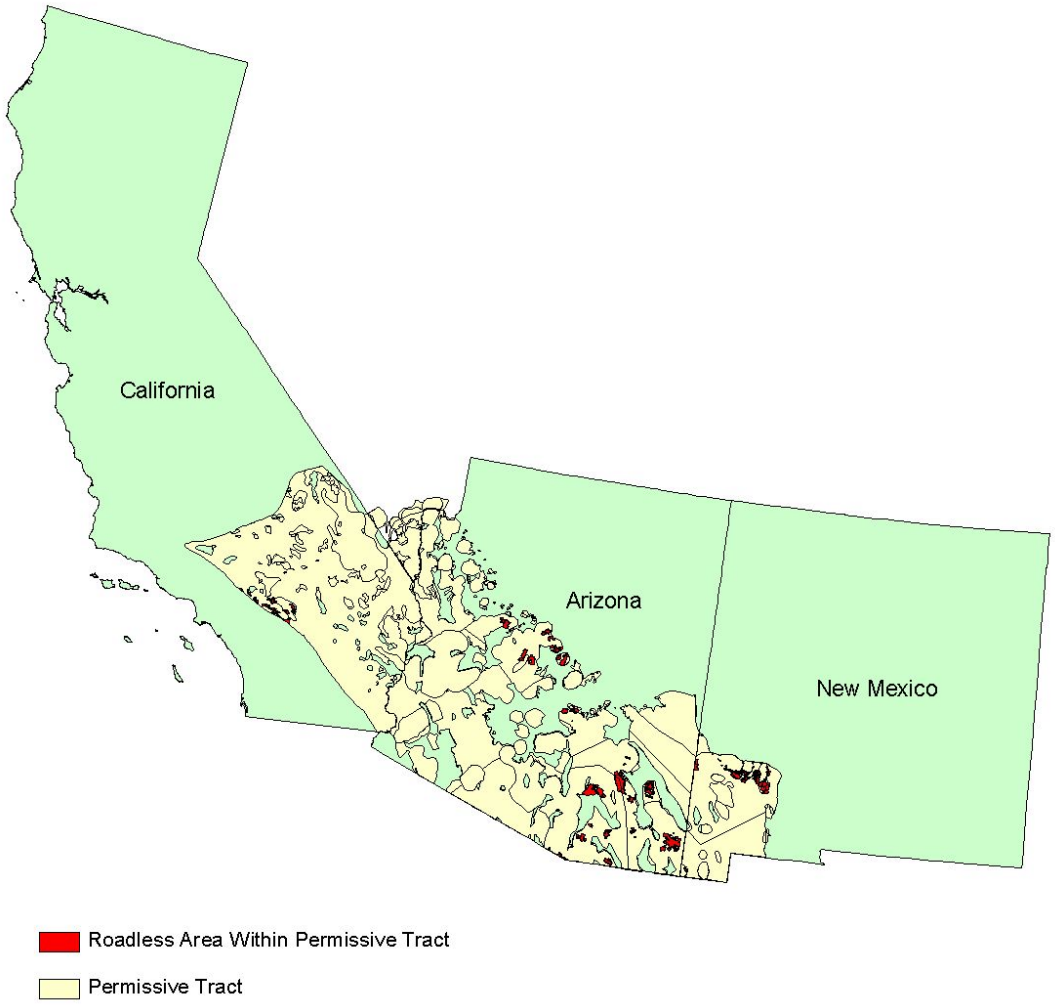
Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Southern Appalachian Mountains



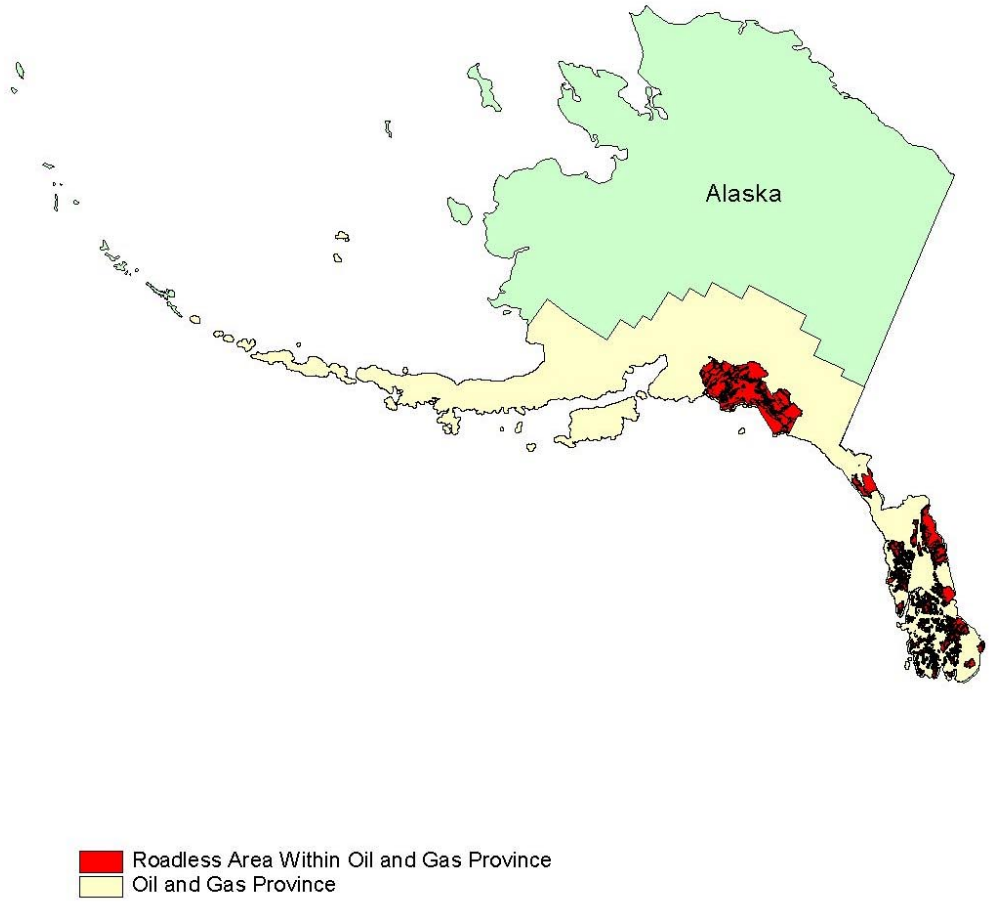
Inventoried Roadless Areas Within Permissive Tracts for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc

Southern Basin and Range



Inventoried Roadless Areas Within Provinces Evaluated For Undiscovered Resources of Oil and Gas

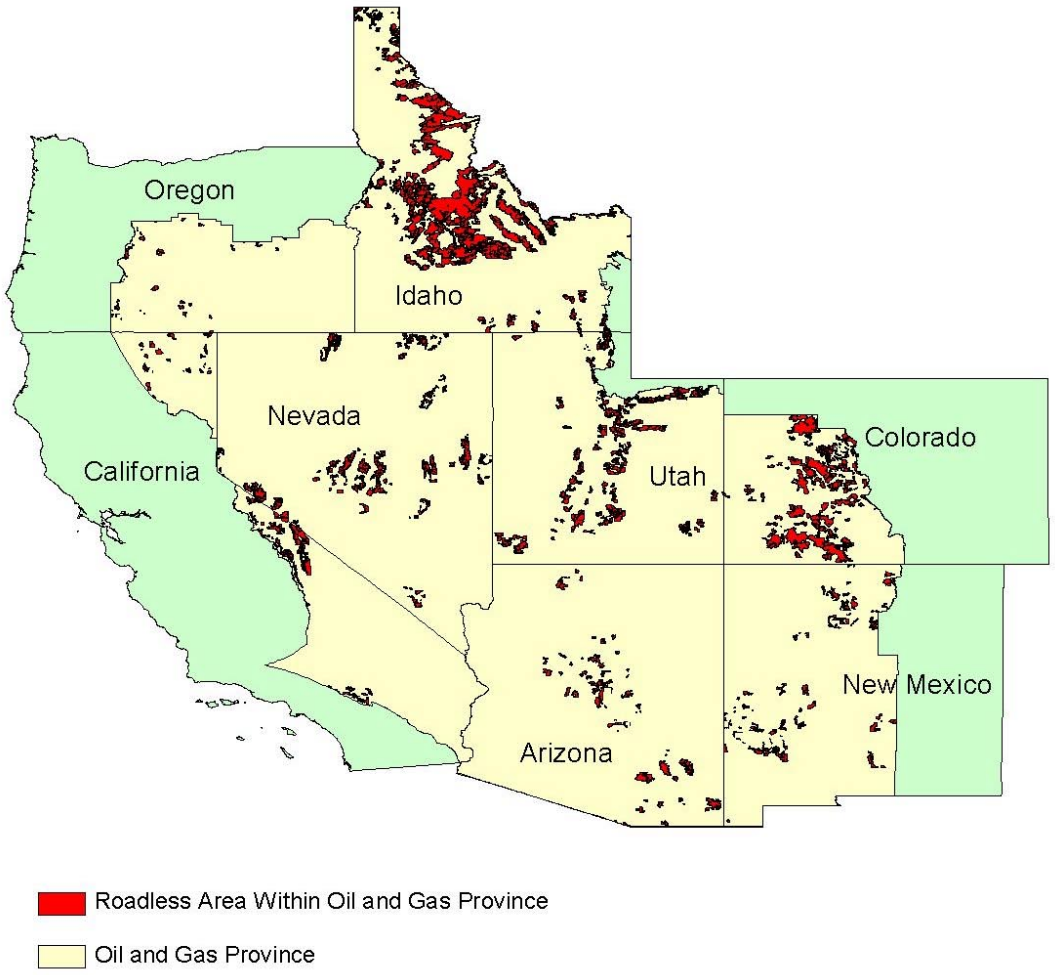
Alaska



Inventoried Roadless Areas Within Provinces Evaluated for Undiscovered Resources of Oil and Gas

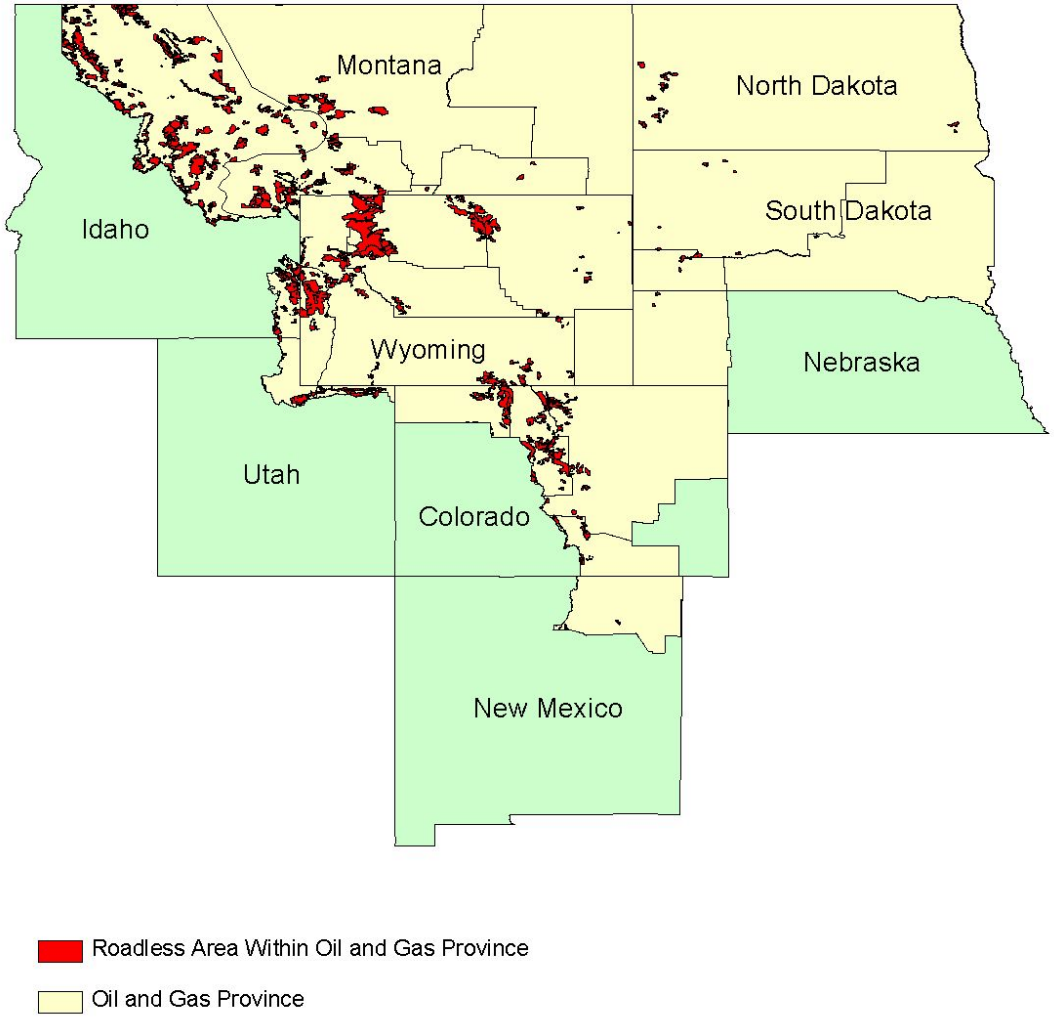
Inventoried Roadless Areas Within Provinces Evaluated for Undiscovered Resources of Oil and Gas

Colorado Plateau/Basin and Range



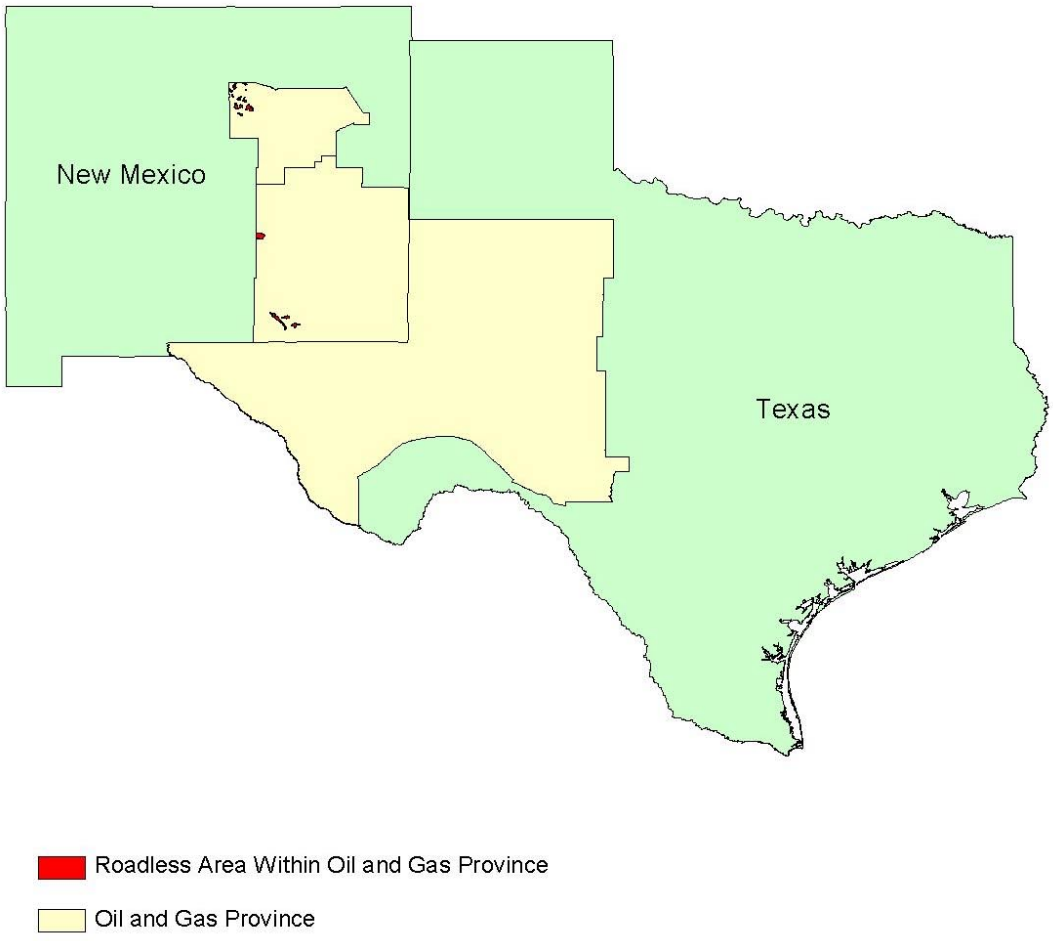
Inventoried Roadless Areas Within Provinces Evaluated For Undiscovered Resources of Oil and Gas

Rocky Mountains/Northern Great Plains



Inventoried Roadless Areas Within Provinces Evaluated for Undiscovered Resources of Oil and Gas

West Texas/Eastern New Mexico



Inventoried Roadless Areas Within Provinces Evaluated For Undiscovered Resources of Oil and Gas

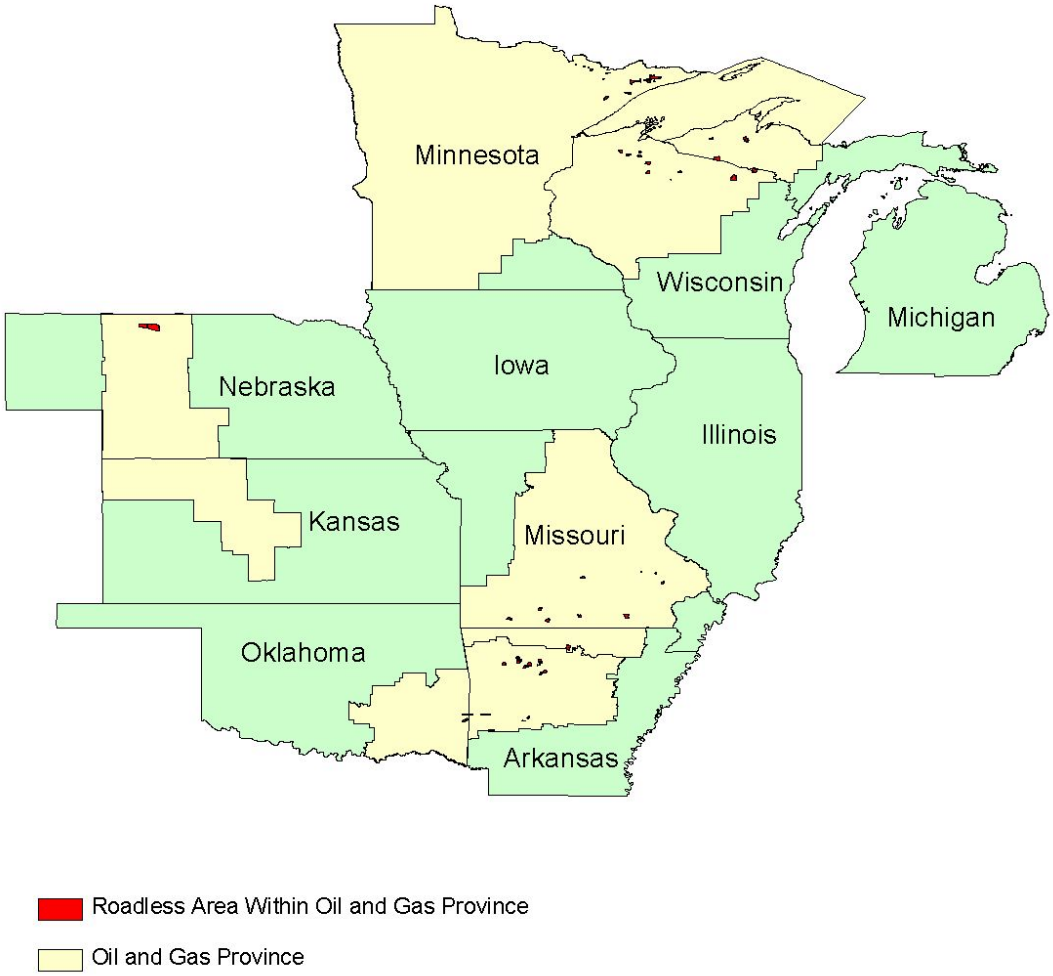
Gulf Coast

Roadless Area Within Oil and Gas Province

Oil and Gas Province

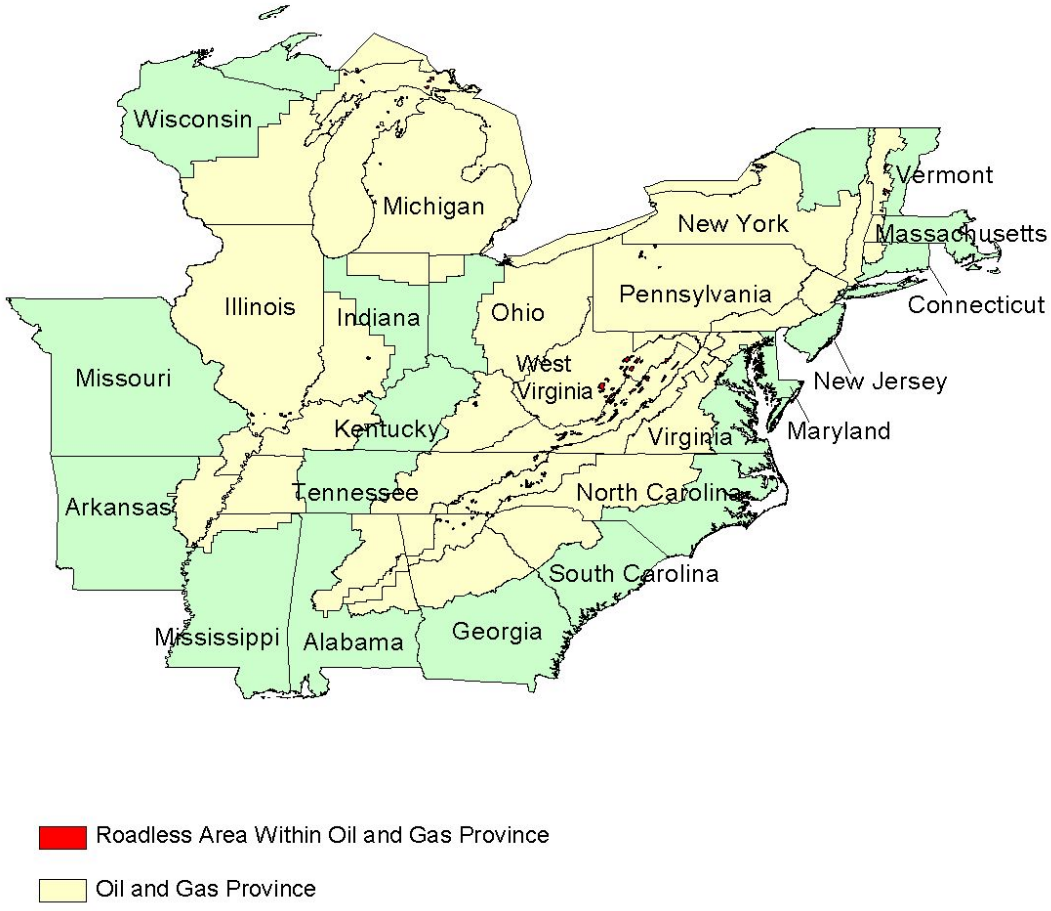
Inventoried Roadless Areas Within Provinces Evaluated For Undiscovered Resources of Oil and Gas

Midcontinent



Inventoried Roadless Areas Within Provinces Evaluated For Undiscovered Resources of Oil and Gas

Eastern U.S.



FOREST-DEPENDENT COMMUNITIES[12]

Affected Environment

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. Stability of resource supplies and uses under a multiple-use doctrine was a major objective. Nondeclining even flow polices for timber were designed in part to address community stability issues. When the stability of resources and uses of National Forest System (NFS) lands could not be assured, economic assistance mitigating the disruption to economic and social systems was often proposed. The National Forest-Dependent Rural Communities Economic Diversification Act in the 1990 Farm Bill sought to provide assistance to rural communities located near National Forests. These were communities that fit a specified definition of "economically disadvantaged" due to the loss of jobs or income derived from forestry, the wood products industry, or related commercial enterprises such as recreation and tourism in national forests (Ashton and Pickens 1995). A congressional hearing in Grangeville, Idaho (July 5, 1995) reflected concern about the future of rural communities, especially those with high employment in industries that rely on management of resources on federal lands. The topic, "Endangered Communities," illustrates the nature of the subcommittee's concerns. Given these concerns about communities, an understanding of the relationship between past agency social policy, land use choices, and rural communities is important.

Stability

The concept of stability, in reference to economy, community, and industry, has been a dominant theme of Forest Service management, especially in relation to timber. In examining community economic stability, the distinction between the business needs of industry and community economic needs is often overlooked (Society of American Foresters Report 1989). While employing local residents, industry interests inevitably differ somewhat from the communities in which they are located.

Forces beyond their control substantially affect both communities and industry. For communities, the effect is cumulative. 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 wood products firms are alternative sources of supply, geographic isolation (proximity to larger labor markets), inter-mill competition for timber supply, inter-community competition for jobs, and changing technology.

[12] Richard Phillips, Forest Service Regional Economist in Portland, Oregon was the primary contributor to the analysis of forest-dependent communities.

Berck and others (1992) sought to examine the influence of timber industry characteristics on community stability against that of larger business cycles by separating the effects of being a small, isolated county with an open economy from the effects of being dependent upon timber. Results showed that the timber industry has surprisingly low variation in employment. It is not much above that of manufacturing as a whole and much lower than agriculture or fisheries. What is different about forestry is the historical extreme reliance of communities on the timber industry alone and that forestry is usually practiced in isolated areas. 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. The study found that areas with proportionately high resource use employment and Forest Service involvement tend to be less diverse. More favorably, these counties tend to be diversifying more rapidly than others. This was attributed to the agency multiple use policy that provides an environment which attracts both tourists and permanent residents to the area.

Forest Service Policy and Communities

Supporting rural communities through management of public lands is primarily a social goal, though it is often framed in terms of economic objectives, such as sustaining jobs or income. Past agency policy and efforts include the willingness and ability of the Forest Service to manage the lands and resources under their jurisdiction for the benefit of communities. Although the Forest Service does not have a specific legal mandate to provide economic stability to rural communities, there is legislative direction that permits and encourages consideration of community economic stability when planning or implementing plans. Thus, the Forest Service has discretion, absent additional guidance from the Congress, to establish economic and social goals appropriate to the agency's missions and available resources.

Use of the national forests for national and regional growth and development was the federal policy when the Organic Act was passed in 1897, and has remained so. Early policy represented a belief that resources existed for the benefit of the local residents who needed them. The 1905 Forest Service's Use Book listed "protecting local residents from unfair competition in the use of forest and range" as a principal objective of the Forest Reserves, apparently in response to concern about the influence of big industry. The Forest Service was an early promoter of using a sustained yield even-flow timber policy to promote the stability of forest communities (Society of American Foresters Report 1989). The Congress, in the White Pine Blister Rust Protection Act of 1940, mentioned for the first time maintaining community stability as the purpose of an act of the federal government. The idea of community stability was firmly connected to timber supply in terms of sustained yield, in the Sustained Yield Forest Management Act of 1944 (Force and others 1993; Society of American Foresters Report 1989). This Act gave authority to establish Cooperative Sustained Yield Units to "promote the stability of forest industries, of employment, of communities, and of taxable forest wealth" intending to support the stability of communities primarily dependent on federal timber. In order to protect domestic wood processing jobs and promote small businesses, the Congress restricted log exports from federal lands and set aside timber for sale to companies with 500 or fewer

employees. The "Morse Amendment" of 1968 prohibited the export of unprocessed logs from National Forests west of the 100th meridian, a prohibition still in effect today.

Beginning in the early 1970s, the Forest Service and the U.S. Small Business Administration implemented a Small Business Set-Aside program. This program set aside a percentage of Forest Service sawtimber sales for exclusive bidding and purchasing by small firms.

The National Forest Management Act (NFMA) of 1976 added substantially to Forest Service community stability policy. It solidified a traditional but contentious even-flow timber supply strategy for National Forests through the sustained yield and nondeclining even-flow provisions in section 11 (36 CFR 219.16) of that law. Both sustained yield and nondeclining even flow were designed in part to address community stability issues. Community stability also surfaced in section 14 (e)(1) of NFMA, requiring bidding methods for timber sales to "consider the economic stability of communities whose economies are dependent on such National Forest materials," with regulations requiring "dependent communities" to be one of several factors considered (36 CFR 223.88). From this, in 1977 and 1987 the Forest Service developed lists of communities expected to better retain wood products employment if nearby National Forests had the option of using either oral or sealed bidding to sell timber (from Forest Service correspondence 1977 and 1987).

Even Flow and Timber Supply

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 Hyde1989). As applied to the community stability problem, this meant maintaining a constant supply of timber so that macroeconomic-induced changes in timber demand did not shut down the mills (and jobs) in rural western communities. The even-flow approach was also used to support existing processing capacity (and jobs) in rural areas aside from dampening the effects of business cycles. In one case, this was formally pursued by authorization of sustained yield units under the 1944 law. In other cases, it became a consideration in agency decisions. The 1977 and 1987 NFMA lists of timber-dependent communities were based more on sustaining customary use than the notion of dampening cyclical effects.

Literature is ambiguous regarding the relationship of sustained timber yields and community stability, as measured by employment in the timber industry (Force and others 1993). Many factors undermine the potential use of even-flow supply of timber to stabilize rural communities regarded as timber-dependent. Macroeconomic forces beyond local control are at work. Federal managers are unable to deliver an even-flow of timber according to projections because of the need to manage for other uses and meet changing public desires. Stabilizing an industry is not the same as stabilizing a community.

Even if the flow of timber sale volume were predictable, it could not be assumed that local mills would be the successful bidder for agency timber sales, or that local communities would 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.

Supply of Other Resources and Uses

Because tourism and recreation, retirement settlement, and other uses of Forest Service lands can provide significant sources of jobs, income, and personal enjoyment, communities value NFS and other public lands for these uses (Society of American Foresters Report 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.

Stability and 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 a community's ability to adapt to change. Beckley (1994) suggested that community adaptability may be a more useful concept than community stability in assessing which communities 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.

Community resiliency, the ability to successfully deal with the inevitable, multiple social and economic changes that are evident in our society, is a primary indicator of a community's health and vitality. Harris (1996) described community resiliency in the Interior Columbia Basin as a function 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 have worked as a community to develop strategies for the future.

Horne and Haynes (1999) developed an operational measure for socioeconomic resiliency at the county level for the Interior Columbia Basin. Their socioeconomic resiliency index was based on a composite of economic resiliency, population density,

and lifestyle diversity. Economic resiliency is defined as diversity of employment, population density is the population of the county divided by the number of square miles in the county, and lifestyle diversity is computed using the PRIZM database (Claritas Corporation 1994). A composite index was then derived from these three individual indices to provide a reflection of a socioeconomic system's ability to adapt to social or economic change. It is not an indication that a socioeconomic system's current status is good or bad. Population density (U. S. Department of Commerce, Bureau of Census 1996) and economic diversity indices are used in this analysis to help in assessing potential effects of the alternatives on community resilience.

Population and Community Resiliency

The population of a community and the rate of change the population experiences are often used as indicators of whether a community is prospering or in decline. 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. The presence of desirable environmental amenities, and especially the types supplied by public lands, can contribute to an area's population and economic growth.

Communities with larger populations tend to have more firms across a variety of industrial sectors. Diversity of industrial sectors and firms provides a cushion to job losses in declining firms or 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 for the Columbia River Basin (Quigley and Arbelbide 1996).

The converse is generally true for communities with small populations, having fewer industries and fewer firms per industry. 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 the 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.

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).

A measure of economic diversity (defined as employment diversity) is available for each county in the United States. This index is derived from the number and variety of industry sectors and associated employment using data from the IMPLAN input-output model and the Shannon-Weaver Diversity Index (Alward 1995). An economic system with a higher employment diversity index (more types of jobs) is thought to better absorb and rebound from changing conditions than systems with a lower index (employment concentrated in a few industries).

There is no similar nationally consistent measure for communities. A study conducted in support of the Interior Columbia Basin Project assessed the type and amount of employment in nearly 400 communities in the project area (USDA Forest Service and USDI Bureau of Land Management 1998). Communities with less than 10,000 people were measured to develop local indices of economic diversity using methodology developed by Robison and Peterson (1995). The resulting economic diversity values represent a relative index of the employment structure of the measured communities. It is an index based on the number of industries reported in a town and the proportion of the workforce in any single industry. The greater the number of industries and the higher the distribution of the workforce across industries, the higher is the index value. This index is a useful characterization of the current employment structure. It is less useful for predicting future change.

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. This analysis uses the Shannon-Weaver Diversity Index (Alward 1995) at the county level to discuss the potential effects of the alternatives on community economic diversity.

Potentially Affected Timber-dependent Communities

The data on planned timber offer from inventoried roadless areas was used to develop a list of national forests that are planning a heavier reliance on supply from inventoried roadless areas in comparison to other national forests. Once these forests were identified, it was assumed that local communities associated with those national forests are most likely to be affected by changes in timber harvest levels.

The planned offer volume by national forest is described in the timber section of this specialist's report. A total of 61 administrative units[13] planned to offer volume from inventoried roadless areas in the next five years.

Of those 61 units, 34 administrative units were selected as most likely to have timber-related impacts on local communities, using the same criteria as used in the draft environmental impact analysis. The selected forests either 1) planned to offer 5 million

[13] Some national forests are managed jointly as an administrative unit. Therefore, the number of national forests affected may be greater than the number of administrative units.

board feet or more in the next five years (average annual offer of 1 million board feet or more) or 2) the average annual planned offer from inventoried roadless areas was greater than 10% of the average total timber offer between 1996 and 1999. Most of the 34 units fit the first criterion (planned offer greater than 5 million board feet). The second criterion was added to include those units that may have relatively small timber programs, but whose future reliance on inventoried roadless areas could impact local communities. The list of administrative units that met those criteria is found in Table 3-75 of the FEIS.

Once the list of national forests was complete, the next step was to examine the list of communities identified in the DEIS and revise the list based on public comment and agency information. Two national forests were dropped from the DEIS list because their volume fell below the 5 million board feet criterion in the revised data set (Wasactch-Cache and Wallowa-Whitman), and two national forests were added because of increases in planned offer volume in the revised data set (Medicine-Bow/Routt and Chequamegon/Nicolet).

For the two new administrative units on the list, the same process for identifying potentially affected communities was used as in developing the initial list for the DEIS. The 1987 update to the 1977 list of timber-dependent communities that the Forest Service provided to Congress was the first source. Timber dependent communities were defined as communities where mills and/or communities use at least 50% of the annual capacity from NFS sales and have at least 10% of their total employment in this industry. The 1987 list contained dependent communities, communities with dependent mills, and the volume of NFS timber processed in dependent mills. The communities from the 1987 list shown in Table 30 include only those communities identified as dependent communities, not communities associated with a dependent mill. Given the changes in harvest volume from NFS lands, the information on dependent mills was considered too dated.

Data from the Interior Columbia Basin analysis of communities (USDA FS and USDI BLM 1998) was not relevant to either of these units, and therefore provided no additional information. Communities identified by the Forest Service as potentially affected by the 18-month moratorium on roadbuilding in roadless areas did not include any communities associated with the Medicine-Bow/Routt or the Chequamegon/Nicolet.

The combined community list was then refined based on whether the community is located in a metropolitan county. The definition of a metropolitan county is based on the proximity to areas of high population as defined by the Bureau of Census (U. S. Department of Commerce, Bureau of Census 1991). The classification of these metropolitan counties used here is based on the USDA Economic Research Service's County Typology (USDA ERS 1995). They include metropolitan counties that are 1) central counties of metropolitan areas of 1 million population or more, 2) fringe counties of metropolitan areas of 1 million population or more, 3) counties in metropolitan areas of 250,000 to 1 million population, or 4) counties in metropolitan areas of less than 250,000 population.

If a community is located in a metropolitan county, the community was removed from the list. Communities located within these counties are likely to have lower dependence on a single industry, and are more likely to be able to adapt to changes in resource flows.

Table 30 compares the list of communities identified in the 1987 list, the list in the DEIS, and the list of communities in the FEIS. Communities were added or deleted from the list based on public comments and input from national forest personnel. For example, many of the communities added in association with forests in Region 4 were provided by input from the Governor's Office of Utah.

Once the communities were identified, the counties in which the communities are located were analyzed to determine the resiliency of those counties based on population density and economic diversity. County resilience is used to indicate the ability of the individual communities to adapt to change, although at a smaller scale community resilience would tend to be less.

The premise of the analysis is that communities located in counties with larger populations and diverse economies can more readily adapt to changing social and economic conditions and are more resilient. The Shannon-Weaver Diversity Index for diversity of employment (Alward 1995) is used to identify diverse economies, and population density (U. S. Department of Commerce, Bureau of Census 1996) is the indicator of large populations. These two indices are used to compare counties within a subregion to provide an analysis that is locally relevant rather than comparing counties nationwide. The Bureau of Economic Analysis (BEA) subregions (Bureau of Economic Analysis 1999) are used to provide this local context. The BEA regions selected are those containing components of the 34 administrative units.

Counties with diversity indices less than the average of all counties in the BEA region and with population densities less than average were designated as lower in resiliency. Counties that have a higher than average population density and diversity indices were designated higher in resiliency. If the indices are split, a medium designation was assigned. However, a county with a population less than 5 people per square mile was specified as low in resiliency. Communities in counties with low resiliency will likely have a more difficulty adapting to changes in resource flows from national forests.

Table 30. Comparison of timber-dependent communities identified in 1987 and the list of potentially affected communities identified in the Roadless Area Conservation DEIS.

Region	National Forest Administrative Unit	1987 List of Timber Dependent Communities	Potentially Affected Communities* DEIS	Potentially Affected Communities FEIS
R1	Clearwater	Kamiah, ID Kooskia, ID Orofino, ID Weippe, ID	Kamiah, ID* Kooskia, ID* Orofino, ID* Pierce, ID Weippe, ID*	Kamiah, ID* Kooskia, ID* Orofino, ID* Pierce, ID Weippe, ID*
	Helena	Townsend, MT	Townsend, MT	Townsend, MT
	Idaho Panhandle	Bonner's Ferry, ID Moyie Springs, ID Princeton, ID Sandpoint, ID St Maries, ID	Bonner's Ferry, ID* Clark Fork, Hope, ID, Moyie Springs, ID* Oldtown, Pinehurst, ID, Plummer, ID* Princeton, ID* Priest River, ID* Sandpoint, ID St Maries, ID* Thompson Falls, MT Kettle Falls, WA* Northport, WA	Bonner's Ferry, ID* Clark Fork, Hope, ID, Moyie Springs, ID* Oldtown, Pinehurst, ID, Plummer, ID* Princeton, ID* Priest River, ID* Sandpoint, ID St Maries, ID* Thompson Falls, MT
	Nez Perce	Elk City, ID Grangeville, ID	Elk City, ID Grangeville, ID* White Bird, ID	Elk City, ID Grangeville, ID* White Bird, ID
R2	Arapaho-Roosevelt	None identified	Saratoga, WY*	Unit dropped in FEIS
	Bighorn	None identified	Sheridan, WY*	Sheridan, WY*
	Medicine Bow/Routt	None identified	Not on DEIS List	Saratoga, WY* Olathe, CO*
	Shoshone	None identified	Cody, WY*	Cody, WY*
	White River	None identified	Saratoga, WY* Olathe, CO*	Saratoga, WY* Olathe, CO*
R3	Lincoln	Mayhill Weed	None Identified	None Identified
R4	Ashley	LaPoint, UT	LaPoint, UT Vernal, UT	LaPoint, UT Vernal, UT
	Boise	Cascade, ID Council, ID Emmett, ID Horseshoe Bend, ID	Cascade, ID* Council, ID Emmett, ID Horseshoe Bend, ID* Montour, ID, Sweet, ID	Cascade, ID* Council, ID Emmett, ID Horseshoe Bend, ID* Montour, ID, Sweet, ID
	Caribou	None identified	Ovid, ID*	Ovid, ID*
	Dixie	Escalante, UT Panguitch, UT	Escalante, UT* Panguitch, UT	Escalante, UT* Panguitch, UT
	Fishlake	None identified	None Identified	Beaver, UT* Bicknell, UT* Lyman, UT* Sigurd, UT*
	Manti-Lasal	None identified	Gunnison, UT Wellington, UT	Gunnison, UT* Old LaSal, UT* Wellington, UT*
	Payette	New Meadows, ID	Cambridge, ID, Casade, ID* Emmett, ID	Cambridge, ID, Casade, ID* Council, ID

Region	National Forest Administrative Unit	1987 List of Timber Dependent Communities	Potentially Affected Communities* DEIS	Potentially Affected Communities FEIS
	Payette cont'd		New Meadows, ID*	Emmett, ID New Meadows, ID*
	Targhee	St. Anthony, ID	Ashton, ID, Driggs, ID, Salmon, ID, St. Anthony, ID, Tetonia, ID, Victor, ID	Ashton, ID, Driggs, ID, Salmon, ID, St. Anthony, ID, Tetonia, ID, Victor, ID
	Uinta	None identified	None Identified	Fairview, UT* Heber City, UT*
	Wasatch-Cache	Kamas, UT	Kamas, UT*	Unit Dropped in FEIS
R5	Klamath	Happy Camp, CA Yreka, CA	Happy Camp, CA Yreka, CA	Happy Camp, CA Yreka, CA
	Shasta-Trinity	Burney, CA* Hayfork, CA Weed-Mt.Shasta-McCloud, CA Weaverville-Douglas City, CA	Burney, CA* Hayfork, CA Weed-Mt.Shasta-McCloud, CA* Weaverville-Douglas City, CA*	Burney, CA* Hayfork, CA Weed-Mt.Shasta-McCloud, CA* Weaverville-Douglas City, CA*
	Six Rivers	Burnt Ranch-Willow Creek, CA	Burnt Ranch-Willow Creek, CA	Burnt Ranch-Willow Creek, CA
R6	Okanagon	Omak, WA Oroville, WA	Omak, WA* Oroville, WA* Pateros, WA Twisp, WA Winthrop, WA	Omak, WA* Oroville, WA* Pateros, WA Twisp, WA Winthrop, WA
	Rogue River	Ashland Central Point Klamath Falls Medford Rogue River White City	Klamath Falls, OR Malin, OR	None identified
	Siskiyou	Brookings, OR Cave Junction, OR Glendale, OR Gold Beach, OR Grant's Pass, OR Powers, OR Williams, OR	Brookings, OR* Cave Junction, OR* Glendale, OR* Gold Beach, OR Grant's Pass, OR Powers, OR Williams, OR	Brookings, OR* Glendale, OR* Gold Beach, OR Powers, OR
	Umatilla	Baker, OR Elgin, OR Hepner-Kinzua, OR Pilot Rock, OR Reith-Pendleton, OR	Baker, OR Elgin, OR Hepner*-Kinzua, OR Pilot Rock, OR* Reith-Pendleton, OR Clarkston WA	Elgin, OR Clarkston WA
	Wallowa-Whitman	Joseph, OR LaGrande, OR North Powder, OR Peshastin Ronald White Swan (BIA) Union, OR	Joseph, OR* LaGrande, OR* North Powder, OR* Union, OR	Unit Dropped in FEIS

Region	National Forest Administrative Unit	1987 List of Timber Dependent Communities	Potentially Affected Communities* DEIS	Potentially Affected Communities FEIS
	Willamette	Albany Brownsville Cascadia Coburg Cresswell Culp Creek Dexter Dorena Euguene Goshen Halsey Jasper-Saginaw Lebanon Lyons Noti Oakridge Springfield Stayton Sweet Home Yoncalla	Yoncalla, OR	None identified
R8	George Washington/ Jefferson	None identified	None Identified	None identified
	Ozark/St. Francis	None identified	Mansfield, AR*	None identified
R9	Chequamegon/Nicolet	Butternut, WI Glidden, WI Hayward, WI Mellon, WI Park Falls, WI Phillips, WI Tomahawk, WI Washburn, WI	Not in DEIS	None identified
	Monongahela	None identified	Marlinton, WV Cowen, WV Webster Springs, WV	Marlinton, WV* Richwood, WV* Webster Springs, WV*
	Superior	Grand Marais Isabella Tofte Finland	Grand Marais, MN* Two Harbors, MN* Isabella MN Tofte, MN Finland, MN	Grand Marais, MN* Two Harbors, MN* Isabella MN Tofte, MN
	White Mountain	None identified	Sandwich, NH Thornton, NH	None identified
R10	Tongass	Coffman Cove, AK Craig, AK Haines, AK Hoonah, AK Ketchikan, AK Klawock, AK Metlakatla, AK Petersburg, AK Sitka, AK Thorne Bay, AK Wrangell, AK Yakutat, AK	Coffman Cove, AK Craig, AK Haines, AK Hoonah, AK Ketchikan, AK* Klawock, AK* Metlakatla, AK* Petersburg, AK* Sitka, AK Thorne Bay, AK Wrangell, AK* Yakutat, AK	Coffman Cove, AK Craig, AK Hoonah, AK Ketchikan, AK* Klawock, AK* Metlakatla, AK* Petersburg, AK* Thorne Bay, AK Wrangell, AK*
* The table also indicates whether the community has a currently operating sawmill. Based on Spelter and McKeever (1999), and agency and public input.				

The discussion of effects in the FEIS also included information that could lessen or contribute to overall county resilience. The additional information was based on the ERS County Typologies (USDA ERS 1995) that characterize counties based on key economic and policy factors. County economic types are defined as follows:

Farming-dependent: farming contributed a weighted annual average of 20% or more labor and proprietor income over the three years from 1987 to 1989.

Mining-dependent: Mining contributed a weighted annual average of 15% or more labor and proprietor income over the three years from 1987 to 1989.

Manufacturing-dependent: Manufacturing contributed a weighted annual average of 30% or more labor and proprietor income over the three years from 1987 to 1989.

Government-dependent: Government activities contributed a weighted annual average of 25% or more labor and proprietor income over the three years from 1987 to 1989.

Services-dependent: Service activities contributed a weighted annual average of 50% or more labor and proprietor income over the three years from 1987 to 1989.

Non-specialized: counties not classified as a specialized economic type over the three years from 1987-1989.

County policy types are defined as follows:

Retirement destination: the population aged 60 years and over in 1990 increased by 15% or more from 1980-90 through in-migration of people.

Federal lands: federally owned lands made up 30% or more of a county's land area in 1987.

Commuting: workers aged 16 and over commuting to jobs outside their county of residence were 40% or more of all the county's workers in 1990.

Persistent poverty: persons with poverty-level income in the preceding year were 20% or more of total population in each of four years, 1960, 1970, 1980, and 1990.

Transfers-dependent: income from transfer payments (federal, state, and local) contributed a weighted annual average of 25% or more of total personal income over the three years from 1987 to 1989.

Potentially Affected Mining Communities

The draft environmental impact statement did not identify potentially affected mining communities. The socioeconomic specialist report for the draft environmental impact statement included a map of the counties in the United States that derived more than 15%

of their earnings from mining. In the final environmental impact statement, those counties were listed in Table 3-78.

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 has total mining earnings over 15%. However, there are a number of communities that may be greatly influenced by activity on the Grasslands.

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 NFS lands.

The effects of Alternatives 2 through 4 would mostly likely occur in those counties where the mining dependence is primarily associated with leasable minerals, where NFS 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 because the area of inventoried roadless areas on eastern forests is relatively small, and most of the current production occurs outside of NFS lands.

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 FEIS Table 3-78. A list of potentially affected communities was developed for those national forests where impacts are likely in the near future (Table 31). The Dakota Prairie National Grasslands were 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 were considered to be potentially 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 was assessed, using the same procedures described previously for counties associated with timber-dependent communities. The current county resiliency rating may not be tied to economic activity related to mining. The tie is likely to be strongest for those counties identified in FEIS Table 3-78, which includes Gunnison, Carbon, and Emery counties.

Table 31. 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[a]	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-Uncompagrhe-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
		Welington, 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

Most of the counties listed in Table 31 have low resiliency. Except for Sanpete, Stark, and William counties, these counties have a population density of 5 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.

CUMULATIVE SOCIAL EFFECTS OF THE ROADLESS AREA CONSERVATION RULE AND OTHER FOREST SERVICE AND FEDERAL PROPOSED OR RECENT POLICIES

The Forest Service manages the national forests and grasslands to provide for the social values that the American public wants from these lands (Bengston and others 1999, Clark and others 1998). Social conditions and values determine what form of resource management is best at a given time; however, because these conditions and values change over time, management approaches must change accordingly (Perley 1997). The challenge to the Forest Service is to manage its lands for a mix of social values, while maintaining a sustainable natural resource base that supports those values and provides options for future generations (Kennedy & Thomas 1995). There has been an evolution in the public conception of the purpose of national forests in America over the last century (Hays 1988). Whereas many people once valued national forests primarily as sources of commodities such as timber, minerals, water, and rangeland, the majority now values them for their recreational, ecological, and scenic values (Hays 1988, Shands 1988, Hays 1998).

This section traces the changing trends in social values held by the American public towards the management of National Forest System lands over the last century, and discusses the current trajectory. It examines how the resource management policies of the Forest Service have changed and continue to change in response to these evolving trends in social values. It then goes on to discuss how the Roadless Area Conservation Rule, and other recent and ongoing rule-making efforts by the Forest Service and other Federal agencies reflect current social values as they relate to public land management. Finally, it predicts the short- and long-term social effects of the roadless rule, together with these other management policies, on key social values that are of concern to the public. Specifically, it examines the cumulative effects of these policies on access to NFS lands, the balance of commodity and non-commodity uses and values on NFS lands, social controversy over the management of roadless areas, public involvement in forest management decision-making, resource supply and demand, and forest dependent communities. It also distinguishes the contribution of the roadless rule versus other rules and policies to these social effects.

Trends in Social Values and Forest Service Management

The Forest Service was founded in 1905. From the early 1900s up until the mid-1940s and World War II, the Forest Service management policy toward its lands was largely custodial (Giltmier 1998, MacCleery & Le Master 1999, Nelson 1995). The Forest Service acted as guardian or caretaker of the national forests and grasslands. Timber production from the national forests was minimal, because there were large supplies of timber available from private lands, and timber companies and private land owners did not want federal timber on the market further increasing supplies and reducing prices, which were already low (Giltmier 1998, Nelson 1995). Livestock grazing was the

predominant commodity use of the national forests and grasslands during this period (U.S. Government Accounting Office 1999), though there was also management to meet the resource demands of local communities (MacCleery and Le Master 1999). Wildfire control was another focus (MacCleery and Le Master 1999). Some people valued public lands for their recreational, aesthetic, and ecological values during this period, but these people lived largely in urban areas, and their values were not a dominant force in the management of National Forest System lands (Kennedy & Thomas 1995). Nevertheless, recreation use grew rapidly between the mid 1920s and the mid 1940s (Nelson 1995).

Following World War II, there was a dramatic increase in demand for lumber as veterans returned from the war, started families, and wanted homes (MacCleery and Le Master 1999). People looked to public lands in the west as a source of wood for housing materials. The timber industry turned to national forest timber to supplement or replace the supply from private forestlands, which had been heavily cut over (Williams 2000). Forest Service management between 1945 and 1960 was dominated by a major expansion of timber production, accompanied by extensive road construction to meet the demand for wood (Nelson 1995). Timber harvest on NFS lands rose from 1.5 billion board feet in 1941, to just under 4 billion board feet in 1950, to roughly 12 billion board feet by 1969 (U.S. Government Accounting Office 1999). By the 1960s, wood extracted from federal lands supplied nearly 20% of the national demand (MacCleery and Le Master 1999).

The Forest Service managed timber production on the national forests according to the scientific principle of sustained yield. Professional foresters managed the national forests for the public; there was little public participation in the process. This was in part because forest "customers" who were not resource producers on NFS lands or residents of nearby communities maintained a distance from these lands, visiting infrequently (Kennedy and others 1998). Commodity interest groups were the main constituents of the American public that participated in national forest and grassland management.

At the same time that timber harvest on NFS lands was increasing, so too was the demand for other uses, especially recreation (U.S. Government Accounting Office 1999). The post-war economic expansion meant that more people became affluent, and had the time and money to spend doing things like visiting the nationals forests and grasslands, and other public lands (Brunson & Kennedy 1995). Technological advances were made in the arena of recreational equipment, further increasing people's ability to enjoy the outdoors (Brunson & Kennedy 1995). In 1946, there was an estimated 18 million recreation visitor days on NFS lands (Dombeck 2000). By 1960, this number had risen to 93 million, and by 1975, to 233 million recreation visitor days (MacCleery & Le Master 1999). As more and more people visited the national forests, they saw the visual effects of timber harvesting. This sparked debate over the use of NFS lands.

Meanwhile, the environmental movement was gaining momentum. The 1960s and 1970s saw a dramatic rise in the environmental consciousness of the American public (Dunlap 1991). People became more concerned about air and water quality, and the environmental and aesthetic impacts of forest management practices (Cortner and others 1999). This growing environmental concern was reflected in a proliferation of environmental legislation and executive orders (EO) that were passed during the 1960s and 1970s, which institutionalized the environmental values embraced by the public. For

example, Congress passed the Wilderness Act (1964), the Endangered Species Act (1973), and new strengthening provisions for the Clean Water Act of 1948 and the Clean Air Act of 1955. Presidential executive orders passed during this time period included President Nixon's issuance of EO 11644 (1972) on the management of off-road vehicles on public land, and President Carter's issuance of EO 11988 for flood plain management (1977) and EO 11990 for protection of wetlands (1977). These laws and executive orders limited the decision space for land managers' actions, restricted some commodity uses of public lands, and mandated protective measures when undertaking public land management.

Environmental groups became increasingly active in trying to assert their influence over forest policy (Hoberg 1998). The practice of clear-cutting, which was the most common method of harvesting timber during the 1960s and 1970s, was particularly contentious. Litigation by environmental groups to halt clear-cutting triggered a turning point in forest management policy. The result was the National Forest Management Act (NFMA) (Hoberg 1998, MacCleery & Le Master 1999). NFMA provided detailed guidance for the national forest planning process, and for timber management practices. The Forest Service also initiated RARE I and RARE II to identify and recommend to Congress areas suitable for Wilderness designation.

In addition, the 1970s saw an opening up of federal agencies' decision-making processes. Laws like the National Environmental Policy Act (1970) and the National Forest Management Act (1976) required the Forest Service to invite the public to comment on agency project proposals and land management plans prior to agency action, and to disclose to the public the anticipated environmental effects of those actions. Furthermore, the Freedom of Information Act (1974) gave the American public access to most internal agency records. These laws encouraged participatory government at an unprecedented scale.

Public awareness of environmental problems and support for environmental protection continued to increase steadily during the 1980s. By 1990, public concern for environmental quality had reached unprecedented levels (The Roper Organization, Inc. 1992). Surveys and polls, voting data, and data on market choices all indicate that environmentalism among the American public has continued to increase dramatically, that the majority of the American public supports environmental protection, and that these sentiments cut across all social and economic groups (Kempton and others 1995, Nie 1999). The public demand for the non-commodity values that NFS lands provide have also continued to increase (Kennedy and Thomas 1995). For example, annual recreation visitor days reached nearly 1 billion by 1999 (Dombeck 2000). In addition, the American public has continued to demand a larger role in land management decision-making since the 1970s.

The American public was demanding that the Forest Service shift its management emphasis away from commodity production and towards the protection of non-commodity values. Congressional actions, most notably Section 318 of Public Law 101-121 (1989) and Section 2001 of Public Law 104-19 (1995 Rescissions Act), were passed with the aim of stabilizing the agency's falling commodity program, but were only temporary in scope. These Acts led to further concerns by the environmental community,

and did not lead to a resolution as to what balance should prevail between commodity use and environmental protection on the national forests and grasslands.

In response to the changing social values towards NFS lands expressed by the American public, the Forest Service implemented a major paradigm shift in its land management approach in the 1990s. What emerged was ecosystem management. Ecosystem management is a knowledge-based approach to undertaking the stewardship of whole ecosystems (including areas beyond public land boundaries) to promote ecological, social, and economic sustainability (Salwasser 1998). It takes the human components of ecosystems into account. The ecosystem management approach entails involving public and private partners in a collaborative role to define management goals, and provides mechanisms for achieving those goals. It aims to balance people's resource needs with environmental protection (Salwasser 1998).

One of the major ways in which ecosystem management represented a departure from the multiple use-sustained yield approach that preceded it is that it expanded the objectives of public land management to include a broader spectrum of values, uses, and services (MacCleery & Le Master 1999). Whereas multiple use-sustained yield emphasized the sustained production of resource outputs, ecosystem management emphasizes ecosystem conditions. Under ecosystem management, the production of resource outputs is not so much an end in itself as a consequence of managing to achieve other, ecologically-oriented objectives (MacCleery & Le Master 1999). Whereas ensuring the long-term health and sustainability of the ecosystem is a central management goal under ecosystem management, under multiple use-sustained yield, ecosystem sustainability was viewed as the constraining factor on the central management goal of maximizing the stream of outputs (Kennedy and others 1998). Another major departure from the past is the emphasis on collaborative stewardship, which expands the participatory role of the public in environmental decision-making. The Forest Service has adopted ecosystem management as the future direction for stewardship of the national forests and grasslands.

The changing social values of the American public are also reflected in the Forest Service's mission and in its Natural Resource Agenda. The mission of the Forest Service is to "sustain the health, productivity and diversity of the land to meet the needs of present and future generations" (USDA Forest Service 2000). The Natural Resource Agenda, which provides a focus for the management of the national forests and grasslands, emphasizes four priorities: ecologically sustainable ecosystem management, watershed health and restoration, recreation, and forest roads and roadless areas (Dombeck 2000).

An average of 10 to 12 billion board feet of timber were sold from the national forests during the 1960s, 1970s, and 1980s. This number has now dropped to 3 to 4 billion board feet annually (MacCleery & Le Master 1999). The area of NFS lands on which timber harvest was permitted declined by 44% between 1989 and 1995 (MacCleery & Le Master 1999). The Forest Service road system was designed primarily to support timber harvest, which has now decreased by almost 70% (Dombeck 2000, U.S. Government Accounting Office 1999). Today, Forest Service roads are used primarily by people visiting NFS lands in search of recreation opportunities (Dombeck 2000).

The management of the Forest Service road system has attracted considerable public scrutiny and political attention in recent years, and has become a focal issue for the Forest Service. The question of how to balance the benefits that roads provide with the impact that they have on the environment is a difficult one, and one that the Forest Service has become proactive in addressing. The Interim Roads Rule, the Roads Policy, and the Roadless Area Conservation Rule all reflect the priorities of the agency's Natural Resource Agenda, and the agency's ability to deal with emerging environmental issues, maintaining its existing infrastructure (roads and facilities), and establishing priorities for forest health within a limited budget and a shrinking and aging work force.

Future Social and Economic Effects

It is likely that recent trends in social values relating to the management of NFS lands will continue into the future, both in the short- and long-terms. The growing national population, growing urban population, and increased conversion of open space land to urban uses will cause more and more people to turn to NFS lands and other public lands as places that provide ecological, recreation, and spiritual and aesthetic values that are becoming hard to find elsewhere. While the public's demand for the commodities available from NFS lands will increase, their desire to see those commodities produced on NFS lands is not likely to. Americans are also likely to be increasingly vocal about how public lands are managed.

The Roadless Area Conservation Rule is one of several recent and on-going policies that reflect the desire of the public to see the environmental health of their public lands protected, and that emphasize the non-commodity values of NFS lands. The recent Forest Service NFMA Planning Rule makes ecological, economic, and social sustainability the goal of national forest and grassland management, and emphasizes collaborative stewardship in land and resource management planning. The Forest Service Strategic Plan emphasizes the Natural Resource Agenda of the agency. The Forest Service Transportation Policy aims to manage access to the national forests and grasslands within the capacity of the land. The Clean Water Action Plan and the Unified Federal Policy promote watershed management to improve water quality and maintain watershed health. The Forest Service Cohesive Fire Strategy provides a management framework for restoring and maintaining ecosystem health in fire-adapted ecosystems. Like the roadless rule, these other policies will promote ecosystem health on public lands, as well as beyond their boundaries. All of them make ecological health and sustainability their primary objective.

What are the effects of these policies, and the relative contribution of the Roadless Area Conservation Rule to these effects, on access to NFS lands, the balance of commodity and non-commodity uses and values, social controversy over roadless area management, local involvement in forest management decision-making, resource supply and demand, and forest dependent communities?

Access

People's ability to use NFS lands depends on their being able to gain access to them. As discussed in Chapter 3 of the FEIS, the American public is very concerned about the impact that the Roadless Rule will have on their ability to gain access to NFS lands, and thereby to continue to use and enjoy them in the ways that they have historically. People are particularly confused about what the Roadless Rule implies for access in combination with the Roads Policy.

Although the Roadless Rule would not alter existing access to NFS lands, existing access could be affected by the Roads Policy. The combined and cumulative effects of the Roads Policy on forest roads are detailed in the Cumulative Effects of the Proposed Rule with Other Federal Policies and National Forest System Roads section of the FEIS. Generally, the effect of decommissioning would be to reduce road density in some areas; it would not close off roaded access to most areas. However, it is expected that acres of unroaded areas could grow by 5% to 10% as a result of implementing these policies together.

The cumulative effects of these two rules would be to minimize new roaded access to NFS lands in the future. This would have the greatest impact on people whose preferred uses of NFS lands are road-based, and on people who can only experience NFS lands that they can reach by roads. The Planning Regulations in concert with the Roads Policy and Roadless Rule could result in slower development of unroaded areas in the future.

Commodity and Non-commodity Values

As stated, Forest Service and other Federal proposed or recent policies all emphasize the non-commodity values of Forest Service lands. The Roadless Rule also emphasizes non-commodity values and uses of Forest Service lands on 58.5 million acres (roughly 31% of all NFS lands). This is in addition to the 18% of NFS lands classified as Wilderness, which already prohibit or restrict road construction. The remaining 51% of NFS lands are open to a wide range of uses and activities, both commodity and non-commodity-oriented. By prohibiting road construction in inventoried roadless areas, an estimated 73% reduction in timber harvest will take place there over the next 5 years compared to the No Action Alternative. Timber harvest in inventoried roadless areas could be further reduced if Alternative 3 or 4 is chosen. In addition, salable and leasable mineral extraction in inventoried roadless areas would likely be precluded by a prohibition on road construction and reconstruction unless mitigation measures are applied. Locatable mineral extraction, livestock grazing, and non-timber forest-product harvest in inventoried roadless areas would likely experience minor effects from the prohibitions.

In light of these proposed and recent rules and policies, the contribution of the Roadless Rule to the trend towards managing NFS lands for their non-commodity values is that it emphasizes managing for these values on a significant portion of NFS lands. It would bring to nearly one half the amount of NFS land that could not have roads. While the other policies and rules emphasize watershed protection and ecological sustainability, they do not directly apply to specific NFS land classifications. This shift has economic implications that are discussed further in this chapter.

Social Controversy over Roadless Area Management

Decisions about public land management are often controversial because of the different values that people attach to these lands, and competing interests in their use. As stated in Chapter 1 of the FEIS, roadless area management has been a substantial point of conflict in adopting land management plans for NFS lands. It is the intent of the Forest Service that a national rule to guide roadless area conservation will reduce this conflict, which has not been adequately resolved at the local level to date. The Roads Policy also aims to address this debate and, similarly, to reduce conflict over roads management. The cumulative effects of the Roads Policy and the Roadless Rule are expected to be reduced public conflict over the management of roads and roadless areas, one of the four goals of the Natural Resource Agenda.

However, Roadless Rule may heighten social controversy over fire management in roadless areas. Under the Cohesive Fire Strategy, inventoried roadless areas are not likely to be a high priority for fuels reduction in the next 20 years. A prohibition on road construction and reconstruction could hinder fuel reduction treatments when they do occur in some inventoried roadless areas, as could a prohibition on timber harvest. This could increase the likelihood of large fires in some high priority areas, especially over the short- to medium-term. Added to this is a perception on the part of some members of the public that a prohibition on road construction would make it harder to fight wildland fires in inventoried roadless areas, should they occur there. Many people believe that roads are needed for fire suppression and for fuels management. Given the extensive wildland fires that occurred during the 2000 fire season, public sensitivity to this issue is heightened. The result could be increased social controversy over the Roadless Rule, and its implications for fire management in roadless areas of NFS lands. Whether this social controversy increases or decreases in the future will depend on what happens with fires in inventoried roadless areas in the coming years, which cannot be predicted.

Local Involvement

The NFMA Planning Regulations, the Clean Water Action Plan and its Unified Federal Policy, and the Cohesive Fire Strategy all emphasize a collaborative approach between agencies, partners, and the public in ecosystem management, whether for fire and fuels management, watershed protection, or land use and management planning. Some members of the public perceive that the Roadless Rule contradicts the emphasis placed on collaboration by these other policies and therefore, reduces their cumulative focus on local involvement, because it imposes national level prohibitions that supercede local-level decision-making. The Roadless Rule would not affect the collaborative decision-making process itself. However, it could have the effect of reducing the public confidence that other programs will follow a collaborative planning path.

Resource Supply and Demand

Management choices made by the Forest Service affect the level of goods and services from NFS lands. A number of factors affect future demands for these goods and services including population growth, economic trends, and technology. These factors were

described in the previous sections as they related to individual resources. The Forest Service has no control over most of the factors influencing future demand for resources. Because of the uncertainty associated with quantitative estimates of future demand and supply, the cumulative effects analysis relies on expected future trends. These general trends are sufficient for evaluating the differences between alternatives.

The Roads Policy and recent planning activities, such as the Northwest Forest Plan, Sierra Nevada Framework, and Interior Columbia Basin Ecosystem Management Project, have the potential to expand the area managed for roadless characteristics, further increasing the supply of roadless areas. The cumulative effect of increases in the area of roadless areas could increase the beneficial effects of the Roadless Rule on ecosystem services, natural resource protection values, passive use values, and some types of recreation use. Protecting more roadless areas through such efforts will further increase the Agency's ability to meet increasing public demand for goods and services that rely on extensive, undeveloped areas of NFS lands. Federal lands will continue to be the main source of large, undeveloped lands into the future. Other public lands and private lands tend to be smaller on a per unit basis and more developed than most Federal lands.

The cumulative effect of the current and proposed policies listed is likely to further reduce the available supply of resources, such as timber and minerals, from NFS lands as discussed elsewhere in Chapter 3. Reduced production from roadless areas may be partially offset by production from other portions of NFS lands, but such substitution potential is seen as limited. In addition to the policies already mentioned, listing of the lynx and future listings of other T&E species are likely to further restrict extractive activities on Federal lands.

Further reductions in Federal timber harvest will increase pressure for harvest on other public and private lands. If cumulative reductions are significant, prices may increase in response and bring new sources of domestic supply onto the market. Increased imports are also likely. Price increases may result in a switch to substitute materials (such as steel) that are not derived from renewable resources. Influences that could offset the increased pressure on domestic and international supplies include technology changes that increase our ability to use small diameter wood products in processing, increases in recycling, and productivity increases in timber yields.

The cumulative effects on future mineral development are difficult to predict. Factors such as discovery of new resources, prices, and technology, determine which mineral deposits are economically recoverable. Estimates of likely future development would be highly speculative. The effect of reduced access to deposits that may be economically recoverable depends on the availability of deposits on other ownerships. Increased development could occur on other portions of NFS lands or other public and private ownerships, or imports could increase.

Roaded and developed recreation opportunities on NFS lands may also be affected by the combined policies. Protection of roadless areas will affect the Agency's ability to develop new developed recreation facilities. Since demand for these types of recreation activities is also growing, density of use will increase, and some type of rationing system may be required. Other Federal lands may also be restricted in developing future capacity

because of many of the same policies affecting NFS lands. As a result, increased pressure on other public recreation lands is likely.

Forest-dependent Communities

A number of communities have strong economic ties to activities on NFS lands. In the past decade, the decline in timber harvest from NFS lands has created economic hardships in communities that depended on harvest flows from NFS lands to maintain harvesting operations and processing facilities. In addition to losing jobs and businesses, reductions in Payments to States reduced funds available for local schools and roads. Community effects depend on numerous factors including the availability of substitute harvest opportunities on other lands and other economic opportunities within the commuting area.

The reductions in timber supply estimated for the prohibition alternatives, and the associated effects on jobs, income, and Payments to States appear minor for most areas. However, these effects may be significant when added to changes in resource flows over the last decade. For example, a wood products manufacturing plant may have been reduced to marginal operating efficiency from restricted timber supply. Further reductions may result in the closure of a mill, which could result in jobs and income losses greater than previously estimated. These effects cannot be estimated with any degree of certainty since too many factors independent of this rulemaking affect future demand and supply.

Similar cumulative effects are likely for mining-dependent communities. Reduced access to roadless areas will restrict future exploration and development for some types of minerals. Communities that currently depend on mining would be affected if production cannot be maintained in the long-term without development of roadless areas. Such communities would face declining jobs and reductions in Payments to States. For communities with both mining and timber sectors, the combined effects would be greater.

The protection of roadless areas will benefit communities with a strong economic tie to dispersed recreation uses and where the natural amenities provided by NFS lands attract new businesses and residents. The cumulative effect of proposed policies is likely to increase this benefit. However, it is possible that restrictions on some types of recreation use could have a negative effect on some sectors of the economy.

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