

Esthetics will be considered in all management practices occurring on the Forest. The goal will be to maintain and/or improve the beauty and liveability of the urban environment to enhance the tourism related economy for the benefit of local, regional and national populations.

A wide variety of terrain and vegetation occur within the planning area. These range from plains with open prairie land to foothills and mountains where conifer forests, open parks and valleys to high alpine areas occur.

The Pike and San Isabel National Forests have an excellent base of inherent capability to produce visual resource outputs. Colorado has an international reputation for its distinctive mountain scenery. Of the 53 peaks in Colorado over 14,000 feet in elevation, 23 are in the Pike and San Isabel National Forests.

The Cimarron and Comanche National Grasslands are a unique scenic resource in their own right. The great open expanses of land broken occasionally by buttes and wooded stream bottoms allow the viewer to see "forever" as the early pioneers did. Old windmills and cabins enhance the landscape by adding history and interest.

In wilderness and in much of the alpine area only ecological changes normally take place. Visual changes normally take place very slowly, except in the case of wildlife or insect epidemics, which have the potential to alter the scenic quality of large areas of land in a short period of time.

The majority of land in the Forest area is visible in middleground and background views from the mountain valleys. Visual impacts result from introducing structures into the landscape, disturbing the soils, or altering the vegetation patterns. Structures can usually be located and designed to blend with their surroundings. Soils can be contoured and revegetated, and vegetation can be managed to achieve positive visual effects. Vegetation treatments which increase ecological diversity usually enhance scenic beauty as long as the treatments imitate natural growth patterns and shapes in the surrounding landscape.

Insect attacks, tree disease, and wildfire are a part of the natural evolution of forests. However, the risk of a catastrophic event can be greatly reduced in a managed forest situation with a wide variety of vegetation sizes and species composition. A highly diverse ecological mixture of vegetation types results in a more scenic forest.

Trends in visual quality indicate a steady decline over the years. Eighty-six percent of the landscape has been altered by

man; twenty-three percent of this to an extent noticeable to the average visitor. It is estimated that about 6,600 acres (0.3%) have been altered beyond acceptable standards.

The inventoried visual quality objectives (IVQO) indicate levels of visual quality acceptable to the public. A comparison with the existing visual condition indicates about 86% of the landscape meets or exceeds the IVQO. On the grasslands 99% of the landscape meets the IVQO.

Demand Trends. Demand by Forest visitors for scenic quality and local concern about impacts on present and future scenic quality are high. Recreation use on the Forest in 1983 was the second highest in the Rocky Mountain Region and fifteenth among all National Forests. This use places great importance on visual quality. Driving for pleasure and enjoying the scenery account for over one-fourth of the recreation use of the Forest. Maintenance of a high quality visual resource will increase in importance as recreation use grows and as more people move to the mountains for the aesthetic setting.

SPECIAL RECREATION AREAS

Windy Ridge Bristlecone Pine Scenic Area. This area includes 150 acres featuring a wind swept ridge with old growth bristlecone pine over 1,000 years old. The area has unique biological values as well as outstanding scenery. The area is located about eight miles northwest of Fairplay, Colorado.

National Natural Landmarks

Two National Natural Landmarks are recorded on the Forest. The National Natural Landmarks program is established to recognize sites which illustrate the ecological and geological character of the United States and to enhance the educational and scientific values of the sites.

The Spanish Peaks are twin peaks rising to 12,683 and 13,626 feet in elevation uplifted by the intrusion of volcanic stocks into sedimentary formations. The resulting vertical cracks filled with lava and now show as a unique system of dikes radiating outward from the peaks like spokes of a wheel. The dikes form spectacular free standing walls 1 to more than 100 feet thick and up to more than 100 feet high extending as much as 14 miles in length.

The Lost Creek National Natural Landmark is located 40 miles northwest of Colorado Springs in the rugged Tarryall Mountain Range. The area features bold outcrops carved into the Precambrian Pikes Peak granite by the forces of erosion. Massive dome shapes, spires and boulders characterize the area. Lost Creek picks its way through the area disappearing and reappearing numerous times before emerging as Goose Creek. The Landmark is within the Lost Creek Wilderness.

National Recreation Trails

Two trails in the planning area are designated National Recreation Trails. They are Devil's Head Trail and Barr Trail. Devil's Head Trail, located on the South Platte District of the Pike National Forest, is approximately 1-1/3 miles in length and ascends to the summit of Devil's Head Mountain. Devil's Head Mountain is a prominent rocky point along the Rampart Range at an elevation of 9,748 feet surmounted by a Forest Service Fire Lookout Station. Several thousand people make the climb each year.

Barr Trail, constructed in 1921, climbs from Manitou Springs to the summit of Pikes Peak, an elevation range from 6,720 feet at the base to 14,100 feet at the top. The 12 mile hike is a popular activity for several thousand visitors each year. The trail traverses through life zones from foothill shrubs in the Montane zone through the spruce/fir zone and into the alpine zone at the summit.

Continental Divide National Scenic Trail

The Continental Divide National Scenic Trail corridor along the Continental Divide was designated in 1978. A specific route has not yet been established. Eventually the trail will extend the length of the Continental Divide from Canada to Mexico. Key portions of the route will be on the Pike and San Isabel National Forests presumably from about Silver Mountain or Webster Pass on the north in the Pike National Forest to Windy Peak over 110 miles to the south in the San Isabel National Forest. Much of this portion of the Continental Divide is above timberline.

Colorado Natural Areas

Three areas have been identified by the state and recommended for protection under the Colorado Natural Areas Program. The Colorado Natural Areas program is a State program administered by the Colorado Department of Natural Resources to identify elements and sites for the Colorado Natural Heritage Inventory.

Lesser Prairie Chicken Area. This area on the Comanche National Grassland represents the "best population" of lesser prairie chicken, Tympanuchus pallidicinctus, a state threatened species. The area is in T.34S., T.35S., R.44W. in Baca County. The area is recognized and provided for in the Forest Plan.

Braya humilis Site. This site represents one of a few known locations of this small alpine plant Braya humilis ssp. ventosa. Further study and assessment is required prior to a recommendation for protection under the Colorado Natural Areas program.

Hoosier Ridge Area. This area is identified as special habitat for rare plant species Eutrema penlandii and Saussurea weberi, both currently under investigation for federal listing by the U.S. Fish and Wildlife Service. Further study and assessment is required prior to a recommendation for protection under the Colorado Natural Areas program.

WILDERNESS

The Colorado Wilderness Act of 1980, (P.L. 96-560) established five wildernesses on the Pike and San Isabel National Forests. Prior to this Act there was no wilderness on the Forest.

Wilderness areas on the Forest are:

<u>Wilderness</u>	<u>Total Area Acres</u>	<u>Acres on Pike & San Isabel NF's</u>
Collegiate Peaks	159,900	81,450
Holy Cross	126,000	9,020
Lost Creek	106,000	106,000
Mount Evans	75,000	34,950
Mount Massive	26,000	26,000

Collegiate Peaks Wilderness, located about 15 miles southwest of Leadville, Colorado, on the San Isabel, Gunnison, and White River National Forests, is characterized by high mountain peaks, well defined drainages and outstanding scenic attractions. Most of the area is located above timberline on steep rocky slopes. There are eight peaks of over 14,000 foot elevation. Vegetation is mostly alpine on the high peaks and ridges with lower slopes timbered with spruce/fir and lodgepole pine. Approximately one-half of the total area is located on the Pike and San Isabel National Forests.

Holy Cross Wilderness, located about ten miles northwest of Leadville, Colorado, on the San Isabel and White River National Forests. Only a small portion of the overall area is within the planning area. The San Isabel National Forest portion includes high peaks up to 13,000 feet elevation along the Continental Divide and scenic basins and valleys dotted with a number of natural lakes at or just below timberline. Much of the area is alpine type, however; lower areas include spruce/fir forests, meadows and grasslands.

Mount Massive Wilderness also near Leadville, Colorado, along the Continental Divide is dominated by and includes Colorado's second highest peak, Mt. Massive at 14,421 feet elevation. Along the Continental Divide, the wilderness joins the White River National Forest's Hunter Fryingpan Wilderness. The area is characterized by alpine mountains and ridges sloping off to spruce/fir and lodgepole pine forests at lower elevations. High mountain lakes are numerous.

Lost Creek Wilderness is less than 40 miles southwest of Denver, Colorado, and has a wide variety of terrain and vegetation. The area ranges from steep rocky slopes up to 12,431 feet at Bison Peak to high mountain meadows and deep canyons to a low of about 8,000 feet elevation. Lost Creek with its unique and outstanding scenic quality, features spectacular granite formations of spires, balanced rocks and huge boulders where the creek disappears. Pine and Douglas-fir provide a contrast with open parks, slopes accented by weather polished snags and stumps, and windblown bristlecone pines left after extensive fires of the late 1800's.

Mount Evans Wilderness surrounds the widely known 14,264 foot elevation Mt. Evans about 30 miles west of Denver, Colorado. It is located on the Pike and Arapaho National Forests. The Mt. Evans highway forms a corridor into the center of the wilderness. Alpine vegetation covers the high peaks of the area with spruce/fir forests on the lower slopes. A little less than half of the wilderness is on the Pike National Forest.

Wilderness Use

Current and projected average annual wilderness use levels are presented in Table III-23.

Current use of the five designated wildernesses is estimated at approximately one visitor day per acre per year. The areas have not been designated wilderness long enough to provide established use levels. Use has generally been unrestricted except to conform with wilderness laws. Use levels are expected to increase significantly in coming years. Demand is projected to exceed supply by mid planning period. In certain favorite destination locations, demand is already exceeding apparent capacity.

TABLE III-23
AVERAGE ANNUAL
WILDERNESS USE
 (MRVD)

	<u>1983</u>	<u>1981- 1985</u>	<u>1986- 1990</u>	<u>1991- 2000</u>	<u>2001- 2010</u>	<u>2011- 2020</u>	<u>2021- 2030</u>
Demand							
Trend	242	286	357	461	609	755	899
Supply							
Potential	-	685	685	685	685	685	685

Wilderness Study Areas

The Colorado Wilderness Act of 1980 (P.L. 96-560) designated four areas in the Pike & San Isabel National Forests as Wilderness Study Areas. Section 105.(a) directed that the Secretary

of Agriculture review and within three years of the date of the Act, report to the President and the Congress his recommendations on the suitability or unsuitability of those areas for inclusion in the National Wilderness Preservation System. Those areas are:

Buffalo Peaks Wilderness Study Area	56,950 acres
Greenhorn Mountain Wilderness Study Area	22,300 acres
Spanish Peaks Wilderness Study Area	19,570 acres
Sangre de Cristo Wilderness Study Area	<u>218,000</u> acres
Total	316,820 acres

(See Figure III-7)

The total Sangre de Cristo Wilderness Study Area contains 218,000 acres; 130,700 acres on the Rio Grande National Forest and 87,300 acres on the San Isabel National Forest.

The suitability analysis for all WSA's are in Appendix C.

Mineral Resource Potential Reports prepared by the US Geological Survey, Department of Interior, for the Wilderness Study Areas and Lost Creek Further Planning Area are contained in Appendix I. See Appendix C for additional information.

Buffalo Peaks Wilderness Study Area - 56,950 acres

The Buffalo Peaks WSA is located on the Divide between the Arkansas and South Platte River (South Park) drainages, about 10 miles southeast of Leadville, Colorado, and 80 miles southwest of Denver. It is located in Lake, Chaffee, and Park Counties.

The east and west Buffalo Peaks dominate the area rising from about 9,200 feet elevation in the southwest corner of the area to the 13,325 foot summit of west Buffalo Peak. The character of the area is alpine peaks and ridges with wet meadows and willow areas north of the peaks. At lower elevations there are large stands of Engelmann spruce and aspen. Lodgepole pine, bristlecone pine, ponderosa pine, and Douglas-fir are common at the lowest elevations.

The Wilderness Attribute Rating System that was used to evaluate the wilderness attributes of the RARE II areas was applied to the Buffalo Peaks Wilderness Study Area with the following results:

(Scale of 1 - 7)	
Natural integrity	5
Apparent naturalness	5
Opportunity for solitude	4
Primitive recreation	<u>4</u>
Total Attribute Rating	18

The Buffalo Peaks Wilderness Study Area contains over 18,000 acres of winter range habitat for deer, elk and Bighorn sheep; approximately 19,000 acres of commercial forest land that is suitable for conventional logging systems (tractors-skidders) on slopes in the 40 percent or less slope class; and over 7,000 acres of suitable livestock range. Tree stands in this study area are susceptible to mountain pine beetle, spruce budworm and spruce-bark beetle outbreaks. The area contains a potential radio antenna site, and a tree plantation. There are adjacent patented mining claims with associated roads.

The area contains several small mineralized zones with low to moderate resource potential for locatable minerals. There is little or no indication of oil or gas, or geothermal energy resources in the study area, (USGS, MF-1628-A).

Buffalo Peaks Wilderness Study Area, 60 air miles west of Colorado Springs, Colorado is in close proximity to 311,900 acres of existing wilderness (Collegiate Peaks, Holy Cross and Mount Massive Wildernesses) on the Pike and San Isabel and adjacent National Forests.

Greenhorn Mountain Wilderness Study Area - 22,300 acres

The Greenhorn Mountain Wilderness Study Area is located on the southern end of the Wet Mountain Range, approximately 20 air miles west of Pueblo, Colorado, and 130 miles south of Denver, Colorado. It is located in Huerfano and Pueblo Counties.

This area contains 22,300 acres of steep, rugged slopes descending from the 12,367 feet elevation Greenhorn Mountain to the eastern plains. Vegetation ranges from pinon-juniper types at the dry lower fringes of the area, through ponderosa pine and Douglas-fir at mid-elevation, to spruce/fir stands near timberline. Alpine vegetation occurs at the higher elevations of the Greenhorn Mountain.

The Wilderness Attribute Rating System that was used to evaluate the wilderness attributes of the RARE II areas was applied to the Greenhorn Mountain Wilderness Study Area with the following results:

(Scale of 1 - 7)	
Natural integrity	6
Apparent naturalness	4
Opportunity for solitude	4
Primitive recreation	5
Total Attribute Rating	19

Greenhorn Mountain Wilderness Study Area contains over 3,000 acres of winter range habitat for deer, elk, and Bighorn sheep; over 4,000 acres of potential peregrine falcon habitat; approximately 3 miles of present and potential stream habitat for

Greenback Cutthroat trout (threatened species); and over 3,000 acres of commercial forest land that is suitable for conventional logging systems (tractors-skidders) on slopes in the 40 or less percent slope class. It does not include any significant incompatible uses except for 160 acres of private land in the northwestern portion of the study area. Tree stands in this study area are susceptible to mountain pine beetle, spruce budworm and spruce-bark beetle outbreaks.

The majority of the study area has a low resource potential for locatable minerals, except for one small area where studies indicate as having a low to moderate mineral resource potential. There is no geological evidence for leasable mineral resource potential, (USGS, OF 83-473).

Spanish Peaks Wilderness Study Area - 19,570 acres

The Spanish Peaks Wilderness Study Area is located on the divide between the Cucharas and Apishapa River drainages approximately 20 miles southwest of Walsenburg, Colorado and 160 miles southwest of Denver, Colorado. It is located in Huerfano and Las Animas Counties.

Major features of this area are the twin Spanish Peaks, rising to 12,683 and 13,626 feet respectively. They were formed by the intrusion of volcanic stocks into sedimentary formations up lifting the peaks and filling the resulting vertical cracks which now show as a unique system of dikes radiating outward from the peaks. The dikes form spectacular free standing walls from 1 to 100 feet thick, up to 100 feet high and up to 14 miles in length. The peaks and surrounding area were approved for inclusion in the National Register of Natural Landmarks in January 1977. Vegetation includes pinyon pine, ponderosa pine, Douglas-fir, Engelmann spruce, white fir, and bristlecone pine topped by the rocky sloped alpine types above timberline to the summits of the peaks.

The Wilderness Attribute Rating System that was used to evaluate the wilderness attributes of the RARE II areas was applied to the Spanish Peaks Wilderness Study Area with the following results:

(Scale 1 - 7)	
Natural integrity	4
Apparent naturalness	4
Opportunity for solitude	4
Primitive recreation	4
Total Attribute Rating	<u>16</u>

Spanish Peaks Wilderness Study Area contains 2,000 acres of winter range habitat for deer and Bighorn sheep; and over 3,000 acres of commercial forest land that is suitable for conventional logging systems (tractors-skidders) on slopes in

the 40 percent or less slope class. It contains over 800 acres of private or patented lands with several semiactive mines. Tree stands in this study area are susceptible to mountain pine beetle, spruce budworm, spruce bark beetle and tent caterpillar outbreaks. Applications for 77 percent of the area have been submitted for oil, gas and geothermal leasing.

The study area contains few small mineralized zones with low to moderate resource potential for locatable minerals. Coal may underlie the area but at a depth of several thousand feet; and the oil and gas potential appears low, (USGS, MF-1542-C).

Sangre de Cristo Wilderness Study Area - 218,000 acres

The Sangre de Cristo Wilderness Study Area lies along the Sangre de Cristo Mountain Range which divides the San Luis Valley and the Rio Grande River drainage from the Wet Mountain Valley and the Arkansas River drainage. The total length of this area is approximately 70 miles. The width varies from 2 to 10 miles. This long, relatively narrow area extends from Simmons Peak, approximately 10 miles south of Salida, Colorado, to Mount Blanca, which is approximately 40 miles west of Walsenburg, Colorado. The central portion of the area is approximately 120 air miles from Denver, Colorado. It is located in Fremont, Custer, Huerfano, Alamosa, and Saguache Counties.

The Sangre de Cristo range rises sharply from the east side of Colorado's San Luis Valley and drops sharply on the east face to the Wet Mountain Valley. The area contains several peaks exceeding 14,000 feet in elevation including Blanca Peak, Crestone Peak, Crestone Needles, Kit Carson Peak, Humboldt Peak, Mt. Lindsey, and Little Bear Peak. Many other peaks exceed 13,000 feet elevation.

Alpine vegetation occurs along the crest of the mountain range with spruce/fir, Douglas-fir, and ponderosa pine at the lower elevations. The western slope of the mountain range is 83 percent nonforested. The eastern slope of the mountain range is only 28 percent nonforested.

The Wilderness Attribute Rating System that was used to evaluate the wilderness attributes of the RARE II areas was applied to the Sangre de Cristo Wilderness Study Area with the following results:

(Scale 1 - 7)	
Natural integrity	6
Apparent naturalness	6
Opportunity for solitude	5
Primitive recreation	<u>5</u>
Total Attribute Rating	22

The Sangre de Cristo Wilderness Study Area contains 11,900 acres of winter habitat for deer, 9,200 acres for elk, and 27,800 acres for Bighorn sheep; 5,000 acres of winter habitat for ptarmigan; and approximately 3 miles of potential stream habitat for Greenback Cutthroat trout. In addition, the area contains 26,900 acres of commercial forest land that is suitable for conventional logging systems (tractors-skidders) on slopes in the 40 percent slope class or less, over 600 acres of private or patented lands, over 3,000 acres of suitable rangeland, 89,600 acres of known mineral reserves, and 60,300 acres of high-medium potential for valuable deposits of locatable minerals. Applications covering 3 percent of the area have been submitted for oil, gas and geothermal leasing. In addition, spruce budworm and mountain pine beetle infestations presently exist on the lower eastern slopes of the study area. This area has some existing use conflicts between motorized and nonmotorized recreationists. Portions of it contain the most highly productive spruce/fir sites on the Forest.

The study area contains several small mineralized zones with moderate resource potential for locatable minerals. A small area of probable geothermal resource potential exists on the west side of the area near Poncha Springs. There appears to be low potential for the occurrence of oil and gas resource within the study area, (USGS Report).

The Sangre de Cristo Wilderness Study Area is adjacent to the Great Sand Dunes Wilderness administered by the National Park Service. It is within 65 air miles from Lost Creek, South San Juan, La Garita, Mount Massive, Hunter-Fryingpan and Collegiate Peaks Wilderness Areas. These areas total over 512,000 acres.

The Bureau of Land Management has identified four wilderness study areas totalling 4,910 acres which are contiguous to the western boundary of the Sangre de Cristo Wilderness Study Area. Details of this study are presented in Appendix C.

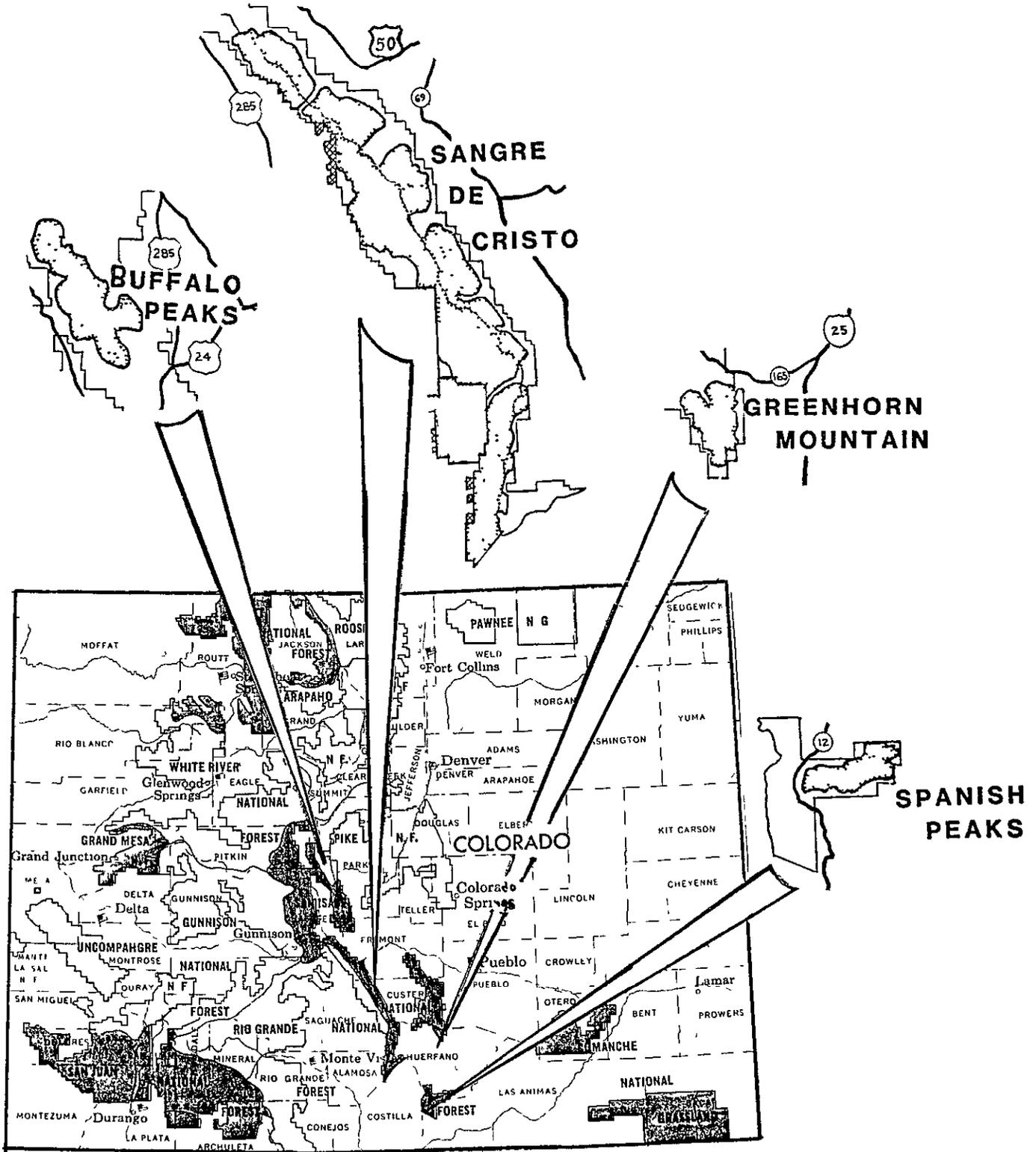
Further Planning Areas

The RARE II (The Second Roadless Area Review and Evaluation) study identified and recommended part of the Lost Creek area for wilderness and allocated part to further planning. In the 1980 Colorado Wilderness Act, Congress established the 106,000 acre Lost Creek Wilderness from the 71,000 acres recommended for wilderness along with an additional 35,000 acres from the Further Planning Area. The remaining Further Planning Area not designated by Congress left 20,723 acres to be administratively evaluated for all uses including wilderness in the Forest planning process.

FIGURE III-7

VICINITY MAP WILDERNESS STUDY AREAS

PIKE AND SAN ISABEL NATIONAL FORESTS



The Lost Creek Further Planning Area is located at the north end of the Platte River mountains about 40 miles southwest of Denver, Colorado. The area is dominated by the 12,000 foot Twin Cone Peaks with spruce/fir and lodgepole pine timber types on the lower slopes and alpine at higher elevations. See Figure III-8.

The Wilderness Attribute Rating System (WARS) that was used to evaluate the wilderness attributes of the RARE II areas was applied to this remaining portion of the Lost Creek Further Planning Area with the following results:

(Scale of 1 - 7)	
Natural integrity	3
Apparent naturalness	3
Opportunity for solitude	4
Primitive recreation	4
Total Attribute Rating	<u>14</u>

This is a low attribute rating compared to the ratings of other roadless areas reviewed on the Pike and San Isabel National Forests during the RARE II study. The original 55,763 acres inventoried RARE II area A2252 was assigned an overall wilderness attribute rating of 22. Thirty-five thousand and forty (35,040) acres of this area were designated as part of the 106,000 Lost Creek Wilderness.

There are numerous constraints, encumbrances and incompatible uses present on the remaining 20,723 acres. These include about 19 miles of logging roads, over 600 acres of recently cutover area, approximately 60 acres of timber plantation, two old sawmill sites, about one mile of range drift fence, a radio repeater site, and 3,840 acres of land with State-owned mineral rights.

Over 50 percent (11,600 acres) of the area contains forest land that is suitable for conventional logging systems (tractors-skidders on slopes in the 40 percent or less class). The entire area has high-moderate potential for valuable deposits of locatable minerals. Over 3,000 acres of the area is suitable for livestock grazing.

The Further Planning Area contains a low resource potential for both leasable and locatable mineral resources, (USGS Report).

There are wilderness opportunities on 179,000 acres of existing wilderness in the Lost Creek and Mount Evans Wildernesses in close proximity to the Lost Creek Further Planning Area.

Potential Wild and Scenic Rivers

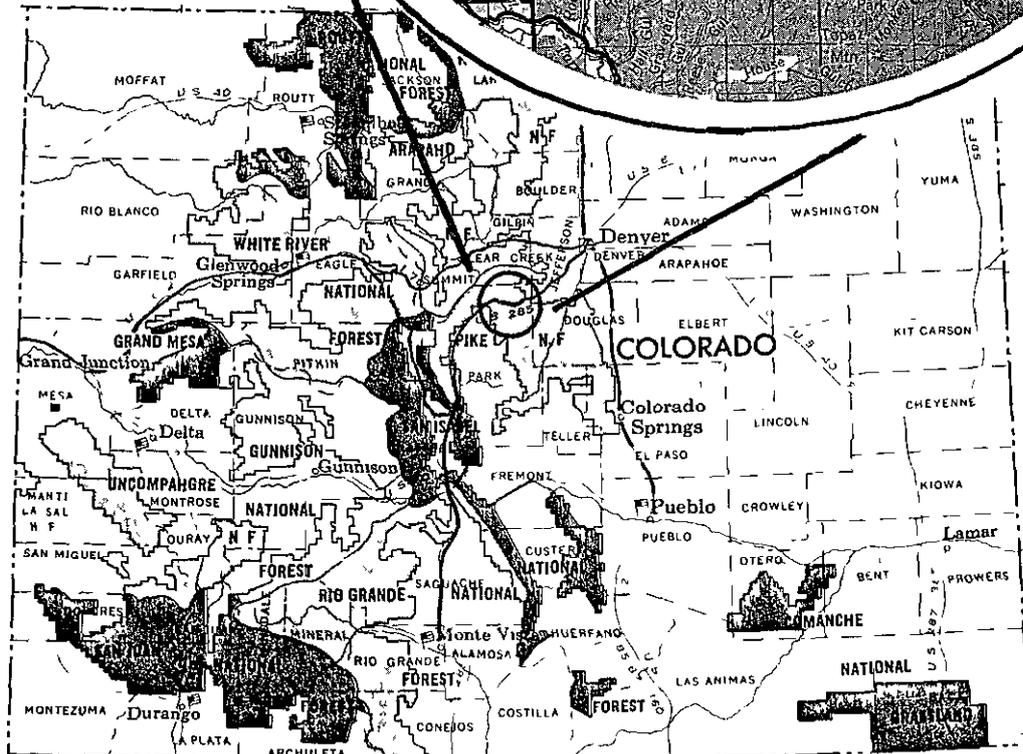
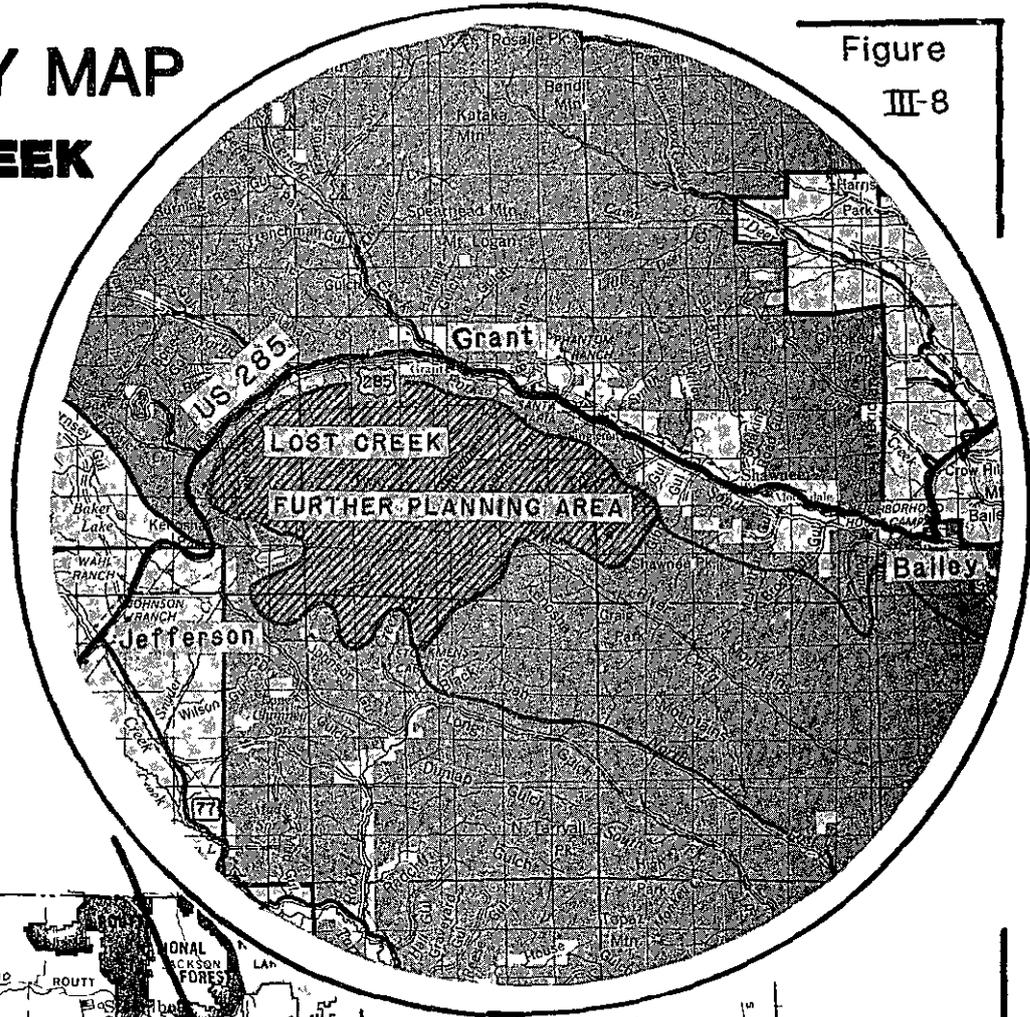
The Wild and Scenic Rivers Act of October 2, 1968, provided for a National Wild and Scenic Rivers System to protect and preserve

VICINITY MAP

LOST CREEK FURTHER PLANNING AREA

PIKE
NATIONAL
FOREST

Figure
III-8



in a free-flowing condition certain rivers which possess outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, or other similar values. In 1979 the President directed agencies to take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory of Potential Wild and Scenic Rivers. Three river segments on the Pike and San Isabel National Forests and Cimarron National Grasslands were listed as potentially eligible for designation. They are Badger Creek from its source to the confluence with the Arkansas River, the Cimarron River from the Colorado - Kansas border to the point where the river leaves the National Grasslands, and the South Platte River segment between Cheesman Reservoir and Elevenmile Canyon Reservoir. An evaluation of those river segments was made and only the South Platte River segment was determined to be eligible for further study. A detailed study of that river segment will be made in the future to determine its suitability for designation. In the meantime, the river segment and corridor will be managed to preserve the special values and qualities which make it eligible. The river segment includes approximately 23 miles of stream.

FISH AND WILDLIFE

Wildlife and Fish Species

Current Uses and Management. In 1983 the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands provided 284,281 recreation visitor days (RVD's) of wildlife and fish habitat related recreation. Of this, 16,618 RVD's were for small game hunting and 46,980 for big game hunting. Fishing accounted for 157,085 RVD's and nature study accounted for 63,598 RVD's.

The planning area has a wide variety of wildlife, due to broad ranges of elevation, climates and soils, and resulting vegetation. The number of vertebrate species which occur on the Pike and San Isabel National Forests, the Comanche National Grasslands and the Cimarron National Grasslands are given in Table III-24. Complete species lists are on file in the Supervisor's Office in Pueblo.

Table III-24
Number of Vertebrate Species on the Pike and San Isabel Planning Area

<u>Species Class</u>	<u>Pike & San Isabel NFs</u>	<u>Comanche NG</u>	<u>Cimarron NG</u>
Amphibians	6	12	10
Birds*	273	277	267
Fish	22	19	16
Mammals*	86	59	50
Reptiles	10	33	33
Total	397	400	375

* Includes migratory species.

Estimated 1983 population sizes and trends of primary game species are given in Table III-25. Specific information on population sizes of small game and non-game species is not available.

Table III-25
Estimated 1983 Populations and Trends of Primary Game
Species Figures are Post-winter, Pre-recruitment Estimates.
Pike and San Isabel National Forests

<u>Species</u>	<u>Pike and San Isabel NFs and</u>			
	<u>Comanche NG</u>		<u>Cimarron NG</u>	
	<u>Colorado</u>		<u>Kansas</u>	
	<u>Population</u>	<u>Trend</u>	<u>Population</u>	<u>Trend</u>
Antelope	879	Up	15	Stable
Bighorn Sheep	1,442	Up	-	-
Black Bear	755	Stable	-	-
Elk	5,435	Stable	15	Up
Mountain Goat	456	Stable	-	-
Mountain Lion	240	Stable	-	-
Mule Deer	23,428	Up	50	Stable
Turkey	1,485	Down	220	Stable
White-tailed Deer	41	Stable	70	Stable

Management of wildlife and fish habitats is closely coordinated with the Colorado Division of Wildlife and the Kansas Forestry, Fish and Game Commission. Objectives and priorities for joint Forest Service-State habitat management projects are established in the respective Comprehensive State Wildlife Plans. Management programs are designed to protect and improve habitat quality for a variety of species and maintain habitat capability for viable populations of all native vertebrate species. This is done through such activities as regenerating forage on big game winter ranges, regenerating aspen, using timber sales to increase habitat diversity and provide needed habitat conditions, travel management, and grazing management on grassland habitats. The various general activities used to protect and improve fish and wildlife habitats are given in Table III-26.

Table III-26
Wildlife and Fish Habitat Protection and Improvement Activities

- Seeding and planting
- Creating openings, early seral stage habitat and edge habitats through cutting or burning vegetation
- Protecting snag habitats
- Developing wildlife cover and nesting structures
- Protecting plants, and food plot areas (fenced enclosures)
- Creating fish spawning beds
- Removing fish passage barriers in streams

Table III-26 Continued

Installing fish cover structures
Stabilizing stream channels and streambanks
Creating potholes and marshes
Deepening ponds and lakes
Developing water sources
Coordinating wildlife and fish habitat needs with:
 Livestock grazing management
 Recreation management
 Travel and road management
 Timber management
 Water and soil management
 Wilderness management

The species in Table III-27 were designated as Management Indicator Species for the respective administrative units of the Pike and San Isabel National Forests. They have been selected to be the focus of habitat management on the planning area, and to assess the effects and influences of land uses on wildlife and fish (36 CFR 219.19 (a)(1)). Criteria used to select wildlife and fish Management Indicator Species are:

- The species has limited or special habitat needs that may be significantly influenced by management practices resulting from land allocations.
- There are current and/or anticipated concerns, conflicts, or issues relative to the species and/or its habitat and other resource management activities.
- The species is in relative high demand for uses such as viewing, hunting, fishing, and trapping.
- The species is either a national or state classified threatened or endangered species.
- The species represents the habitat requirements and environmental suitability for other species (ecological indicator species).

The habitat type or plant series which ecological indicator species are associated with are:

Mountains

WA	Water	LP	Lodgepole Pine
CW	Cottonwood	AS	Aspen
SB	Sagebrush	FM	Mt. Grassland
OK	Oak	SF	Spruce/fir

PJ	Pinon-Juniper	HR	High Riparian
PP	Ponderosa Pine	AL	Alpine
DF	Douglas fir		

Grasslands

SG Blue Gramma - Buffalograss
BS Bluestem - Sandreed - Sand Sage - Sand Dropseed - Galleta
CW Cottonwood
PJ Pinon Juniper

The lists of Management Indicator Species represent broad ecological niches on the Forest and Grasslands and are not intended to represent the needs of all other wildlife species. However, by providing habitat for all of the above species, generally the habitat needs for a wide range of species is provided. Forest Direction in Chapter III of the Forest Plan requires that a minimum of 40 percent of potential habitat be maintained for every native vertebrate wildlife species. As a result of public and agency comments on the DEIS, additional species have been added to the lists of Management Indicator Species.

Adequate, accessible food and cover for deer and elk have been identified as a factor limiting their populations on portions of the planning area. Deep snows limit access for these animals to some areas that otherwise could provide adequate food and cover. On some lands that are accessible, natural plant succession and overbrowsing are currently causing a downward trend in both quality and quantity of winter range habitat. In some cases winter recreational use on the Forest and development of private lands adjacent to the Forest limit the use of otherwise suitable winter range habitat on Forest lands.

Over 500,000 acres of deer and/or elk winter range have been identified on the planning area. These are areas used by deer and/or elk for at least a portion of the winter (December-March) during a winter of normal severity. Current winter range on the planning area supports an estimated 2,942 elk and 11,962 deer. For planning purposes, this is also assumed to be the current capability of habitat on the planning area for elk and deer production. Where winter range or summer range is thought to limit deer and/or elk populations, projects are developed to maintain or increase habitat carrying capacity.

The estimated 1,442 bighorn sheep on the planning area occur in 16 distinct herds. Although they range over a total of approximately 148,000 acres, specific seasonal distribution of sheep is poorly known. Some studies to better evaluate sheep habitat capability are on-going, and some habitat improvement projects are being developed.

Numerous streams, lakes and reservoirs on the planning area provide fish habitat, and rainbow, brook, brown, cutthroat and

TABLE III-27
MANAGEMENT INDICATOR SPECIES

	1/ SPECIAL HABITAT	2/ HIGH CONCERN	3/ HIGH DEMAND	THREATENED OR ENDANGERED	4/ ECOLOGICAL INDICATOR	HABITAT TYPE	5/ ABUNDANCE
<u>Comanche National Grassland</u>							
Antelope		X	X				C
Bobcat			X		X	PJ	R
Mule Deer		X	X				C
Black-tailed Prairie Dog		X	X		X	SG	A
Black-tailed Jackrabbit			X				C
Long-billed Curlew		X			X	SG	U
Ferruginous Hawk	X	X					U
Northern Oriole					X	CW	C
Burrowing Owl	X				X	SG	C
Great Horned Owl		X	X		X	PJ-CW	U
Lesser Prairie Chicken		X	X	X	X	BS	U
Scaled Quail			X		X	BS	A
Cassin's Sparrow					X	BS	C
Turkey		X	X		X	PJ-CW	R
Lewis' Woodpecker	X				X	CW	C
Bewick's Wren	X				X	PJ	U
Cliff Swallow	X				X	Cliffs	A
<u>Cimarron National Grassland</u>							
Mule Deer		X	X				C
White-tailed Deer		X	X				C
Black-tailed Prairie Dog		X			X	SG	A
Bobwhite			X				A
Mourning Dove			X				A
Mississippi Kite			X				U
McCown's Longspur					X	SG	C
Northern Oriole					X	CW	C
Burrowing Owl	X				X	SG	C
Lesser Prairie Chicken		X	X		X	BS	C
Scaled Quail			X		X	BS	C
Cassin's Sparrow					X	BS	C
Turkey	X	X	X		X	CW	R
Red-headed Woodpecker	X				X	CW	C
<u>Pike & San Isabel National Forests</u>							
Beaver		X	X				U
Bighorn Sheep	X	X	X				U
Mule Deer		X					C
Elk		X	X				C
Pine Marten	X	X			X	SF, DF, LP	R
Abert's Squirrel	X	X			X	PP	U
Mountain Bluebird	X				X	FM	A
Peregrine Falcon	X	X		X			R
Mallard		X			X	WA	C
Water Pipit					X	AL	C
Yellow-bellied Sapsucker	X	X			X	AS	C
Green-tailed Towhee					X	SB	C
Turkey	X	X	X				R
Lewis' Woodpecker	X	X			X	PP, CW	U
Northern Three-toed Woodpecker	X	X			X	SF, LP, PP	U
Black-throated Gray Warbler					X	PJ	C
Virginia's Warbler					X	OK	C
Wilson's Warbler					X	HR	C
Brook Trout		X	X				A
Greenback Cutthroat Trout	X	X		X	X	WA	R

- 1/ Has a special habitat need during some phase of the life cycle.
2/ High public concern for the species and its habitat.
3/ High public interest for hunting or viewing
4/ Species presence indicates particular, very specific biological community
5/ Abundance Code
A - Abundant, observations of 15 per day viewed in suitable habitat
C - Common, observations of five per day viewed in suitable habitat.
U - Unusual, observations of one per day viewed in suitable habitat
R - Rare, may not be seen in one day.

lake trout are the most popular fish species with anglers. There are about 1,200 miles of perennial streams which provide fish habitat, as well as 150 lakes and reservoirs, which total about 6,300 surface acres. Twin Lakes (2,500 acres) and Turquoise Lake (2,000 acres) are the largest lakes within the planning area. Several warm water ponds provide important fisheries for sunfish, catfish, and bullheads on the Cimarron and Comanche National Grasslands. Fish stocking is done where natural populations cannot support the heavy fishing pressure they receive, and is coordinated with the Colorado Division of Wildlife and the Kansas Forestry, Fish and Game Commission. Management programs emphasize improving riparian habitat, providing better instream cover and spawning habitat, stabilizing stream channels, and identifying stream and lake sites where fish habitat may be improved. Additional inventory and project work is being planned whereby improvement of riparian, watershed and transportation programs will improve fish habitat. Considerable opportunity exists for increasing fish habitat carrying capacity on several streams and lakes on the planning area.

Demand Trends. Rapidly increasing demand for hunting, fishing and non-consumptive wildlife uses, such as nature study and wildlife photography, exist on the Forest. In the Rocky Mountain Region, hunting and fishing recreation has increased 22 percent in the past 5 years. By the year 2030, recreational demand for fishing in the Region is expected to increase by 101 percent, big game hunting by 68 percent, nature study by 55 percent and small game hunting by 41 percent. Relatively easy access to the Forest from Front Range population centers results in particularly high demand for recreational opportunities associated with wildlife and fish. The estimated quantity of recreation-visitor-days associated with wildlife and fish are displayed in the dispersed recreation demand and supply figures.

General assumption regarding wildlife and fish habitat management on the Pike and San Isabel National Forests are:

- Consumptive and non-consumptive demand for wildlife currently exceeds supply.
- Overall demand for wildlife will increase even faster in the future than it has in the recent past.
- Non-consumptive wildlife uses will increase faster than consumptive uses as hunting and trapping become more restricted.
- Demand for fishing currently exceeds supply.
- Fishing use will increase even faster in the future than it has in the recent past.

- Much of the wildlife and fish resource demand above the current supply can be provided through habitat improvement practices on the Forest.
- Wildlife and fish habitat improvement projects will become increasingly important, especially in areas of high human use on the planning area.

Habitat Diversity

Current Use and Management. Habitat diversity on the planning area is the variety, abundance and distribution of different plant species and plant associations associated with differences in topography, elevation and aspect. It is usually described in terms of the amount and kind of forb, grass, shrub and tree species, including stand structure, shape and size.

Habitat diversity on the National Grasslands is best described in terms of plant species, topography, and the amount of uncommon habitat components such as shrubs, trees, rock outcrops, cliffs and water sources. The general habitat types on the Comanche and Cimarron National Grasslands are given in Table III-28. Short and mid-grass prairie is the primary habitat type. Diversity is generally managed through livestock grazing use, and protection and propagation of trees, shrubs and water sources.

Table III-28
General Habitat Types of the
Comanche and Cimarron National Grasslands

<u>Habitat Type</u>	<u>Percent</u>
Short-, mid-grass Prairie	74
Sand Sage, soapweed Prairie	14
Juniper Woodlands	8
Cottonwood-willow Riparian	2
Rock outcrops, Cliffs	2
Water	Less than 0.1
Total acres: 527,047	

Habitat diversity on the National Forests is indicated by the relative distribution of major habitat types displayed in Table III-29. About 75 percent of these lands are forested habitats, and 25 percent non-forested habitats. Douglas-fir, ponderosa pine and spruce/fir are the most common forested habitats. Alpine tundra and high elevation talus and rock are the most abundant non-forested habitats available to wildlife. The percent of each of the five major forested vegetation types by structural stage is given in Table III-30.

Table III-29
Percent of Forested and Non-forested Major Habitat
Types on the Pike and San Isabel National Forests
Excluding the Comanche and Cimarron National Grasslands

<u>Forested Stands</u>			<u>Non-forested Stands</u>		
<u>Habitat</u>	<u>Total</u>		<u>Habitat</u>	<u>Total</u>	
<u>Type</u>	<u>Acres</u>	<u>Percent</u>	<u>Type</u>	<u>Acres</u>	<u>Percent</u>
Douglas-fir	443,863	27	Mt. Grassland	43,234	8
Spruce/fir	385,262	23	Talus/Rock	172,394	31
Ponderosa Pine	388,626	23	Willow	58,347	10
Lodgepole Pine	222,873	14	Pinon/Juniper	52,272	9
Aspen	166,092	10	Gambel Oak	28,616	5
Bristlecone, White, Limber Pine	<u>53,602</u>	<u>3</u>	Alpine	186,497	33
			Mt. Mahogany	7,039	1
			Sage	3,687	1
			Water	<u>8,500</u>	<u>2</u>
	1,660,318	100		560,586	100

Table III-30
Structure of Major Forested Habitat Types

<u>Percent of Acreage</u> <u>by Structural Stage</u>	<u>Douglas-</u> <u>Fir</u>	<u>Spruce/</u> <u>Fir</u>	<u>Ponderosa</u> <u>Pine</u>	<u>Lodgepole</u> <u>Pine</u>	<u>Aspen</u>
Grass-Forb	2	5	3	2	2
Seedling-Sapling	1	2	1	7	17
Poles	19	28	9	62	72
Mature	71	47	79	27	8
Old-Growth Habitat	<u>7</u>	<u>18</u>	<u>8</u>	<u>2</u>	<u>1</u>
Totals	100	100	100	100	100

To obtain a general evaluation of habitat diversity on the National Forest portion of the planning area, 137 Diversity Units, averaging 16,200 acres in size, were identified. Each Diversity Unit usually comprises one or two distinct watersheds, and therefore is quite manageable as a unit. General habitat diversity for each Diversity Unit was rated by the following criteria: relative amount of forested and non-forested acreage; amount of grass-forb, seedling-sapling, polesized, mature and old-growth forest stands; the number of habitat types present; the average stand size; and the availability of water. The results are given by level of general habitat diversity in Table III-31.

Table III-31
Habitat Diversity Ratings of Diversity Units
Level of General Habitat Diversity

<u>Diversity Class</u>	<u>Index Rating</u>	<u>Number of Diversity Units</u>
Extremely Low	0-29	4
Low	30-35	13
Moderately Low	36-45	43
Moderately High	46-56	48
High	57-66	17
Extremely High	67-90	<u>12</u>
		137

Analysis has shown that most of the following characteristics occur where Diversity Units have a below average General Habitat Diversity rating:

- Lack of non-forested habitats, natural or created, especially at lower elevations.
- Poor structural diversity in most major forested habitat types. Acreage of grass-forb and seedling-sapling stands is particularly low.
- Few major habitat types are present. Additional aspen, spruce/fir and mountain grasslands would be particularly desirable and feasible in many below-average Diversity Units.
- Stands of different habitat types are irregular in distribution.

The amount of mature ponderosa pine and Douglas-fir is generally excessive. However, in some places, insect epidemics are common and old-age forests 160 years old and older are lacking. Snag cutting for fuelwood has left few standing dead trees for cavity-nesting wildlife species in many areas near the Front Range population centers.

Spruce/fir structural stage distribution is generally good, although the amount of early seral stage habitat should be greater to meet wildlife needs. Currently, old growth habitat is adequate only in the spruce/fir habitat type. Spruce/fir also provides the best within-stand vertical diversity due to the number of stands composed of two or more distinct age classes of trees.

Lodgepole pine habitats are generally the least diverse among the forested habitats. Most stands are pole-sized trees, and understory seedlings, shrubs, grasses and forbs are usually very sparse.

Aspen habitats on the planning area are also predominantly pole-sized trees, but diverse understories of grasses, forbs and shrubs are usually present. Since it is usually a seral species on the planning area, aspen stands are gradually being invaded by more shade-tolerant conifer species. Many stands which are classified as conifer stands were aspen stands at one time, and still have much suppressed but viable aspen in their understories.

The percentage of each of the five major forested habitat types that would be in each of five structural stages to provide optimum habitat for wildlife species on the planning unit is given in Table III-32. Such structural stage distributions are goals on Diversity Units where optimum habitat diversity is desired.

Table III-33 displays the relative occurrence among the five forested habitat types and the relative overall importance of each of these habitats to the wildlife species on the Pike and San Isabel National Forests. The number of wildlife species with very strong habitat requirements for only the young structural stage forested habitats (grass-forb, seedling-sapling) and the number of species with similar requirements for only the older structural stages are given in Table III-34. This information is based on the Forest Service Rocky Mountain Wildlife and Fish Habitat Relationships Data Base.

Table III-32
Optimum structural stage distribution within each
of the Five Major Forested Habitat Types for the
Wildlife Species which occur on the
Pike and San Isabel National Forests

(% of Total Habitat Acreage in Each Structural Stage)					
<u>Structural Stage</u>	<u>Douglas- Fir</u>	<u>Spruce/ Fir</u>	<u>Ponderosa Pine</u>	<u>Lodgepole Pine</u>	<u>Aspen</u>
Grass-forb	15	13	14	13	14
Seedling-sapling	17	15	16	15	16
Poles	19	16	18	18	20
Mature	25	26	26	26	26
Old-growth	<u>24</u>	<u>30</u>	<u>26</u>	<u>28</u>	<u>24</u>
	100	100	100	100	100

Table III-33
Occurrence of the Five Major Forested Habitat Types, and
their importance to the wildlife species which occur on the
Pike and San Isabel National Forests
 (% of Total Forested Habitat Type Acreage in Each Habitat Type)

	<u>Douglas-</u> <u>Fir</u>	<u>Spruce/</u> <u>Fir</u>	<u>Ponderosa</u> <u>Pine</u>	<u>Lodgepole</u> <u>Pine</u>	<u>Aspen</u>	<u>Total</u>
Habitat type occurrence	28	24	24	14	10	100
Habitat type importance	18	17	28	17	20	100
Total acres in 5 habitat types - 1,606,716						
Total wildlife species on Forest - 375						

Table III-34
Number of species on the Pike and San Isabel National Forests
with very strong habitat requirements for only the young
or only the older structural stages of the
Five Major Forested Habitat Types

<u>Structural</u> <u>Stages</u>	<u>Douglas-</u> <u>Fir</u>	<u>Spruce/</u> <u>Fir</u>	<u>Ponderosa</u> <u>Pine</u>	<u>Lodgepole</u> <u>Pine</u>	<u>Aspen</u>
Species with only young structural stage requirements (grass-forb, seedling-sapling)	5	9	16	7	9
Species with only older structural stage requirements (mature, old-growth)	23	21	27	22	15

Currently, timber harvest and the use of prescribed fire are the primary management activities used to obtain desired levels of habitat diversity. Approximately 3,500 to 4,500 acres are treated annually.

Without freedom from human disturbance, wildlife cannot benefit fully from suitable and improved habitat conditions. Habitat effectiveness is influenced by the amount of human use and activities that occur within an area. The frequency and time of year of disturbance are also important factors. Road use and off-road vehicle uses are decreasing the effectiveness of habitats for many wildlife species, especially deer, elk and bighorn sheep. Without freedom from disturbance, the species which are intolerant of disturbance find only limited benefit from improved habitat conditions.

what research?

Within the Pike and San Isabel National Forests there are 2,792 miles of roads--353 miles surfaced, 812 miles graded and 1,627 miles primitive. These miles of road do not include the National Grasslands. The amount of potential disturbance caused to elk has been quantified by Lyon (1984) as a function of both roads and available cover. The habitat effectiveness of the 137 Diversity Units on the Pike and San Isabel National Forests has been estimated based on elk research and the amount of available cover and road mileage in each of the Diversity Units (Table III-35).

Table III-35
Number of Diversity Units by Elk Habitat Effectiveness Rating, 90%+ indicates optimum habitat effectiveness.

<u>Habitat Effectiveness Rating</u>	<u>Number of Diversity Units</u>	<u>% of Total Diversity Units</u>
90%+	26	19
80-89%	21	15
70-79%	30	22
60-69%	32	24
50-59%	21	15
40-49%	4	3
below 40%	3	2
	<u>137</u>	<u>100</u>

Demand Trends. General assumptions relative to demand trends for wildlife habitat diversity management are:

- The Forest Service will continue to provide adequate diversity to maintain viable populations of wildlife and fish species presently occurring on the planning area.
- Wildlife habitat diversity is an important indicator of wildlife species diversity and population levels.
- Management indicator species will be used to determine the levels of wildlife habitat diversity necessary to maintain viable wildlife populations.
- As road building, timber harvest, fuelwood cutting and recreational use increases, there will be a direct effect on elk and other species which are intolerant of disturbance.

Threatened and Endangered Species

Current Use and Management. The Endangered Species Act of 1973 directs all Federal agencies to use their authorities to carry out programs for the conservation of endangered and threatened plant and animal species. The Pike and San Isabel National

Forests have, or may have, the Federally or State classified threatened or endangered animal species given in Table III-36. There are no such classified plant species known to occur on the planning area.

Several potential peregrine falcon nest sites have been identified on the Forest. These birds may be reintroduced to some of those sites. Habitat for black-footed ferrets is being maintained in conjunction with prairie dog habitat management on the National Grasslands. Habitat quality is being maintained for the greenback cutthroat trout populations on the planning unit, and reintroduction into other suitable streams is ongoing. Lesser Prairie Chicken populations and habitat are being monitored and maintained on the Comanche National Grasslands to determine management action needed to recover this species. Habitat conditions required by the remaining six threatened and endangered species are being maintained. The occurrence of seven of the species listed in Table III-36 on the planning area is peripheral or unknown, based on recent surveys. Prairie falcons do nest on the Colorado portion of the planning area but are not known to nest on the Cimarron National Grassland in Kansas. Habitat improvement opportunities for the seven peripheral species are very limited. Management primarily involves habitat and species surveys, protection of suitable habitat and identification of opportunities where habitat requirements can be better provided.

Table III-36
Threatened and Endangered Species
On the Planning Unit

<u>Species</u>	<u>Designation</u>
Bald Eagle*	Endangered - Federal
Peregrine Falcon	Endangered - Federal
Black-footed Ferret*	Endangered - Federal
Greenback Cutthroat Trout	Threatened - Federal
River Otter*	Endangered - Colorado
Lynx*	Endangered - Colorado
Wolverine*	Endangered - Colorado
Lesser Prairie Chicken	Threatened - Colorado
Prairie Falcon*	Threatened - Kansas
Least Tern*	Threatened - Kansas

*Occurrence on planning unit is peripheral or uncertain.

The Forest Service will continue to fulfill its responsibilities under the Migratory Bird Treaty Act and the Bald Eagle Protection Act when conducting analysis for project activities. This insures that habitat requirements for migratory birds and bald eagles are maintained or improved.

Those areas identified by the Colorado Natural Areas Program (CNAP) which contain habitat for State threatened species or for potential threatened or endangered species will be protected from deterioration pending completion of a suitability examination for a Special Interest Area (SIA) and subsequent decision for establishment. Areas identified in the future will receive the same protection. The areas now identified are:

<u>Area</u>	<u>Species</u>	<u>Remarks</u>
<u>Plants</u>		
West Hoosier Ridge	<u>Braya humilis</u> ssp. <u>ventosa</u>	Partially on the White River NF
Mt. Bross	<u>Braya humilis</u> ssp. <u>ventosa</u>	
East Hoosier Ridge	<u>Eutrema penlandii</u> <u>Saussurea weberi</u> <u>Armeria maritima</u> ssp. <u>Sibirica</u> <u>Ipomopsis globularis</u>	Partially on the White River NF
Lost Park Ptilagrostis Site	<u>Ptilagrostis porteri</u>	
Carrizo Frasera Site	<u>Frasera Coloradensis</u>	
<u>Animals</u>		
Lesser Prairie Chicken Habitat	Lesser Prairie Chicken	Threatened in Colorado-Management Indicator Species for Comanche N.G. Known habitat in Management Area 4B

Demand Trends. Assumptions concerning management of threatened and endangered species are:

- Public demand for special treatment and endangered plant and animal species and their habitat will continue.
- Demands for other National Forest and Grassland resource outputs will often be in conflict with threatened and endangered species habitat requirements.
- The Forest Service will continue to fulfill responsibilities outlined under the Endangered Species Act.

RANGE

Current Use and Management. Grazing is an important resource use on the Pike and San Isabel National Forests and particularly on the Comanche and Cimarron National Grasslands. Livestock grazing began with the earliest settlement of the plains and mountain valleys.

Grazing use increased to high levels before the National Forests were established. Subsequently, much of the mountain rangelands deteriorated due to overuse. The plains rangelands were also overused and many areas were plowed and farmed. Severe droughts during the 1930's resulted in severe loss due to wind erosion on much of the farmed and grazed lands.

Permitted grazing use in the mid 1950's was about 140,000 Animal Unit Months annually. Permitted sheep use has decreased steadily since then and cattle use has increased, especially on the National Grasslands, with current permitted use being about 205,000 Animal Unit Months. The increases are a result of improved grazing management and installation of structural and nonstructural range improvements.

Approximate levels of current grazing use are shown in Table III-37.

Table III-37
APPROXIMATE CURRENT GRAZING USE
(FY 78-83 Average)

<u>Permitted Livestock</u>	<u>Number</u>	<u>AUM</u>
Pike & San Isabel National Forests		
Cattle	10,150	38,518
Horses	222	266
Sheep	4,510	2,723
Comanche & Cimarron National Grasslands		
Cattle	26,057	160,423
Horses	18	169
Total		
Cattle	36,207	198,941
Horses	240	435
Sheep	4,510	2,723

There are 68 allotments on the National Forests and 224 allotments on the National Grasslands (see Appendix H, FEIS), 8 of the National Forest allotments are vacant but are available for grazing by livestock.

Many National Forest areas were severely overgrazed in the past resulting in erosion and reduced productivity. Livestock numbers were reduced and rehabilitation projects such as reseeding, terracing, check dams and tree planting were accomplished.

Some problem areas still exist, usually as a result of improper livestock distribution. Efforts are underway, or are planned, to resolve these problems through development of new water sources, fencing, improved grazing management systems and in a few cases, reduced stocking.

Decreases in base ranch properties because of subdevelopment for residential sites or sale of water rights on privately owned irrigated meadow lands adjacent to and within the Pike and San Isabel National Forests has decreased the amount of livestock on non-federal lands. On the National Grasslands grazing use fluctuates more dramatically because of annual weather conditions.

Production capability was determined through the development of yield tables based on current forage production, estimation of forage produced on range that could be grazed if range improvements such as water developments are installed, estimated increased forage production as a result of non-structural range improvements (reseeding, pitting, brush control, etc.), and estimated increased production as a result of intensive grazing management systems.

Colorado State University (Fort Collins, Colorado) has on-going studies on the Comanche National Grasslands (Southeast Colorado Research Center) which are looking at livestock production capabilities under various range management systems.

Suitable range is land accessible to livestock and capable of producing forage on a sustained yield basis. Table III-38 shows suitable range acres in the planning area.

Table III-38
SUITABLE RANGE

Pike & San Isabel National Forests		
Rangeland	140,416	acres
Timbered rangeland (aspen, ponderosa pine, spruce/fir and non- commercial timber types)	354,954	acres
Total	495,370	acres
Comanche & Cimarron National Grasslands		
Rangeland total	526,564	acres
Planning Area total	1,021,934	acres

Areas not available for grazing include watershed withdrawals, administrative areas and developed sites including recreation sites.

Appendix H displays the current status of grazing allotments on the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands.

Demand Trends. Average annual permitted grazing use on National Forests and Grasslands are shown in Tables III-38 and III-39.

Demand for grazing on the National Forests is expected to increase from current levels of about 40,000 AUM's to about 60,000 AUM's by the year 2030. Production capability is expected to exceed demand on the National Forests. Some forage production occurs in isolated small areas that are not economically feasible to graze with livestock. In other areas forage is allocated between wildlife and livestock.

Demand for grazing on the National Grasslands is expected to exceed their production capability. Increased production because of initiation of intensive grazing management systems and installation of structural and nonstructural range improvements will occur. Permitted use is expected to increase from current levels to about 185,000 AUM's by the year 2030.

Increased livestock use is possible in many areas when additional range improvements, especially water sources, are installed and improved grazing management systems such as rest-rotation, deferred rotation and high intensity-short duration are initiated.

On the National Forests forage production can be increased by decreasing tree crown cover. This forage production will be reduced or lost as the crown cover increases or tree stands are reestablished. This is called transitory range. Through proper

scheduling, needed amounts of transitory range can be made available. Mature aspen stands are also important forage production areas. Many aspen stands are being replaced by conifers in the understory. Conifer stands produce much less forage. By harvesting mature aspen stands and/or removing the invading conifers, higher forage production is maintained as well as providing a healthy aspen component in the Forest.

The greatest potential for increasing forage production is by decreasing tree stand density in the ponderosa pine vegetation type. Large areas of dense tree cover of this type exist on the Forests and these lands are producing little or no forage. Forage increases for both domestic livestock and big game animals can be attained by reducing tree stocking levels. Table III-39 displays average annual permitted grazing use on the Pike and San Isabel National Forests. Table III-40 displays average annual permitted grazing use on the Cimarron and Comanche National Grasslands.

Table III-39
AVERAGE ANNUAL
PERMITTED GRAZING USE NATIONAL FORESTS
 (MAUM)

	<u>Current</u> <u>Level</u>	<u>1981-</u> <u>1985</u>	<u>1986-</u> <u>1990</u>	<u>1991-</u> <u>2000</u>	<u>2001-</u> <u>2010</u>	<u>2011-</u> <u>2020</u>	<u>2021-</u> <u>2030</u>
Demand							
Trend	40	42	44	48	52	56	60
Supply							
Potential	65	67	70	83	85	82	74

Table III-40
AVERAGE ANNUAL
PERMITTED GRAZING USE NATIONAL GRASSLAND
 (MAUM)

	<u>Current</u> <u>Level</u>	<u>1981-</u> <u>1985</u>	<u>1986-</u> <u>1990</u>	<u>1991-</u> <u>2000</u>	<u>2001-</u> <u>2010</u>	<u>2011-</u> <u>2020</u>	<u>2021-</u> <u>2030</u>
Demand	160	170	175	182	187	192	205
Production							
Capability	160	165	170	177	181	187	193

TIMBER

Current Use and Management. The use of timber is closely associated with demands for products to carry out activities of local industries, meet local building needs, and the demand for fuelwood.

The Pike and San Isabel National Forests have approximately 1,065,220 acres of tentatively suitable forest land.

Timber management on the Pike and San Isabel National Forest has not been a cost effective program when considering only the direct costs and revenue of growing and selling trees. However, the timber program provides the opportunity to accomplish other resource objectives and is directed at improving other resource conditions, such as esthetics, wildlife habitats, water yields, and range. Some specific examples of timber management to benefit other resources follow:

- Aspen needs to be regenerated to maintain the presence of aspen species near present levels (a desirable goal for wildlife and visual management). Without regeneration treatments, much of the aspen type would eventually be replaced by other vegetation through natural succession. Regeneration can be achieved by burning or cutting, but at a relatively high cost with no monetary return. The sale of aspen and conifer stands which have residual aspen in their understories can accomplish the same goal; utilization of the wood fiber and realization of a monetary return.
- The skewed age class distribution towards an older, mature to over-mature forest makes the trees highly susceptible to insects and disease. Direct control of epidemics is an expensive, short-term solution. Silvicultural treatments including timber sales, offer an opportunity to provide long-term protection at a reduced cost while realizing the additional benefits of the fiber harvested.
- An additional benefit of changing the Forest's age class distribution from its present mature condition is the increase of early successional structural stages, an important habitat requirement for many wildlife species. Since the advent of fire control, the effectiveness of fire as the principal natural creator of early structural stages no longer provides for a suitable structural balance. The balance of structural stages can be improved by regenerating mature forests. Such changes in age classes are most efficiently accomplished with timber sales.
- The importance of water in the arid west is increasing as demand grows substantially and the available supply remains relatively constant. It is well documented that vegetation management can increase water yields. ^{1/} The opportunity for the largest increases occur in the subalpine forests from small clearcuts. Sale of timber harvested from such cuts may also reduce the costs of creating the openings.

^{1/} "Watershed Management in the Rocky Mountain Subalpine Zone," Charles F. Leaf, USDA Forest Service, February 1975.

- The esthetic beauty of the Forest is important to thousands of people who visit the National Forest annually. Studies ^{2/} of visual perception indicate that most people enjoy the appearance of a younger, vigorous, healthy forest over that of an over-mature forest with dead and dying trees evident to the viewer. A coordinated visual management/vegetation program can significantly enhance visual quality in scenic areas as well as provide wood products.
- Downhill skiing is a major recreational activity on the National Forest. Forest vegetation is essential to a quality skiing experience because it improves snow retention and snow quality; it provides better depth perception; and it creates a pleasurable outdoor experience. An overmature, decadent forest which is highly susceptible to wildfire and insect epidemics is not a desirable condition. A younger, vigorous forest with a more balanced age class distribution provides the desired benefits at much less risk. A portion of the required vegetation management costs may be recovered by selling the resultant wood products.
- Dispersed motorized recreation is a very popular activity on many of the Forest's roads. A coordinated timber management and travel management program offers the opportunity to enhance dispersed motorized recreation by increasing opportunities and improving the distribution of use..
- A related resource management need is improved access for public firewood gathering. Much of the firewood along existing roads has been removed through public firewood programs. Improved Forest access as a result of resource management will substantially increase the availability of public firewood.

All capable, available, and tentatively suitable for timber production lands could be used to produce outputs and meet the objectives of managing National Forest lands.

Those lands which are required to meet the objectives of the selected alternative are classed as suitable lands. Those lands surplus to those required to meet the objectives of the selected alternative are classed as unsuitable.

Figure III-9 displays a summary of lands capable, available, and tentatively suitable for timber production on the Forest.

^{2/} In Proceedings, 1979 Convention, Society of American Forester, October 14-17, 1979, Boston, Massachusetts, pp. 95-102

FIGURE III-9

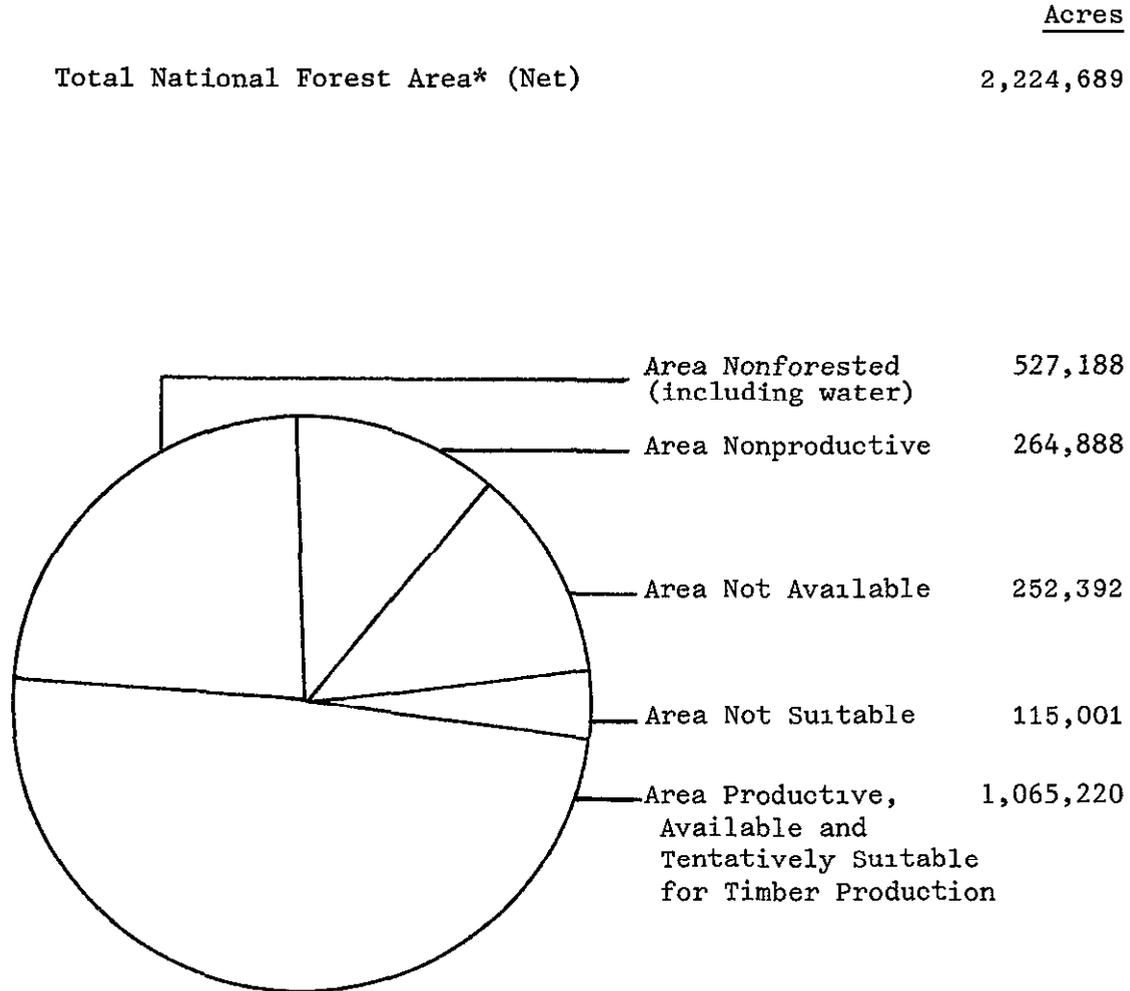
LANDS AVAILABLE AND SUITABLE FOR TIMBER PRODUCTION

<u>Criterion</u>	<u>Classification</u>	<u>Acres</u>	
	Net National Forest Ownership*	2,224,689	
	Water	9,845	
	Nonforest Land	517,343	
	Forest Land		
	A. Nonproductive/uneconomical (Less than 20 CF/Ac/Yr)	264,888	
Legislatively or Administratively Withdrawn	B. Productive but not Available	1. Reserved Wilderness	130,302
		Wild and Scenic Rivers	0
		Natural Areas	790
		Special Areas	0
		2. Deferred Wilderness Study Areas -designated by Congress	102,700
		-designated by Administration	18,600
	C. Productive and Available but not Suitable		
Lack of Technology	1. Technologically Not Suitable Irreversible Soil or Water- shed Damage	69,976	
		Five Year Regeneration	27,824
Administrative Allocation	2. Administratively Not Suitable Experimental Forest Administrative Sites	12,418	
		4,783	
	D. Tentatively Suitable Land	1,065,220	

* Pike and San Isabel National Forests unit only. The Comanche and Cimarron National Grasslands are excluded from this summary because they contain no suitable forest land.

FIGURE III-10

LANDS TENTATIVELY SUITABLE FOR TIMBER PRODUCTION



* Includes only the Pike and San Isabel National Forests. Does not include the Comanche or Cimarron National Grasslands.

DEFINITIONS FOR FIGURES III-9 AND III-10

Net National Forest Ownership: The acreage of Federal lands which have been designated by Executive Order or statute as National Forest, National Grasslands, or Purchase Units.

Water: Streams, sloughs, estuaries, and canals 120 feet or more in width; and lakes, reservoirs, and ponds more than one acre in area.

Nonforest Land: Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other use. Includes areas used for crops, improved pasture, residential areas, improved roads of any width and adjoining clearings, and powerline clearing of any width. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearing more than one acre in size to qualify as nonforest land. The nonforest land is classified as land not suited for timber production.

Forest Land: Land at least 16 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Nonproductive Forest Land: Forest land which is not capable of growing industrial crops of wood at least at the minimum biological growth potential of 20 cubic feet per acre annually as established in the Regional plan. Nonproductive forest land is not suited for timber production.

Productive Forest Land. Forest land which is capable of growing industrial crops of wood at or above 20 cubic feet per acre per year. This classification includes both accessible and inaccessible, stocked and nonstocked land.

Unsuitable Forest Land - Deferred: Productive forest land which has been withdrawn from timber production by the Secretary or Chief of the Forest Service. Productive but not available forest land is classed as not suited for timber production.

Unsuitable Forest Land - Reserved: Productive forest land which has been legislatively withdrawn or administratively withdrawn from timber production on a permanent basis. Examples of this classification are Wilderness Areas, Primitive Areas, Research Natural Areas or special interest areas or similar formal withdrawals approved by the Chief or higher authority.

Productive And Available: Productive forest land which has not been legislatively withdrawn or administratively withdrawn from timber production by the Secretary or the Chief of the Forest Service. This classification includes RARE II Further Planning Areas and administrative designation below the Chief's level withdrawing land from timber production.

Technologically Not Suitable/Irreversible Resource Damage:

Forest land that is productive and available for timber production but technology is not available that will insure timber production, including harvesting, from the land without irreversible resource damage to soil productivity or watershed condition. Availability of technology is judged on whether technology is currently developed and available for use. This is not an economic test, and the technology does not have to be available in the local area.

Technologically Not Suitable/Over Five-Year Regeneration: Forest land that is productive and available for timber production but where there is not reasonable assurance that such lands can be adequately restocked within 5 years after final harvest. The five-year regeneration requirement does not apply in areas managed to promote nontimber resource values.

Administratively Not Suitable: Forest land that is productive and available for timber production but is not organized for timber production under sustained yield principles because of long-term allocations made prior to this planning effort. Some timber may be cut from these areas but it will generally be a by-product of some other management activity. Experimental Forest and developed recreation sites are normally included in this component.

Productive, Available And Tentatively Suitable Forest Land:

Productive forest land that has not been legislatively or administratively withdrawn and is physically suited for timber production.

The size class distribution for the 1,065,220 acres of productive (capable), available and tentatively suitable timber producing lands are displayed in Table III-41.

Table III-41
SIZE CLASS DISTRIBUTION

<u>Species</u>	<u>Sawtimber</u>	<u>Poletimber</u>	<u>Seedlings & Saplings</u>	<u>Understocked</u>	<u>Uneven-Aged</u>
Aspen	17%	39%	39%	5%	0
Douglas-fir	69%	15%	3%	13%	0
Ponderosa Pine	76%	2%	2%	20%	0
Lodgepole Pine	33%	58%	8%	1%	0
Spruce/fir	31%	20%	6%	6%	37%

This current size class distribution has important implications for future timber management strategies on the Pike and San Isabel National Forests. Improvement of size class distribution is needed to improve wildlife habitat diversity, maintain and enhance visual opportunity, and increase wood fiber production. In addition, many acres of forest land are entering the size class where they are more susceptible to attack by various insects and diseases.

Average annual acres of silvicultural treatments are shown in Table III-42.

Table III-42
SILVICULTURAL TREATMENT

	<u>TIMBER STAND IMPROVEMENT</u>	<u>REFORESTATION</u>
1960-69	422 acres/year	419 acres/year
1970-79	1201 acres/year	423 acres/year
1980	1232 acres (Ponderosa Pine) 40 acres (Lodgepole Pine) <u>115</u> acres (Spruce/fir)	
	1387 acres 1980 Total	

Authority for managing the timber resource is based on the Organic Act of 1897, the Multiple Use Sustained Yield Act of 1960 and the National Forest Management Act of 1976. Direction and conditions for determining long-term sustained yield capacity and allowable sale quantity are set forth in 36 CFR 219.16.

The timber resource is being regulated on a non-declining basis. This means that wood fiber yield for any decade will not be less than that of the previous decade. This also implies that the average harvest amount in any decade cannot exceed the long-term capability of the Forest to produce wood fiber.

Timber sales are designed to meet multiple use objectives and to perpetuate the forest. These objectives include sustained timber yields, increased forage production, maintenance or improvement of visual characteristics, maintenance of vegetation diversity, increased water yield, improved wildlife habitat diversity, increased winter range and control of insects and disease. Harvesting has generally been limited to tractor/skidder logging methods on slopes in the less than 40 percent slope classes. Other logging systems suitable for harvesting lands in the 40-70 percent slope classes are available but are currently not being used locally. Shelterwood regeneration has been the major silvicultural method used to harvest ponderosa pine and Douglas-fir. Clearcutting has been the major method to harvest aspen and lodgepole pine, and group selection and clear-

cutting has been used for spruce and subalpine fir. Intermediate cuts include both precommercial and commercial thinnings.

Demand Trends. As a result of the Forests' proximity to the Front Range population centers, demand for wood fiber is greatest within a 75 mile radius of Denver, Colorado Springs and Pueblo. Table III-43 displays the average annual demand trend for timber on the Pike and San Isabel National Forests.

Table III-43
AVERAGE ANNUAL DEMAND TREND FOR TIMBER
Million Cubic Feet/Million Board Feet

Time Periods	Current Use 1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Total Wood Fiber	6.9/23*	9.0/30	11.1/37	12.6/42	12.6/42	13.0/46	15.0/50
Sawlogs	3.3/11	4.5/15	5.1/17	5.1/17	5.1/17	5.4/18	6.0/20
Fuelwood	3.6/12	4.5/15	6.0/20	7.5/25	7.5/25	7.6/28	9.0/30
Supply Potential LTSY Alt. A		12.8/43	12.8/43	12.8/43	12.8/43	12.8/43	12.8/43
Supply Potential Max. Timber Production Potential		34.5/116	34.5/116	43.1/145	53.9/181	40.5/136	30.3/102

* Indicates 6.9 million cubic feet which is the equivalent of 23 million board feet.

The species of trees suitable to meet the above demands and used to compute allowable sale quantity include ponderosa pine, Douglas-fir, Englemann spruce and blue spruce, lodgepole pine, subalpine fir, and aspen.

Continuation of recent trends would indicate a steady increase in fuelwood demand. A growing commercial fuelwood industry is already in place.

Fuelwood

The fuelwood issue has created significant impacts on the Forest, particularly along or near the Front Range urban corridor. With the unprecedented rises in fossil fuel prices that have occurred since 1973, an increasing number of households have turned to using wood as a primary source of heating. A much greater number use wood for supplementary heat or for esthetic purposes. In 1976, approximately 58 percent of all new single family homes built had one or more fireplaces, as com-

pared to 44 percent in 1969. The number of wood stoves also rose substantially. As a result, tremendous amounts of fuelwood have been removed from the Forest. Easily accessible areas for fuelwood collection are no longer available. Round trip commuter distance to obtain fuelwood can range from 70 to 140 miles.

Region-wide, the estimated use of fuelwood has doubled each year for the last five years. The estimated amount of fuelwood removed from the Pike and San Isabel National Forests is currently 11 million board feet annually.

On the basis of increase in demand for fuelwood as a primary and secondary source of home heating because of increased rates of fossil fuels, it is estimated that residential use of wood fuels will continue to increase steadily. In addition, the increases in population, according to population projections, particularly in Denver and Colorado Springs, will place added demands on fuelwood in the future.

The present policy is that fuelwood for personal use requires a permit. Permits are issued for designated areas. The policy is to charge fair market value for all fuelwood. In general over the years ahead, nearly all of the fuelwood supply must come from green or live trees.

When the public is selecting live trees, it must be done under a managed situation so that the tree stands are improved, not decimated, hence the need for a permit system. The use of fuelwood does permit the intensive management of tree stands which otherwise are marginal economically. It permits the use of wood residues left over from logging and the use of trees from 5 to 7 inches in diameter as thinnings.

The demand for sawtimber is based on existing mill capacity dependent on the Forest for supply. A small increase in demand is expected from sawmills on the fringe of the traditional market area.

WATER

Current Use and Management. The Pike and San Isabel National Forests encompass most of the headwaters of the Arkansas River (1,100,000+ acres) and portions of the headwaters to the South Platte River (1,100,000+ acres). All of the Comanche and Cimarron National Grasslands (500,000+ acres) are in the Arkansas River Watershed.

The Pike and San Isabel National Forests produce an average annual water yield of 1,262,000 acre-feet. The Cimarron and Comanche National Grasslands produce an additional 15,800 acre feet of water annually. Total mean annual water production for the Forest is estimated to be about 1.28 million acre-feet.

Water is a valuable resource produced on the Forest. The demand for water originating from National Forest System lands is increasing rapidly as the Front Range population centers and industrial sectors grow.

The annual water yields from the Forests can be increased depending on the extent and location of vegetation treatments and snow management activities. A maximum increase of 4,849 acre-feet per year is possible through vegetative treatments.

The greatest opportunity for increasing water yield is by creating small openings in the subalpine forest. Research has shown that snow accumulation patterns are optimum when openings are five to eight tree heights in diameter, are protected from the wind and are interspersed so they are five to eight tree heights apart. This results in about 40 percent of a timber stand in small openings with 60 percent of the stand remaining to shelter the openings.

Other opportunities for increasing water yield are through construction of snow fences. High elevation sites which have large upwind areas exposed to the wind are the most efficient places to utilize snow fences. Many of the high elevation areas on the Pike and San Isabel National Forests are not conducive to large snow fencing projects due to steep upwind slopes which limit the extent of the contribution areas. Snow fences will be used on a smaller scale such as supplementing stock ponds.

Numerous water collection, transmission and distribution systems exist within the Forest boundaries. Requests for future water developments will be handled through the Forest Service special use authorization process.

The Pike and San Isabel is currently in the process of applying for state water rights for all of its water uses for campgrounds, picnic grounds, summer homes and stock water developments. The Forest has also made instream flow claims for favorable conditions of water flow under the Reservation Principle.

On July 3, 1978 the U.S. Supreme Court (United States vs. New Mexico, 438 U.S. 696 - more commonly known as the Mimbres Decision) held that the National Forests, reserved from the public domain under the authority of the Organic Act of 1897, were reserved to "...insure favorable conditions of water flow and to furnish a continuous supply of timber..."

In-stream flows needed to insure favorable conditions of water flow, a reservation purpose upheld by the Court, will be claimed under the Reservation Principle. The reason for this is that insuring those favorable conditions requires the maintenance of sufficient flows to prevent the accumulation of sediment and

debris that would cause unfavorable conditions. These flows are also important to insure the availability of water for fire-fighting, and the maintenance of riparian vegetation which acts as a firebreak and provides protection to stream banks. An unfavorable condition would develop when a stream energy (that is, the ability to transport its sediment load) is reduced by diversion to a point where gradient, channel form, and scouring depositional patterns are adversely affected.

Conflicts over instream flows, and water needed for recreation, esthetics, wildlife preservation and livestock purposes will more than likely be resolved through judicial proceedings in State and Federal Courts.

The majority of water on the Forest meets or exceeds state water quality standards. The few streams that do not meet state standards are polluted from acid mine drainage from old mines no longer in use. A couple of streams are polluted by naturally occurring outcrops of highly mineralized rock. Sayers Gulch near Leadville, Mosquito Creek near Fairplay, and Handcart and Bruno Gulches near Grant are the streams most affected by acid drainage or highly mineralized geology.

Except for sediment, water quality is generally not adversely affected by Forest management activities. Initial analysis indicates that nine watersheds might exceed threshold sediment levels. The Forest standards and guidelines state that threshold sediment levels will not be increased by activities. A threshold sediment level is the maximum amount of sediment a stream can carry without adversely affecting the existing channel stability. Many of the unacceptable sediment levels are due to highly erodible soils in combination with high road densities within a watershed. Restoration measures such as road closures and rehabilitation are necessary in order to bring the sediment back to acceptable levels.

All activities occurring on the Forest must be mitigated if necessary in order to meet state water quality standards as well as threshold sediment levels.

Section 404 of the Clean Water Amendments Act, October 18, 1972 (P.L. 92-500), ("Federal Water Pollution Control Act Amendments of 1972") regulates the discharge of dredged or fill material in the Nation's waterways, lakes and wetlands. These activities must be authorized under the Nation-wide permit or individual permits issued by the Department of the Army.

Demand Trends. The growing population and agricultural industries located along the Front Range place heavy demands on available water supplies. All streams in the Forest are over-appropriated; that is, there are more water rights than water available to fulfill them. The demand for water is expected to

continue to increase with the increasing population along the Front Range. This demand will be greater than the 1.28 million acre-feet per year that is produced on the Forest without increases from management activities.

MINERALS

Forest Service policy toward mineral activities on National Forest System lands is guided by statutes and expressed in regulations; in statements of the President, the Secretary of Agriculture and the Chief of the Forest Service; and in the Forest Service Manual.

Minerals are fundamental to the Nation's well-being. The National Forest System, by coincidence of geology and geography, is a principal storehouse of mineral and energy resources. The search for and production of minerals and energy resources are statutorily authorized uses of the National Forest System, except for those lands formally withdrawn from mineral activities by an Act of Congress or by Executive authority. Mineral activities on National Forest System lands are encouraged in accordance with the National Mining and Mineral Policy Act, the Acts governing mineral disposals from National Forest System lands and the various applicable Federal and State statutes governing protection of the environment, including air and water quality.

The Forest Service objective is to manage minerals related activities in a timely manner, consistent with multiple use management principles, and to integrate the exploration, development, and production of mineral and energy resources with the use, conservation, and protection of other resources.

All National Forest System lands are available for mineral exploration and development, unless specifically precluded by acts of Congress or other forms of formal withdrawal. Appropriate terms, conditions, or stipulations are already a part of, or can be added to, nearly any permit, operating plan, or lease to provide adequate protection for surface resources of National Forest System lands.

There are currently 354,734 acres of National Forest System lands that are withdrawn from mineral activities. This includes 266,278 acres withdrawn from both leasing and from mineral entry under the 1872 U.S. Mining Law and 88,456 acres withdrawn from mineral entry only. Currently, there are 229 Forest Service withdrawals of the Forest. All of the withdrawals are being or are scheduled to be reviewed for possible revocation. Additional information on specific site withdrawals is contained in Section II, Mineral Withdrawals, of the Environmental Impact Statement for this Forest.

The Bureau of Land Management (BLM), U.S. Department of the Interior, has the primary responsibility for administering the laws and regulations regarding the disposal of minerals from public lands. The Forest Service has the responsibility for the protection and conservation of the surface resources. Resource management standards and guidelines applicable to mineral activities on nonwithdrawn National Forest System lands are contained in the Forest Direction Section of the Forest Plan. Site specific stipulations for mitigation measures will be assigned when lease applications and operating plans are received.

The objective of the Forest Service is to integrate the development and use of mineral resources with the use and conservation of all other Forest resources to the fullest extent possible under the laws governing mineral disposal. Forest Service policy is:

- To cooperate actively with the Bureau of Land Management to administer the mining and mineral leasing laws on lands administered by the Forest Service.
- To take appropriate action to protect the interest of the United States by requiring prospectors and mining claimants to comply with the mining laws and to prevent unauthorized uses on mining claims; and
- To issue permits and leases for mineral disposal or consent to the issuance of permits or leases by the Bureau of Land Management as authorized by law and when such disposal is in the public interest. Damages will be weighed against benefits to be derived when considering the public interest. All mineral permits or leases issued by the Forest Service or for which consent is given will prohibit unnecessary disturbance of the surface and will provide for reasonable restoration of the surface.

Statutory and regulatory direction separate mineral resources in lands owned by the United States into three categories: locatable, leasable, and salable.

Locatable Minerals

Locatable minerals are those valuable deposits subject to exploration and development under the U.S. General Mining Law of 1872 and its amendments. Commonly, locatables are referred to as "hardrock" minerals. Examples include, but are not limited to, deposits of iron, gold, silver, lead, zinc, copper, and molybdenum. Citizens, and those who have declared their intent to become citizens have the statutory right to explore for, claim, and mine mineral deposits in Federally-owned lands subject to the U.S. Mining Laws, including those of the National

Forest System. Through a memorandum of understanding with the Bureau of Land Management (BLM), U.S. Department of the Interior, the Forest Service administers most aspects of operation of U.S. Mining Laws on National Forest System lands. In addition, under the regulations in 36 CFR 228, the Forest Service approves exploration and mining operating plans and administers those operations to insure protection and reclamation of affected surface resources.

Current Use and Management. Historically, mining activities have often dominated the employment sectors in several of the human resource units since settlement occurred in Colorado. The Leadville, Salida, and South Park Ranger Districts are located within the Colorado Mineral Belt. This area is a narrow but irregular shaped zone trending southwest from Boulder through Leadville to Durango. Most of Colorado's mining districts lie within this belt. The mineralized belt has produced significant amounts of metallic and nonmetallic minerals since the 1860's.

Current mining activities can be found throughout the Forests. Development and production activities include the several base and precious metals operations in the Alma-Como area, and the Climax and Henderson Mines. Exploration activity is centered in the Sawatch, Mosquito, and Sangre de Cristo Mountains, and the South Park area.

The following includes some known mineral occurrences in the planning area:

MINERAL OCCURRENCES

<u>MINERAL</u>	<u>OCCURRENCES</u>
Placer Gold	Leadville, Buena Vista-Twin Lakes, Fairplay-Alma, Como, Upper Tarryall Creek
Iron Ore	Calumet Mine - Chaffee County
Manganese	Leadville area
Molybdenum	Climax Mine, Clear Creek, Webster Pass
Tungsten	Climax Mine, Tarryall Creek, Cleora
Beryllium	Badger Flats, Lake George area, St. Peters Dome, Mt. Antero
Thorium	Climax Mine, St. Peters Dome
Uranium	Kenosha Pass, Thirty-nine Mile Mountain, East Sangre de Cristos, Marshall Pass, Southwest Wet Mountains, Arkansas Hills, Kim Area on Comanche National Grassland

Copper	Carrizo District Comanche National Grassland
Sodium	Comanche National Grasslands Cimarron National Grasslands
Potassium	Vicinity of Antero Junction Vicinity of Mosquito Lake (near border of Rio Grande National Forest)
Gemstones (amethyst, tourmaline, smoky quartz, amazonite, topaz, aquamarine, and turquoise)	South Park, Leadville, Pikes Peak, Salida, San Carlos, Lake George

Demand Trends. Development of locatable minerals will play an important role in the management of the Forest as mineral products are provided to meet the future needs of the Region and the Nation.

Exploration and development for hardrock minerals is expected to increase in the future. As market prices increase, more activity is likely to occur particularly for base and precious metals.

Leasable Minerals

Federally-owned leasable minerals include fossil fuels (coal, oil, gas, oil shale, etc.), geothermal resources, potassium, sodium, carbon dioxide, phosphates, and sulphur in New Mexico and Louisiana. These minerals are subject to exploration and development under leases, permits or licenses granted by the Secretary of the Interior. The controlling statutes currently are the Mineral Lands Leasing Act of 1920 and amendments, the Mineral Leasing Act for Acquired Lands of 1947, and the Geothermal Steam Act of 1970, whichever applies to the particular resource. The Secretary of the Interior's authority is administered by the Bureau of Land Management. When National Forest System lands are involved, the BLM requests the Forest Service's recommendation for minerals, other than coal, subject to the 1920 Act, or the Forest Service's consent decisions for minerals subject to the 1947 and 1970 Acts and for all coal deposits. Forest Service recommendations for and consent to the BLM for leasing, permitting or licensing except for coal include appropriate stipulations to be included in the issued license, permit or lease for the management of surface resources. The Secretary of the Interior, through the Office of Surface Mining (OSM) for coal and through the BLM for other minerals has the authority under provisions of the Surface Mining Control and

Reclamation Act of 1977 to administer operations on National Forest System lands leased, licensed or permitted under his authority.

Prior to approval of operating plans, the Forest Service participates with BLM or OSM in the formulation of the site-specific terms and conditions of operating plans so that the plans provide appropriate mitigation measures to insure that adverse impacts on surface resources will not exceed applicable environmental protection standards. Plans must be designed to minimize the impacts of operations on other uses and surface resources, and to provide for prompt reclamation or restoration of affected lands upon abandonment of operations.

Current Use and Management. Oil and gas, as well as other leasable products, have been produced extensively in the Cimarron and Comanche National Grasslands. Exploration for oil and gas has occurred in several areas of the Forest.

Oil and gas production activities currently do not occur on the Pike and San Isabel National Forests. However, there are producing wells on the Grasslands. The potential for hydrocarbon accumulation exists in sedimentary rocks along the flanks of the Sangre de Cristo and Mosquito Ranges, and the Spanish Peaks. Currently, there are two producing and five "shut-in" gas fields in the Carrizo District of the Comanche National Grasslands. Oil and gas are being produced from 23 oil and gas fields within the Cimarron National Grassland boundary.

The Cimarron National Grassland overlies one of the world's largest known accumulations of natural gas. This field, the Hugoton Known Geologic Structure covers in excess of four million acres in Kansas and has been producing both oil and gas since 1923. In 1981, Morton County, Kansas, oil production exceeded 1.7 million barrels and gas production surpassed 49 billion cubic feet. A known carbon dioxide area exists in the central portion of the Springfield District.

A potential deposit of potassium exists near Porphyry Peak southwest of Salida. Known occurrences of potassium within the planning area are in the vicinity of Antero Junction and Mosquito Lake. Occurrences of sodium have been found on the Cimarron and Comanche National Grasslands. Alunite is a secondary mineral formed principally from the actions of acid sulfate solutions forming replacement or disseminated-type deposits. Helium and natural gas liquids are produced at several facilities. The Cottonwood Creek, Chalk Creek and Poncha Springs geothermal area have good potential for electrical production.

About ninety (90) percent of the ownership for oil and gas on both the Cimarron and Comanche National Grasslands exists in reservations and outstanding rights, or non-federal ownership.

During the land acquisition programs of the Department of Agriculture's Resettlement Administration in the 1930's, a significant number of properties were acquired by the United States subject to a reservation of mineral interests for a specific number of years. In most cases the vendor also reserved rights to use the surface in conjunction with development, production, and marketing of the reserved minerals. Terms for these reservations vary from 40 years to 100 years with the most common term being 50 years. Many of these properties are now producing oil and gas under private leases.

Starting in 1985, about 35 percent of the non-federal ownership will revert back to the U.S. Government and continue into the mid and late 1990's. There will be a significant increase in revenue credited to the National Forest account as a result of the reversions.

The Forest has two coal reserve areas, South Park Field and the Raton-Mesa Region. The South Park Field touches the Forest north of Jefferson and is not active. The Raton-Mesa Region, a known recoverable coal resource leasing area, consists of the Walsenburg and Trinidad fields.

Demand Trends. Criteria has been established for case by case use in recommending availability for oil, gas and geothermal leasing with and without surface occupancy for all National Forest System lands in the planning effort. Mineral development will play an increasing role in the management of the Forest as energy and other resources are provided to meet the future needs of the Region and the Nation.

Exploration and development for oil and gas is expected to increase in the future. Inflationary cost factors have kept most activities at a low level. A positive change in the economy could increase the mineral activities throughout mineral resource potential areas for leasable minerals. If activities increase, the Forest is likely to notice effects as a result of necessary support facilities, such as roads, pipeline, and electric transmission lines.

Salable Minerals

Salable mineral materials, or common varieties, are generally low value deposits of sand, clay and stone that are used for building materials and road surfacing. Disposal of these materials from the National Forest System is totally at the discretion of and by the Forest Service. Requirements controlling salable mineral material operations are similar to those for leasable minerals.

Refractory and clay shale deposits exist along the Front Range. Sand and gravel is available in all counties. The main sources are alluvium and terrace gravels along the South Platte and Arkansas Rivers and their tributaries.

Current Use and Management. There are numerous sources for salable products on privately owned lands in or near the planning area which places little demand on Forest common variety products. Limestone and dolomite are used considerably for building and construction purposes. Pikes Peak District possesses a valuable source of high quality limestone desired for construction and decorative purposes. The market for such products has been good.

Demand Trends. An increase in common variety minerals for on Forest uses may occur as road construction development increases on the Forest. The demand for Forest resources for off Forest uses is not expected to be significant except for districts along the Front Range where considerable construction is occurring.

Mineral Potential

A mineral potential evaluation was conducted to determine the possible existence of locatable and leasable mineral deposits in the Forest and Grassland areas. Mineral potentials were determined for metallic and nonmetallic minerals and energy fuels. A set of general criteria was established which included known favorable geology and structure, known mineral occurrences and reserves (if data available), and field activity related to mineral exploration, development and production. The "potential levels," determined as high, medium, and low, are based on today's knowledge and prices and may change at any time, depending on the mineral economy, technological advances, or further exploration.

High mineral potential includes favorable geology and structure, known economically valuable mineral occurrences and reserves (if data available), and field activity. Medium mineral potential includes favorable geology and structure, known mineral occurrences with insufficient evidence of present economic value, or sub-economic deposits, and occasional activity. Low potential includes geology considered unfavorable at this time, no known mineral occurrences, explored or prospected sites determined non-economic, and little or no present activity. The low potential level does not infer the lack of mineral deposits, but rather insufficient knowledge at this time.

The following eight mineral element levels "rate" the potential occurrence of mineral-related activities during the life of the management plan:

- Locatable/leasable minerals - producing sites/known reserves
- Locatable minerals - high/medium potential

- Leasable minerals - high/medium potential
- Locatable/leasable minerals - low potential
- Leasable minerals - no potential
- Leasable minerals - unknown potential
- Reservations and Outstanding Rights - All levels of potential;
- Mineral Withdrawals
- Salable minerals - known areas

(See Appendix H of the Forest Plan for detailed description of mineral element levels.)

Mineral potential maps were developed by gathering data from individuals and references, including historical production records. The mineral potential maps are a part of the planning records and are available for review in the Pike and San Isabel National Forests Supervisor's Office, Pueblo, Colorado.

Additional information on mineral occurrences, production, and geologic environment is found in the Mineral Potential Report for the Pike and San Isabel National Forests in the Appendix H.

HUMAN AND COMMUNITY DEVELOPMENT

The population living in or near the planning area generally share similar needs and interests. The area's cultural and economic survival and development are tied to some degree to National Forest System (NFS) land and resource management. Dependency and use of the Forest lands are important to the majority of the public in or near the NFS lands in the planning area.

The value of human resources and the needs of the local communities and other publics are recognized in all phases of NFS land and resource management. Forest resource management is aimed at complementing local community and public needs to the extent allowed by personnel ceilings, federal funding and regulations.

Employment and Training

The Pike and San Isabel National Forests participate in a number of human resource programs aimed at accomplishing resource related activities while providing employment and training to eligible individuals, both young and old. In 1980, 726 persons participated in several employment training, and development programs administered by the Pike and San Isabel National Forests. The conservation work performed in these programs represents an integral part of the resource management and development program in the National Forest System and on lands of state and local cooperators.

Several human resource programs have been established by the federal government to provide temporary employment to local individuals and at the same time to reap the benefits of the provisional labor.

Youth Conservation Corps (YCC)

This program was established to accomplish needed conservation work on public lands. Purpose of the program was to provide gainful employment for youths, 15-18 years old, male and female from all social, economic, ethnic, and racial classifications. During the period 1972-1980, four YCC camps were established on Pikes Peak, San Carlos and South Platte districts in the planning area. Number of enrollees ranged from 120 to 144.

Young Adult Conservation Corps (YACC)

This program was established in 1977 and designed primarily for local youths. The program was utilized to accomplish needed conservation work on public lands. Purpose of the program was to provide gainful employment for youths 16 to 23 years of age not enrolled in school. Several Districts have participated in implementation of the YACC Program. Ranger Districts include Leadville, Pikes Peak, San Carlos, Salida, and South Platte.

Senior Citizen Service Employment Program (SCSEP)

This program is utilized to foster and promote useful part-time work opportunities in community service activities for unemployed, low income persons who are 55 years of age or older and who have poor employment prospects. The SCSEP has provided substantial benefits to both elderly individuals and the Forest Service. Enrollees are given the opportunity to supplement their income while providing the much needed assistance to the Forest Service.

College Work Study Program

This program is utilized to provide job training and financial aid to economically disadvantaged college students.

Volunteers

Volunteers of all ages provide many valuable hours of work to the Forest Service annually. These include school groups and organizations as well as interested non-affiliated individuals.

The Human Resource Programs have resulted in many person-years of work accomplishment and have included such activities as clerical, trail construction and maintenance, stream and fish habitat improvement, fence and recreation area facility construction, water bar construction, tree planting, insect and

disease control, fuel treatment, fire control and mop-up, vehicle and structural maintenance, and wildlife habitat improvement (i.e., installation of bird houses). These are only a few of the many activities carried out by the enrollees.

High unemployment in the planning area creates a demand for jobs, particularly during offschool season. The recent budgetary and personnel ceiling cuts have affected the Forest Service's ability to hire summer seasonal employees and to fill continuing type positions. It is anticipated that high unemployment will continue in the future because of the planning area's proximity to the population boom metropolitan areas such as the Front Range urban corridor.

A Forest Service goal is to utilize human resource programs as funding and ceilings become available. Opportunities to provide employment and to develop employable skills to eligible individuals, both young and old, will be considered in the planning of all Forest and Grassland resource related projects and activities. The YCC and YACC programs were phased out in fiscal year 1982 as part of an effort to achieve budget savings and a redirection of Federal Government activities. Other human resource programs will be utilized to the extent possible.

SUPPORT ELEMENTS

LANDS

Special Land Use Administration

Special uses are those non-Forest Service occupancies and uses of National Forest land such as summer homes, recreation sites, organization camps, pastures, facilities, fences, transmission lines, electronic sites, and water developments which are authorized by special use permit. Approximately 34,672 acres are occupied by 1,155 special uses within the planning area. The types and areas of uses are generally evenly distributed throughout the Forest except for oil and gas pipelines which are concentrated on the Cimarron National Grassland. Increasing populations along the Front Range have caused increasing demands for more uses on National Forest lands. Development of private lands within and adjacent to the Forest has increased the need for access or supporting facilities which can only be provided by National Forest lands. In other situations public needs can best be met by private development on National Forest lands rather than federal development. Annual fees produced by the land uses totalled about \$150,000 in 1980.

Landownership

Landownership patterns are quite varied across the Forest. Private lands within the external boundaries of the Forest total about 307,238 acres

There are approximately 9,150 miles of property boundaries on the Forest. About 7,500 miles of these boundaries need to be marked and posted.

The acquisition and disposal of lands within the National Forest System is accomplished under several laws. The most commonly used process is through land exchange. Under the General Exchange Act of March 20, 1922, the exchange must be in the public interest. The lands exchanged must be of equal value, and must be in the same state.

Lands may be acquired as opportunities arise in accordance with the Forest Land Adjustment Plan and current program. Landownership adjustments may be accomplished also by jurisdictional transfer with other agencies.

Rights-of-Way

Rights-of-way may be authorized by permit or easements to accommodate facilities, transportation needs and utility corridors. On the National Forest System lands within the planning area, 1,713 miles of various rights-of-way have been granted. This computes to approximately 6,774 acres of land as of 1980.

License and Permits

Various laws have been established to provide for licenses and permits other than special use permits. Generally, they are issued by agencies other than the Forest Service after Forest Service review and involvement.

Withdrawals and Special Areas

These areas include administrative sites, recreation sites, potential hydroelectric sites, Bureau of Reclamation withdrawals, reservoir, natural areas, scenic areas, experimental forests, fish hatcheries, watersheds, and military installations. Each classification or withdrawal has specific conditions or restrictions depending upon the proposed use. Approximately 98,862 acres of the withdrawals prohibit entry under the general mining laws. Withdrawals are reviewed periodically to determine their need. Current reviews are to be completed by 1991.

SOILS

Current Use and Management. The Pike and San Isabel National Forests' soils have developed in response to weathering of parent material, climate, topography, vegetation and time. The Forest has extreme variations in slope, aspect and elevation. These differences produce variations in micro-climate, an important element affecting soil development. Deeper more productive

soils within the Forest are most often found on: (1) northerly aspects where moisture is more prevalent and there is less direct sunlight, (2) higher elevations receiving more moisture; and (3) gentle slopes where there is less potential for erosion. Residual soils which have developed in place are frequently deep enough on north facing slopes to support dense conifer stands. They are generally shallow (less than two feet) on south aspects. Specific information about the soils in different locations of the planning area are as follows.

Front Range. Elevation ranges from 7,000 to 14,110 feet. Soils vary considerably in texture, depth and productivity, but are high to moderate in erodibility and low to moderate in fertility. Where the landform is characterized by short, sharply breaking steep slopes, the coarse granite parent materials, low amounts of organic matter, and lack of a stable structure produce the most potential for slope failure and soil erosion.

Wet Mountain Range The soils in the Wet Mountain Range with elevations from 6,000 to 12,600 foot elevations are generally deep (4 feet or more) to moderately deep. Fertility varies from low to high but is classed as moderate overall.

Sangre de Cristo Range. The Sangre de Cristo Range with elevations from 7,800 to 14,000 feet have generally shallow, coarse textured soils low to moderate in fertility. Erodiability is classified as moderate.

Spanish Peaks. In the Spanish Peaks, soils are deep to shallow with moderate erodibility and fertility.

Thirty-nine Mile Mountain. At the southern end of South Park, Thirty-nine Mile Mountain soils are deep to shallow, moderate to low in erodibility and high to moderate in fertility.

Upper Arkansas River The Upper Arkansas River area includes the high mountain peaks along the Continental Divide and the steep to moderate sloped valleys which dissect the area. The formation of these soils were influenced considerably by glacial action. Depths, fertility and erodibility vary considerably.

Comanche National Grassland. On the Comanche National Grasslands, soils vary by administrative unit. There are three predominant soil types in the Carrizo Unit. There are the so called tighter soils, consisting mainly of clay-loam with a shallow to deep hardpan; the sandy soils ranging from sand to sandy clay-loam in the subsoil; and the deep loams and clay loams in the basalt and sandstone breaks. The sandy soils are the most productive though much of the fertility has been lost by past farming practices and erosion. Timpas Unit soils are silty clay loam; or adobe, with a transition toward sandy clay

loam to the west Soil depth varies from shallow (less than two feet) on the lime ridges to deep in the swales. Soil productivity is limited by soil moisture. Erosion is not serious in most pastures but there is a high potential. All soils are subject to severe wind water erosion when there is not a protective cover.

Cimarron National Grassland. The Cimarron National Grasslands have two distinct types of lands, the hard lands and the sandy lands. The hard lands contain heavy textured clay and clayey soils which are shallow to medium in depth. Most have limitations requiring careful management for pasture, range and wildlife. The sandy lands consist of level to gently rolling topography with deep sandy soil favorable to cultivation under normal precipitation patterns. However, these soils, during periods of drought are highly susceptible to wind erosion and must be managed with extreme care. The rolling hilly areas are the most severely eroded lands and require careful management

Demand Trends. The demand on the soil resource is a continuing concern to both the Forest Service and the public. This concern focuses primarily on the potential for accelerated erosion, decreases in soil productivity and increases in stream and lake sedimentation. There are approximately 84 miles of road construction planned for in the first 10 year period. Over 1,300 acres of productive soils (producing vegetation) will be removed from the productive soil base and placed in a non-productive category as a result of this activity. Some of these acres will return to production, however, other soils will be permanently removed from vegetation production. Activities such as flooding from water impoundments, building construction and wildlife can reduce or temporarily remove soils from production. Approximately 193 miles of trail construction or reconstruction are planned in the first 10 year period. This will also remove these soils from the productive base.

Approximately 10,000 acres of timber management activities will occur annually. This places additional demands on the soil resource Potential for changes in soil is disturbed. Mitigation measures contained in the Plan (Chapter III) reduce or prevent the adverse impacts to soils from timber harvest, road and trail construction and other activities.

Natural forces, (wind, water, gravity) cause soils to erode. Natural soil erosion levels can be as much as two to four tons per acre per year in forested and grassland areas. Mass soil movement (large blocks of soil, rock and vegetation sliding downhill) can occur from natural forces such as earth tremors, excessive soil moisture, weak soil and rock contact layers. Mass soil movement can also be triggered or accelerated by Forest

management activities. Examples of these include: 1) removing mechanical support (road cut); 2) adding weight to a slope (increasing water infiltration); and 3) softening lake shores (flooding from impoundments).

Continuing concerns of the public and the Forest Service about accelerated soil erosion rates and changes in soil productivity will require increased management emphasis on maintaining and improving soil productivity and mitigating or preventing anticipated adverse impacts.

FACILITIES

A wide variety of facilities are present in the Forest. Facilities include buildings and structures needed for resource management, administration and public use. Fences, dams, stock-water developments and wildlife structural improvements are included. Roads, trails and associated improvements are part of the facilities. Recreation facilities are included in developed recreation. Many facilities are owned and operated under special use permits for various purposes throughout the Forest.

Structures

The Forest has 64 owned and 9 leased buildings for administration and management of the Forest and Grasslands. The buildings include 13 public service or office buildings, 21 dwellings or bunkhouses and 39 storage, service, utility or other buildings. Energy consumption is approximately 90,000 KWH electricity, 20,000 CCF of natural gas and 11,000 gallons of LP gas per year for offices, storage and service buildings. Condition of buildings varies with age and use, though all are in serviceable condition.

Dams

Because of the Forests' location relative to the Front Range cities of Denver, Colorado Springs and Pueblo, several water storage reservoirs have been constructed on or adjacent to the Forests. Other dams have been constructed for irrigation purposes as well as for recreation uses. Both of the major drainage systems (Arkansas River and South Platte River) have had dams constructed on them. Two dams have been proposed for construction, Two Forks Dam on the South Platte River and another (unnamed) dam on the Tarryall Creek near Lake George, Colorado.

The Forest has an inventory of 39 dams of which 5 are high hazard. The high hazard dams are owned and operated by other governmental agencies.

Electronic Sites

Communication facilities are authorized by special use permits. There are 30 locations that have been developed as commercial electronic sites. These sites have been identified on the Forest Plan Map. With satellite communications being rapidly developed and implemented, a dependence on surface sites will be declining.

Bridges

On the Forest Development Road system, there are 59 bridges. Of these bridges, 15 are owned and maintained by the respective counties. An accurate inventory of major trail bridges is not kept. There is some need for bridge construction and replacement, however, a specific action plan will not be formulated until adequate funding is available.

Transportation

Major federal and state highways provide convenient access from population centers through the main Forest and Grassland units. County and Forest System roads further provide an extensive network to give access to most areas of the Forest. Forest System roads consist of the following:

Table III-44
Miles of Road

	<u>Primitive</u>	<u>Graded</u>	<u>Gravel</u>	<u>Paved</u>
Pike NF	1046	528	137	44
San Isabel NF	581	284	131	41
Comanche NG	115	261	240	0
Cimarron NG	0	169	33	0
Total	<u>1742</u>	<u>1252</u>	<u>541</u>	<u>85</u>

Many of the Forest System roads are also on County road systems and are maintained by those counties to serve local public needs. Where the Forest Service has primary maintenance responsibility, roads are maintained to meet resource management needs and to provide public safety. Future transportation needs reflect dramatic population increases in Colorado's Front Range. County and state systems will absorb most of the impact whereas expansion of the Forest System will be to meet resource management needs.

TRAVEL MANAGEMENT

Current Use and Management. Use of the roads rather than the roads themselves cause most of the impacts on other resource uses and activities. Road management direction in the various alternatives concentrates on managing the use of existing and future roads. It includes obliteration, total or seasonal closures, and controlled use for specific purposes. This will minimize impacts on wildlife and dispersed nonmotorized recreation users. It will also assist in controlling rising maintenance costs.

Under current management, a variety of road and trail closure techniques are employed to serve several resource protection needs. Seasonal or year-round closures are used to prohibit on or offroad use on large areas of the Forest. For the most part, these closures are implemented to protect the soil, water, and wildlife resources.

Local roads that have been built to serve a short-term need, but which will be needed again in the future, are commonly closed by gates to restrict vehicular traffic. This minimizes maintenance needs and helps protect other resources.

Temporary timber sale roads are customarily physically obliterated and some primitive roads which are not on the transportation system are scarified and seeded.

Signing primitive roads and tracks as being closed to motorized use is done frequently, but is not particularly effective because of limited enforcement ability and vandalism of the signs.

Demand Trends. The demand for use of Forest roads is significant. Currently congestion occurs primarily on public roads rather than Forest Service roads, and most often at the beginning and end of weekends. Four-wheel-drive interests want more opportunities for off-road and primitive-road use. The owners of private inholdings want access to their property. Sightseers want more roads with better driving surfaces. Although there is demand for numerous and varied road opportunities, many nonmotorized recreationists want fewer roads. In the immediate future, demand for roads is expected to increase

Trails

Current Use and Management. There are 1200 miles of trails on the Pike and San Isabel National Forest Trails System. There are none on the Grasslands. The trails vary from lightly maintained for a primitive experience level to highly developed for large volumes of people and specialized uses. Trails of particular interest are the Rainbow Trail extending almost 100 miles from the southern Sangre de Cristo range to the Continental Divide south of Marshall Pass, and the Main Range Trail extending over 170 miles from Tennessee Pass paralleling the

Continental Divide south to Cottonwood Creek west of Buena Vista. Also included are two National Recreation Trails, Barr Trail and Devil's Head Trail. Segments of the Continental Divide National Scenic Trail will be included when final location is determined. The Rampart motorcycle trail system southwest of Denver has over 100 miles of trails especially designed and administered for motorcycle use. Trails where motorized use is not permitted are usually indicated by a sign on the trail and noted on the Pike and San Isabel National Forests Travel Management Map.

Demand Trends. Projected demand for trails is expected to increase along with the demand for dispersed recreation opportunity. The demand for trails closer to the population center is expected to exceed that for more remote trails.

Utility Corridors

There are numerous utility companies that furnish electricity, gas, telephone communications and water throughout the planning area. Approximately 440 miles of utility corridors are currently located on the National Forest and Grasslands in the planning area. These are: 269 miles for electricity, 65 miles for natural gas, 35 miles for telephone communications, and 72 miles for water transmission. Major corridors are shown on the Forest Plan and alternative maps. The demand for additional energy and water may result in increased use of existing corridors or the provision for new ones.

A joint utility corridor study is being conducted by the Forest Service and the Bureau of Land Management. Utility companies and state representatives have been asked to participate in the study in developing standards and guidelines for corridor selection. The standards and guidelines for corridor selection and designation are required by the National Forest Management Act and the Federal Land Policy and Management Act. The purpose of the study is to avoid a proliferation of corridors across Federal lands and to combine compatible uses where possible.

PROTECTION

Fire

Statistically the Forest and Grasslands have about 3.4 million acres in its protection area. Dry climatic conditions, seasonal high winds, topography and vegetation create potential for large fires. Frequent lightning occurrence along with heavy recreation and other Forest use also contribute to the potential for disastrous fires. During the past ten year period the average occurrence has been 140 fires per year. The majority of these were on the Forest. Although the number of fires on the Grass-

lands is fewer, they tend to become larger because of high winds and large areas of dry grass. Area wide, 70% of the fires are smaller than one-quarter acre and 99% are less than 100 acres. Lightning starts 48% of the fires. Recent large fires within the Forest that burned over 1000 acres were the Wildcat Fire in 1963 - 2,427 acres, and the Maes Creek Fire in 1978 - 2,300 acres.

Reducing the possibility of fire is accomplished through fire management procedures. Currently 1,500 to 2,000 acres per year are managed to reduce hazardous fire fuels. Prescribed or planned fire is sometimes used to eliminate slash and to accomplish other resource management objectives. Fuelwood programs have been initiated and coordinated with the State Forester and Bureau of Land Management which help meet fuel reduction objectives and contribute to local firewood needs.

Fire suppression efforts require immediate action on wildfires in high risk areas and escaped fires. In addition to its own fire specialists, the Forest maintains cooperative fire suppression agreements with 25 other agencies which include counties, other federal agencies, municipalities and the Colorado State Forest Service. The Forest maintains only one fire lookout within the planning area located on Devil's Head Mountain near Denver. Most fires are detected and reported by Forest users or from aircraft observations.

Forest Pest Management

Pest management includes the control of insects, disease, and undesirable plants or animals.

Insect outbreaks have occurred periodically throughout the Forest for many years. Epidemics are often triggered by weather or other natural situations such as drought, warm winters or extensive timber blowdown. However, the underlying cause is often related to the overall forest condition. On the Pike and San Isabel National Forests, a disproportionate percentage of the timber is in the mature age class and as it grows older, becomes increasingly susceptible to insect and disease attack. Tree stand management efforts are being aimed at producing a better age distribution. The major insect pests in the area are Mountain Pine Beetle and Western Spruce Budworm. The Engelmann Spruce Beetle potentially poses a threat in spruce stands. Outbreaks of other insects such as the Tent Caterpillar have caused some local concerns over the past years but have not been widespread. Dwarf mistletoe in ponderosa pine and lodgepole pine has been a major pest in the Forest as well. Integrated pest management activities in cooperation with the State Forester and private landowners produces a healthier overall forest condition. This coordination allows treatment of all lands in an infested area which leads to more effective management.

Grasshoppers have been a major pest concern on the grasslands. Cooperative efforts with grazing associations and private landowners have reduced damage to rangelands. Prairie dog management plans developed in consultation with the State Division of Wildlife have effectively controlled the size and number of prairie dog towns.

Control of animals, including game animals, furbearers, and fish is accomplished in cooperation with the appropriate state regulatory agency and the U.S. Fish and Wildlife Service in accordance with appropriate laws, regulations and orders.

Plant species which may be recognized as pests are the Canadian Thistle, Loco, Western Toadflax and other weeds, however, no widespread concentrated control efforts have been considered. Control of other vegetation such as trees spreading to grazing lands, spread of oakbrush and tree stands of undesirable tree species are problems dealt with in regular management activities.

Air Quality

This section was expanded in response to comment L-8 in Chapter VI of this FEIS.

The Clean Air Act and its 1977 amendments give the States most of the responsibility for managing air quality within their boundaries. The framework for air quality management is the State's implementation plan.

The Forest Service role in air quality management is coordination of National Forest activities with State and Federal air quality control efforts. This is accomplished by properly managing the air pollution created by Forest Service activities such as prescribed fire, construction and use of roads, and the operation of various facilities. It also includes review of ski area permit applications for potential air quality impacts from fireplace smoke and automobile exhaust. The Forest Service has a primary responsibility for protecting the Forest from adverse impacts created by external sources of air pollution, such as industrial plants and automobiles, by coordinating with the Environmental Protection Agency and the State of Colorado.

The Forest Service complies with the agricultural burning application and permit requirements of the Air Pollution Control Division, Colorado Department of Health.

Air quality management on the Forest is accomplished to insure compliance to the Clean Air Act amendment of 1977 (P.L. 95-95), Colorado's 1974 Fugitive Dust Laws (CRS 1973, 25-7-108), the Colorado Air Quality Control Act of 1979, and the Wilderness Act of 1964. The Forest Service's responsibility in this regard is to protect the air quality and related values.

Currently two state non-attainment areas are within the planning area. They are the Denver region which includes Douglas and Jefferson Counties and the Colorado Springs area which covers El Paso County. Little air quality data has been collected on the Forest. Present temporary pollution sources in the Forest are engine exhaust and road dust from vehicle travel, and smoke from recreation campfires, wildfires or fire management activities. Of the 3,618 miles of roads in the area, only 85 miles are paved.

Law Enforcement

Problems include, but are not limited to, vehicle use on closed areas or trails, littering, vandalism, theft, resource trespass and illegal timber cutting. The Forest works cooperatively with state and local law enforcement agencies in situations of mutual concern. Those areas closest to large metropolitan areas experience the most problems. During 1980 Forest Officers issued 573 violation notices for various violations of Federal laws and regulations.

STATE AND PRIVATE FORESTRY

Current Use and Management. National Forest System land can be used as a base to implement, develop, and demonstrate sound, practical, and economically efficient management practices. These practices may then be used on lands of other ownerships. This use will also help support the natural resource management goals of other resource agencies, both state and federal.

Technical staff expertise on the Forest is available on an ad-hoc basis to provide review and suggestions to other agencies. This includes serving as members of interagency coordinating groups, involvement as a private citizen in professional societies and local advisory or civic organizations.

Specific resource management activities which provide opportunities to further State and Private Forestry related goals are:

- Rural fire protection on rural lands;
- Prescribed fire use;
- Integrated pest management;
- Oil, gas, and uranium prospecting and development;
- Coordinating resource management plan development;
- Tree planting and genetic improvement;
- Tree stand improvement;
- Forest products market development;
- Developed recreation management;
- Wildlife habitat management;
- Range management techniques including structural and nonstructural improvements;
- Youth development; and
- Watershed restoration.

Demand Trends. Furthering the achievement of State and Private objectives requires maintaining an active working relationship with a wide variety of federal and state agencies, industrial and environmental organizations, and individuals. State forestry agencies are the primary delivery system for cooperative forestry programs. National Forest System management attempts to complement those efforts wherever feasible.

ENVIRONMENTAL

CONSEQUENCES

CHAPTER IV ENVIRONMENTAL CONSEQUENCES

OVERVIEW

Environmental consequences are the anticipated effects and impacts on the physical, biological, social, and economic environment of implementing an alternative. Identification of these expected consequences provides the scientific and analytical basis for comparing alternatives. The alternatives considered in detail in developing the Forest Land and Resource Management Plan (referred to as the Forest Plan) are described in Chapter II of this Final Environmental Impact Statement.

Environmental consequences can result from application of management direction, but also from non-Forest Service applicants such as mining, special uses, etc. (See Forest Plan, Chapter III). Management direction contains two parts: Forest Direction and Management Area Direction. Forest Direction applies to all areas of the Forest with criteria defining where (i.e., wilderness, riparian, steep slopes) and when it must apply. Management Area Direction specifies how resources are to be managed to meet Forest Plan goals, which emphasize selected resources. Management area maps in the Forest Plan and the alternative maps in this document indicate where individual management area direction would be applied. Each alternative has a different mix of Management Area Prescription allocations which provide a variety of activities; different levels of resource outputs, goods and services, such as recreation capacity, habitat diversity, timber production, water yield, and grazing use. In turn, the level of goods and services, the sites of their production, and their interaction yield distinct environmental consequences.

Environmental consequences of implementing any of the alternatives fall within certain limits. Management direction includes requirements that insure long-term productivity of the land, protection for resources and mitigation of expected adverse impacts.

This chapter displays the projected output levels by alternative and describes the direct and indirect environmental consequences that result, assuming the mitigation required in the management direction is applied. Direct environmental effects occur at the same time and place as the initial cause or action; indirect effects occur later in time or removed in distance from the actions but are still reasonably foreseeable. Interactions exist within the alternatives. A change in one output can have a "ripple" or "domino" effect, resulting in changes in other outputs.

Environmental consequences described in this chapter are grouped by resource as in the previous chapters.

The requirements for monitoring implementation of management prescriptions, management practices, and the effects of Plan activities are found in Chapter IV, Forest Plan. These monitoring requirements apply to all alternatives, based on the availability of funds to accomplish the monitoring activities.

Summary of Changes Since the Draft EIS

Most of this chapter has been revised and expanded to address public and agency comments and revised analysis requirements relating to the Draft Environmental Impact Statement and Proposed Forest Plan. Major changes are as follows:

In response to public comment a vegetation section has been added to portray, in one place, the effects of treating or not treating vegetation in the various alternatives. This section also explains the role of vegetation treatment in achieving a healthy forest. Vegetation treatment has also been expanded in other discussions throughout the chapter where appropriate.

The proposed action has been reanalyzed in response to public comments and revisions relating to both Forest and Management Area Direction, Chapter III, Forest Plan. Adjustments in land use allocations have been made to address comments made by individuals, organizations, and agencies. Forest and Management Area Direction was developed at the Regional Office level for consistent management and public understanding, and the Forests' version of these was incorporated into all alternatives.

The "Direct and Indirect Environmental Effects" section has been expanded for all resources to better portray mitigation and the effects of management direction on other resources and programs.

Sections have been revised or expanded to more adequately portray the data, methodology, and assumptions used in the analysis, as well as respond to public comments on the Draft EIS and revised management direction. The discussion of budgets and economic analysis has been clarified and expanded, particularly as it relates to resource tradeoffs

Minor format and editorial changes have been made to clarify the narrative and some numerical values have been corrected throughout the chapter.

DIRECT AND INDIRECT ENVIRONMENTAL EFFECTS

As explained in the overview of this chapter, differences in environmental consequences result from the application of various combinations of Management Area Prescriptions to different locations on the Forest in the respective alternatives. Table II-4 in Chapter II shows the acreage allocation by management area for each alternative.

VEGETATION

Summary of Changes Between the Draft and Final EIS

- The general write-up has been expanded substantially to more clearly state the management philosophy of the Forest.
- More detail has been added to show current, desired, and expected vegetation condition

Overview

The Forests' vegetation is an important and dominant feature of the natural landscape. How vegetation will be managed is largely the subject of this EIS and Forest Plan. Vegetation management activities provide a wide range of benefits, including wildlife habitat improvement, water yields, livestock forage, increased recreation opportunities, wood fiber and numerous other goods and services.

Most of the nonforest vegetation can be classified as mountain meadow, alpine tundra, shrubland or scree (widely scattered tree cover on rockslides). Nonforest vegetation provides many benefits, including natural beauty and diversity, forage for wildlife and domestic animals, hiking, camping and nature study. Opportunities to manage nonforest vegetation include planting or seeding, grazing, fencing, burning and spraying with herbicides. Opportunities also exist to perpetuate nonforest vegetation in a natural (unaltered) condition.

Forested lands are very diverse and include stands of white fir, Douglas-fir, aspen, lodgepole pine, ponderosa pine, Engelmann spruce, subalpine fir, bristlecone pine, limber pine, pinyon and juniper. Most stands contain more than one species, which increases their diversity and associated importance as wildlife habitat. One characteristic with important implications is that forest tree stands are mature or over-mature. Table IV-1 provides an age-class analysis of forested vegetation.

Aspen is an important cover type of the Forest. It provides many benefits, especially with regard to visual quality, livestock grazing, wildfire resistance, wildlife habitat and soil stabilization. Some form of disturbance, either natural or

human-caused, must occur before an aspen stand will regenerate. Most pure aspen stands have their origin in wildfire. Around the turn of the century, the Forest Service began to effectively control wildfire, thereby removing a major force that destroyed conifer stands containing remnant aspen. It was primarily wildfire that allowed this so called "fire species" to form pure stands. Conifers, which are more tolerant of shade, regenerate under aspen, grow up through it and eventually replace it altogether. Now that wildfire no longer plays an aggressive role in regenerating aspen, other methods must be substituted such as burning, spraying and cutting to prevent conifers from replacing it. Since aspen is mature at 80 years and older, the Forest needs to regenerate about 270 acres of aspen per year (outside of wilderness) to maintain it in the natural landscape. Currently, about 27,000 acres of aspen are approaching maturity, and are in need of regeneration (Table IV-1). Public and commercial fuelwood programs and the multi-product timber sale program are providing for harvesting aspen and accomplishing some regeneration needs.

TABLE IV-1 AGE ANALYSIS OF PRODUCTIVE FOREST LAND, PIKE AND SAN ISABEL NATIONAL FORESTS, COLORADO 1/

Age Class (Years)	Spruce/Fir		Ponderosa Pine		Douglas-Fir/ White Fir		Lodgepole Pine		Aspen	
	Area (Ac)	Pct.	Area (Ac)	Pct.	Area (Ac)	Pct.	Area (Ac)	Pct.	Area (Ac)	Pct.
1-20	3738	2	5458	3	527	0	2186	1	9774	9
21-40	1827	1	0	0	0	0	1039	1	14307	13
41-60	0	0	449	0	13272	4	5345	3	15912	14
61-80	24727	10	8889	4	37391	10	39942	23	17896	16
80-100	31244	12	81183	41	67666	19	59999	35	20214	20
101-120	46669	19	57587	30	86194	25	37301	22	27000	22
121-140	33109	13	28445	14	53673	15	15904	9	6712	6
141-160	9198	4	10876	5	36149	10	4233	2	0	0
161-180	45068	18	2747	1	29023	8	6461	4	0	0
181-200	9620	4	2747	1	17486	5	0	0	0	0
201-300	40654	17	2747	1	15287	4	0	0	0	0
TOTAL	245854	100	201128	100	356668	100	172410	100	112015	100

Source: 1980 Forest Inventory Tables, Supervisor's Office

1/ Does not include area without an assigned age (understocked, etc)

Conifer forests (spruce/fir, lodgepole pine, ponderosa pine, Douglas-fir/white fir and others) are also important for providing wildlife habitat, recreational opportunities and scenic beauty. Much of the conifer type is old and susceptible to insects, diseases, weather damage, fire and other factors causing mortality. The percentage, by type, of the conifer forest that is mature or overmature is displayed in Table IV-1 and is:

- spruce/fir (older than 120 years): 56 percent;
- ponderosa pine (older than 120 years): 22 percent;
- Douglas-fir/white fir (older than 120 years):42 percent; and
- lodgepole pine (older than 100 years): 37 percent.

Some area of old-growth (overmature) conifer forest is desirable for vegetation diversity, wildlife habitat and dispersed recreation. However, the recent epidemic of mountain pine beetle in ponderosa pine and the current outbreaks of spruce budworm and pine beetle in lodgepole pine are indicators of declining health and vigor in much of the conifer type. Increased conifer regeneration will result in a more balanced age-class distribution, fewer losses to insects and diseases and a more productive, vigorous forest. Regeneration is also needed to accomplish improved wildlife havitat, water yield, livestock grazing and other multiple-use objectives for which National Forest System lands are managed.

The objectives for each management area influence the range of management practices that are evaluated for use in modifying the existing vegetation. For example, vegetation may be treated differently depending on whether the objectives emphasize reduction of natural fuels, suppression of insect or disease outbreaks, improved wildlife habitat or increased water yields.

It is widely recognized that forests with a diversity of vegetation species and ages provide the greatest variety of habitat for wildlife and are generally more resistant to insect and disease epidemics than forests with uniform forest types and ages. Vegetation diversity and related diversity of wildlife lends variety to visual quality and many dispersed recreation uses.

The desirability of vegetation diversity is recognized in the National Forest Management Act of 1976. This Act amended the Forest and Rangeland Renewable Resources Planning Act of 1974 16 USC 1604(g)(3)(B), directing the development of regulations to specify guidelines for land management plans to provide for diversity of plant and animal communities based on the suitability and capability of the specific land area. The amendment also directs that land management plans provide for steps to be taken to preserve the diversity of tree species similar to that existing in the area controlled by the Plan.

Most forest products and many amenities are derived from vegetation species which have reached maturity. In order to provide a sustained, even flow of these benefits it is necessary to maintain a fairly even distribution of age classes within the species type. This is true for forest types such as spruce/fir, lodgepole pine, and most tree species types. Conversely, for the oakbrush type most of the wildlife habitat benefits are derived by maintaining an early age class.

The desired, current and projected distribution of successional/structural stages for the forest types on the Forest is shown in the following figures by Alternative for comparison purposes; figures IV-1 through IV-4 for the areas in Wilderness and Figures IV-5 through IV-9 for the areas outside of Wilderness. The desired distribution of successional/structural stages is that which is considered optimum for the Forest to provide a sustained yield of wildlife habitat, visual quality, dispersed recreation experiences, wood products, and resistance to insects and disease. The primary basis for the desired distribution of successional/structural stages on the Forest is the optimum habitat capability for the Forest's wildlife management indicator species.

The assumption was made that the existing distribution of forest types (the species) is a desirable situation and can be maintained reasonably close to current conditions.

The four successional/structural stages shown in the figures relate to both the ages of the stands and their structural condition. Mixed-age stands are included in the tables on the basis of the average age for the stand. For the most part, mixed-age stands are included in the tables as being in the late successional stages as old growth. This is particularly true of the aspen types. The estimated 40 percent of aspen which will not be succeeded by other species are projected to become "old growth aspen."

For more detailed information about vegetation outputs and the effects of resource management activities on vegetation, refer to the Resource Element discussions which follow this section

FIGURE IV - 1

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES IN WILDERNESS UNDER MANAGEMENT ALTERNATIVE A

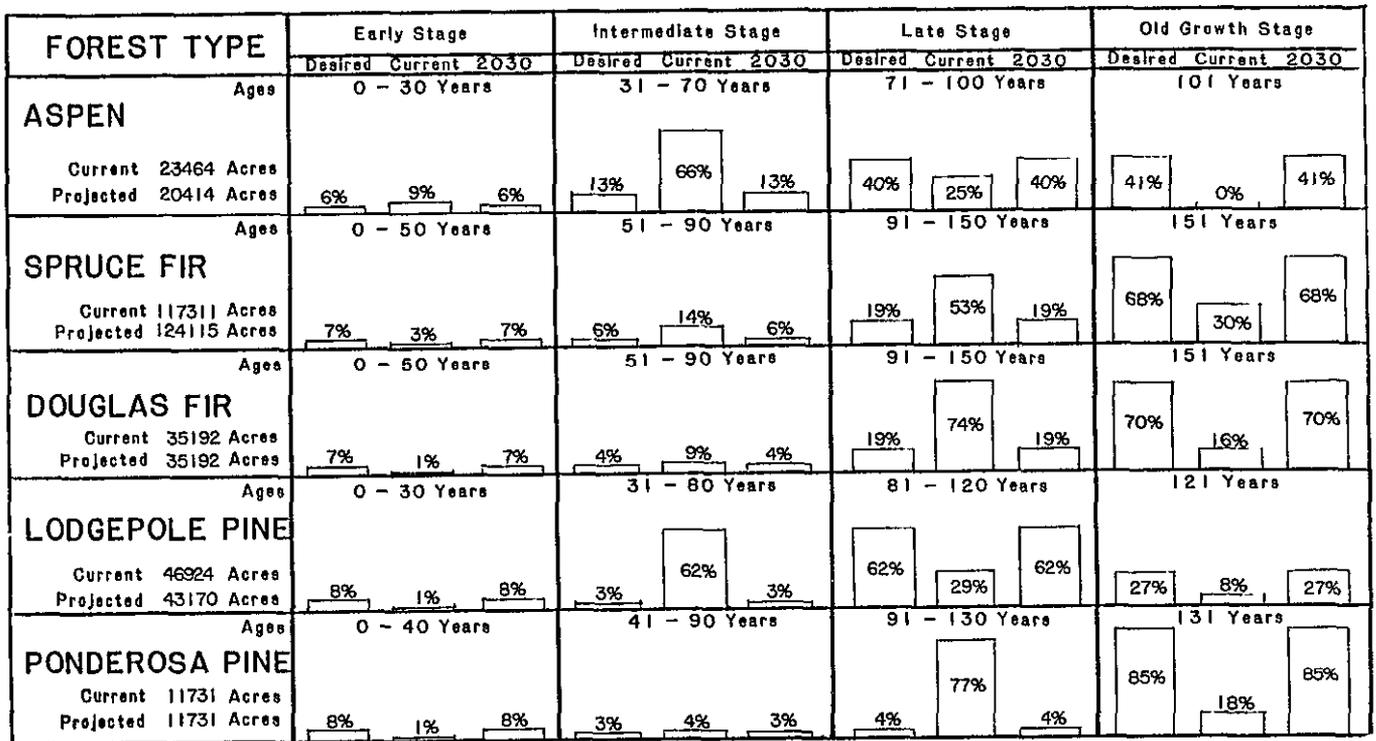


FIGURE IV - 2

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES IN WILDERNESS UNDER MANAGEMENT ALTERNATIVE B

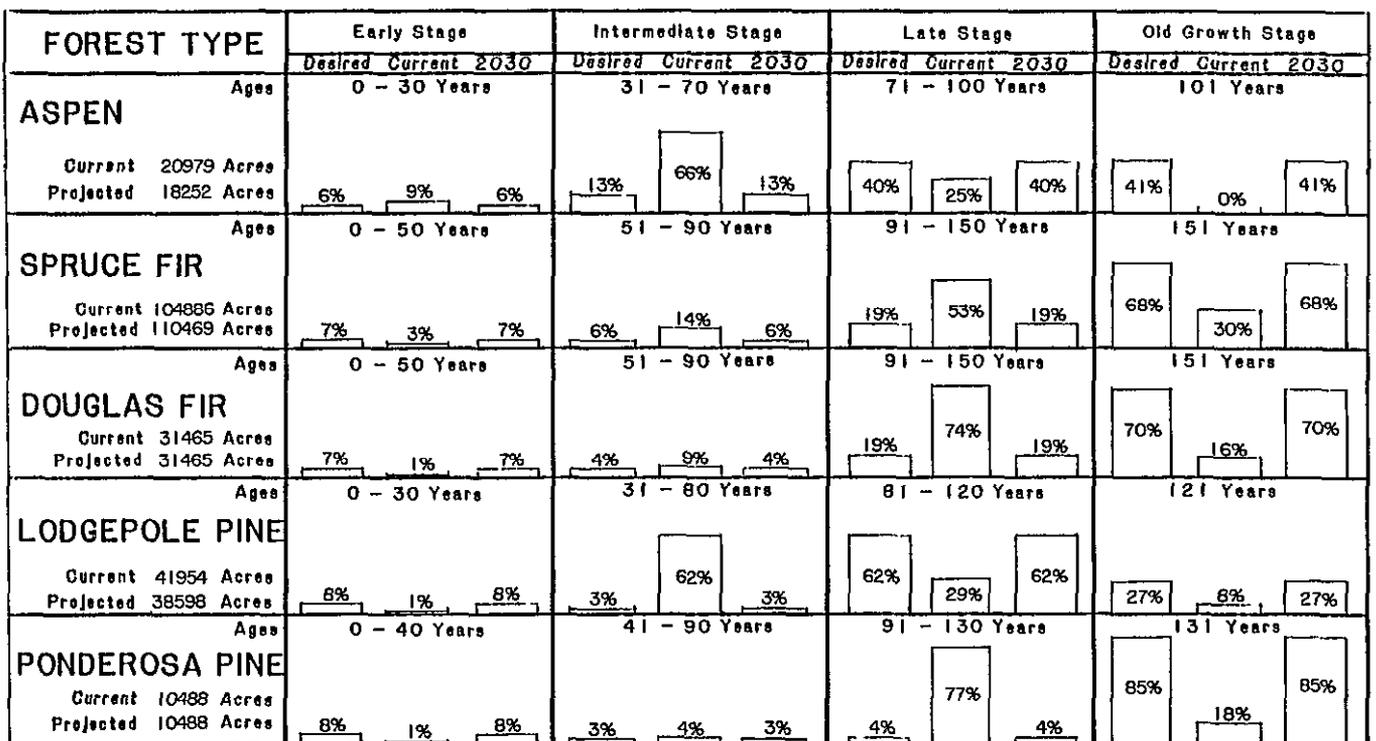


FIGURE IV - 3

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES IN WILDERNESS UNDER MANAGEMENT ALTERNATIVE C

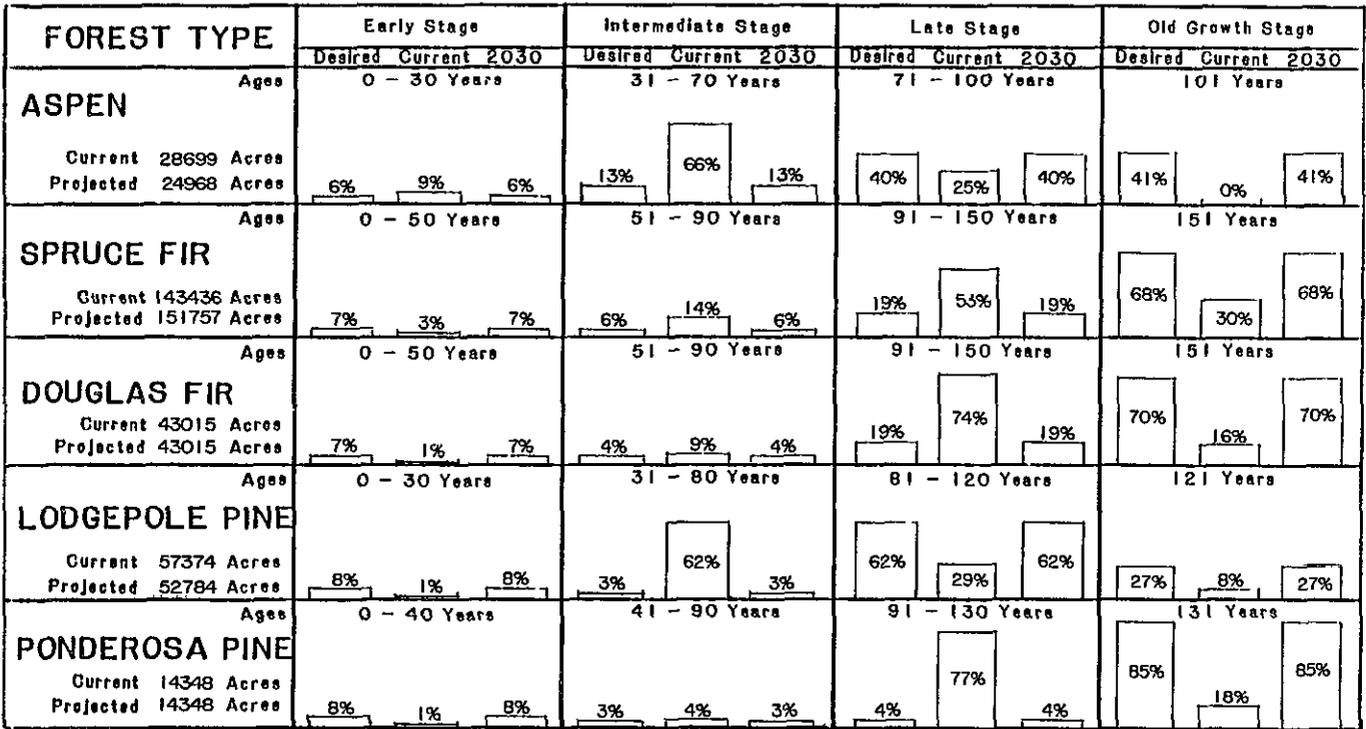


FIGURE IV - 4

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES IN WILDERNESS UNDER MANAGEMENT ALTERNATIVE D&E

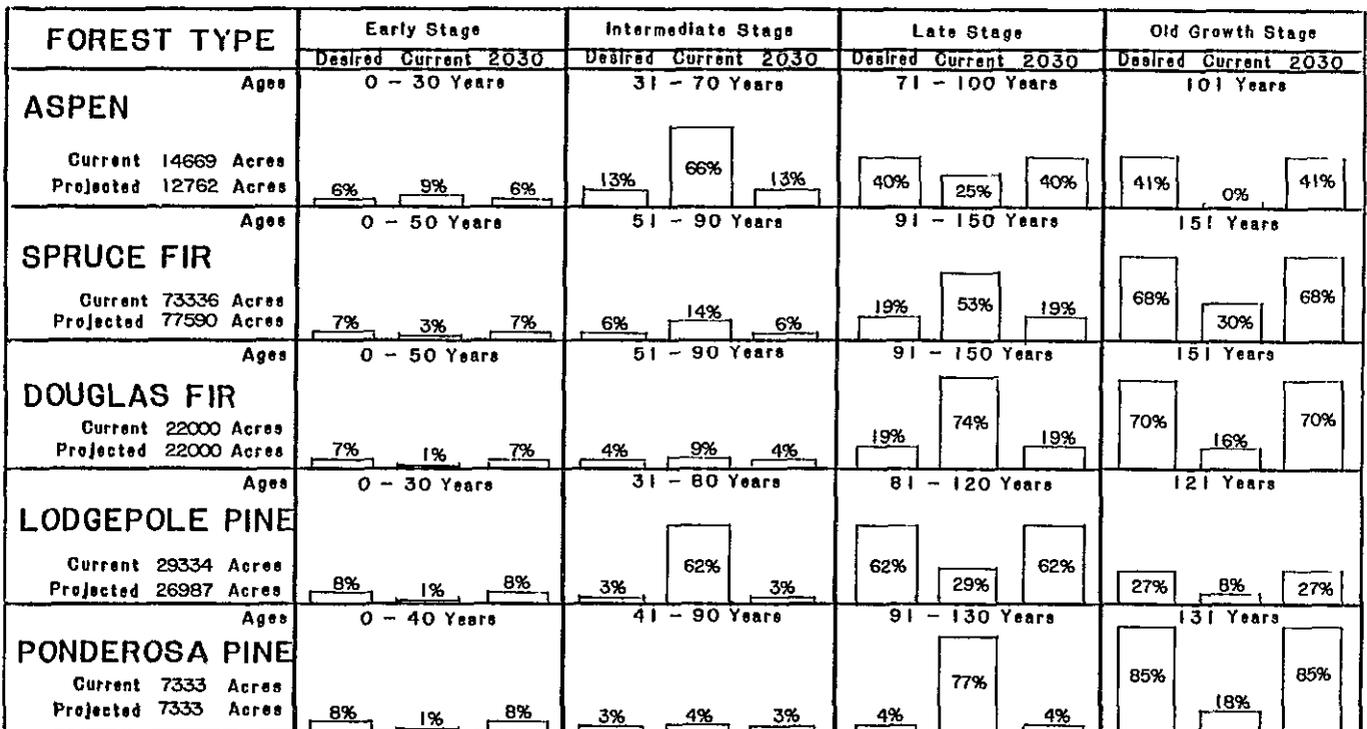


FIGURE IV - 5

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES OUTSIDE WILDERNESS UNDER MANAGEMENT ALTERNATIVE A

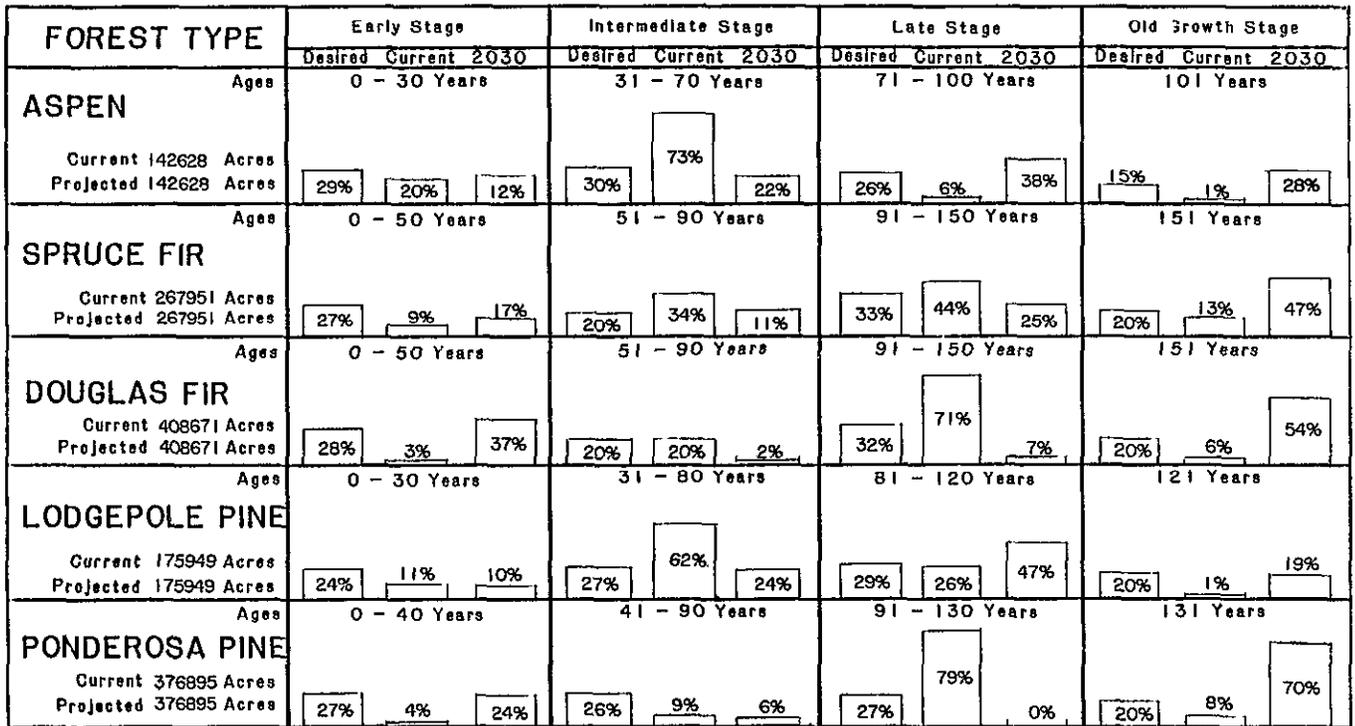


FIGURE IV - 6

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES OUTSIDE WILDERNESS UNDER MANAGEMENT ALTERNATIVE B

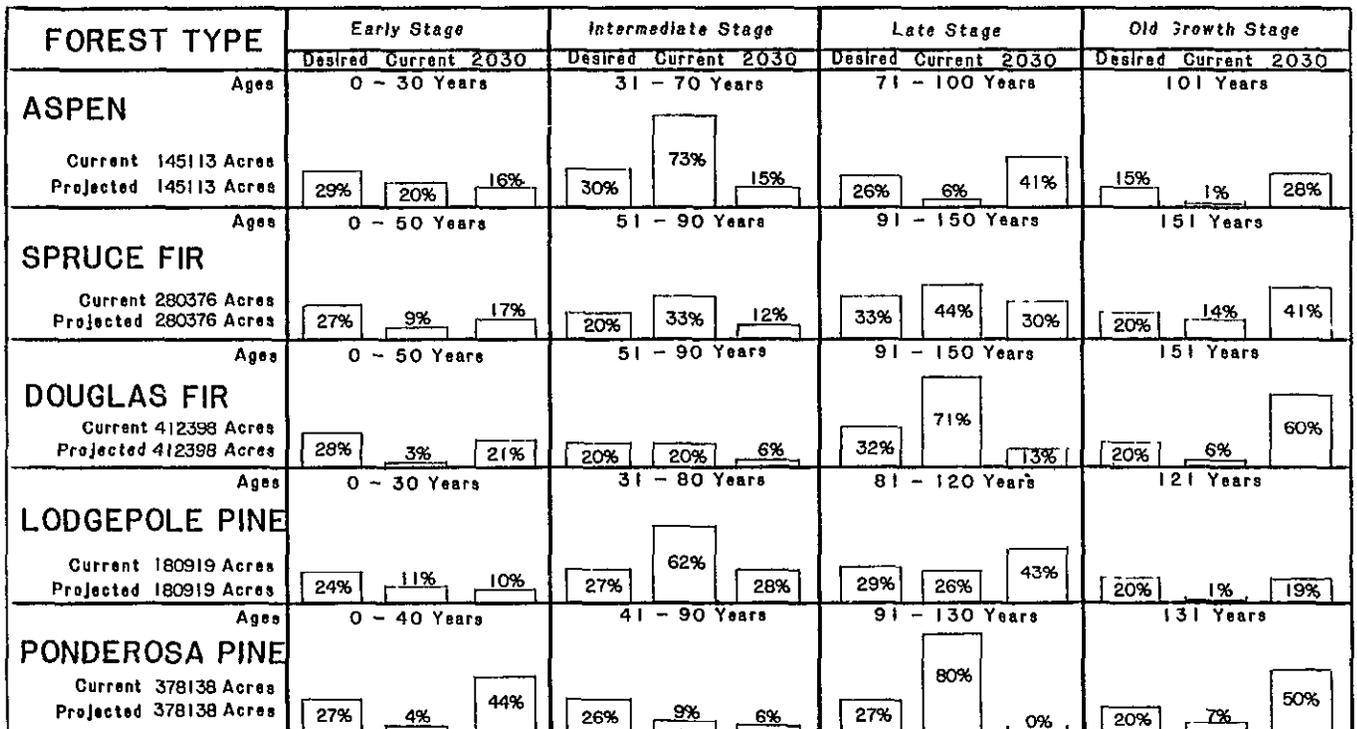


FIGURE IV - 7

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES OUTSIDE WILDERNESS UNDER MANAGEMENT ALTERNATIVE C

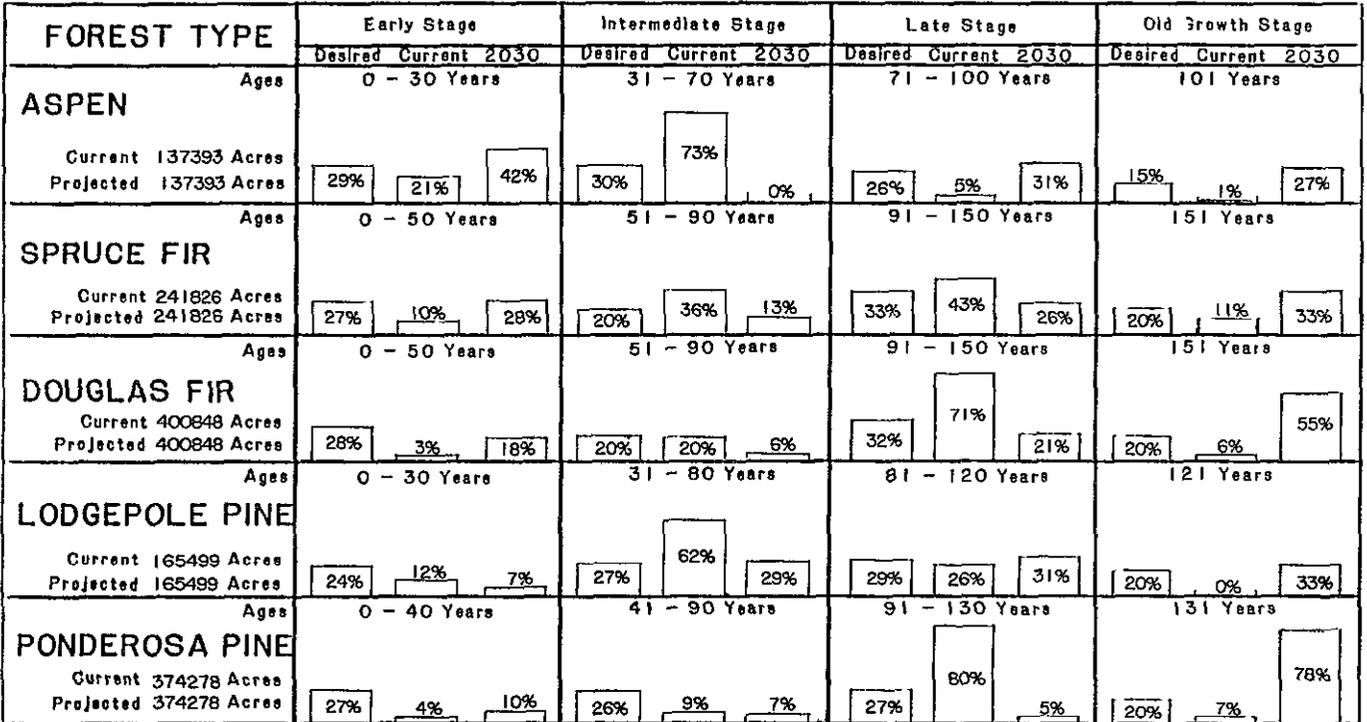


FIGURE IV - 8

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES OUTSIDE WILDERNESS UNDER MANAGEMENT ALTERNATIVE D

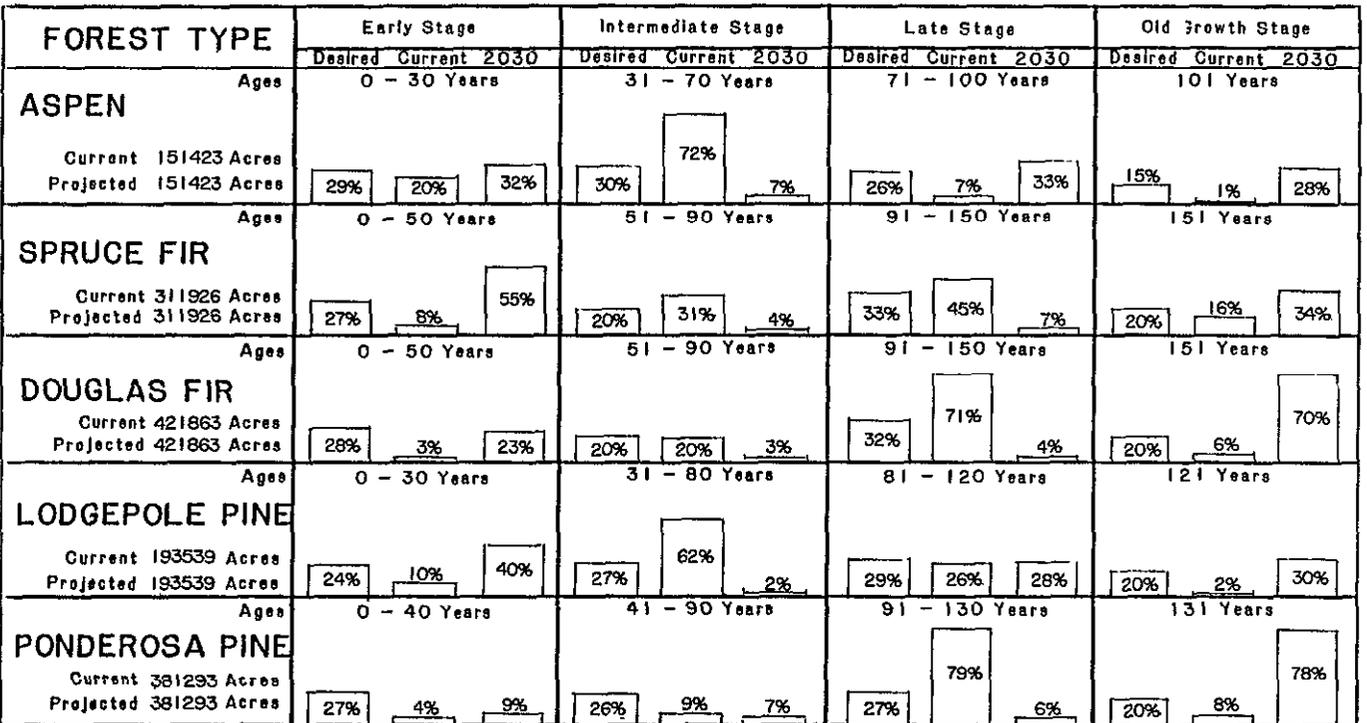


FIGURE IV - 9

DESIRED, CURRENT, AND PROJECTED DISTRIBUTION OF SUCCESSIONAL/STRUCTURAL STAGES AND STAND AGES OF FOREST TYPES OUTSIDE WILDERNESS UNDER MANAGEMENT ALTERNATIVE E

FOREST TYPE	Early Stage			Intermediate Stage			Late Stage			Old Growth Stage		
	Desired	Current	2030	Desired	Current	2030	Desired	Current	2030	Desired	Current	2030
ASPEN Ages 0 - 30 Years 31 - 70 Years 71 - 100 Years 101 Years Current 151423 Acres Projected 151423 Acres	29%	20%	14%	30%	72%	16%	26%	7%	42%	15%	1%	28%
SPRUCE FIR Ages 0 - 50 Years 51 - 90 Years 91 - 150 Years 151 Years Current 311926 Acres Projected 311926 Acres	27%	8%	48%	20%	31%	8%	33%	45%	7%	20%	16%	37%
DOUGLAS FIR Ages 0 - 50 Years 51 - 90 Years 91 - 150 Years 151 Years Current 421863 Acres Projected 421863 Acres	28%	3%	7%	20%	20%	6%	32%	71%	16%	20%	6%	71%
LOGEPOLE PINE Ages 0 - 30 Years 31 - 80 Years 81 - 120 Years 121 Years Current 193539 Acres Projected 193539 Acres	24%	10%	13%	27%	62%	11%	29%	26%	45%	20%	2%	31%
PONDEROSA PINE Ages 0 - 40 Years 41 - 90 Years 91 - 130 Years 131 Years Current 381293 Acres Projected 381293 Acres	27%	4%	7%	26%	9%	7%	27%	79%	8%	20%	8%	78%

RECREATION

Overview

An area of concern to many of those who commented on the DEIS and Proposed Forest Plan was that the pursuit of recreation opportunities should be considered the major use of the Forest. Recreation is a very important resource of the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands. This is due to the natural diversity and attractiveness of land and its close proximity to the metropolitan areas of Colorado. The Forest is also accessible to Kansas, Oklahoma, Texas, and New Mexico with relatively short driving distances.

Various management methods and philosophies are reflected in the different alternatives. All alternatives emphasize outdoor recreation on a Forest-wide basis; however, some alternatives emphasize the more primitive opportunities while other provide more opportunities at the developed end of the spectrum. More and different recreation opportunities may be provided through various management methods and development of facilities.

The alternatives provide varying degrees of consistency with the recommendations made in the State Comprehensive Outdoor Recreation Plan (SCORP) for Planning Regions 3, 4, 6, 7 and 13, which occur within the Forest. The SCORP identified picnicking, developed camping, fishing, and hiking as highly needed activities that are consistent with the role of the Forest Service.

The potential exists for developing camping and lodging facilities on private land within the Forest. Whether this potential will be developed is difficult to assess.

Dispersed Recreation (Other than Wilderness)

In all alternatives at least 50 percent of all acreage is assigned to prescriptions which emphasize recreation. Dispersed recreation opportunities also exist in management areas emphasizing resources other than recreation (e.g., hunting and 4-wheel driving in timber management areas).

Table IV-2 illustrates Forest-wide ROS composition for each alternative at the end of the 50-year planning period (see USFS ROS Users Guide for a discussion of ROS. this document is available for review at the Forest Supervisors Office, Pueblo, CO.). The table also shows the existing inventoried ROS composition. The percentages were derived from estimated changes from the existing situation due to management prescription allocation and projected road construction.

The proposed action, Alternative A provides opportunities for both motorized and nonmotorized recreation users. Seventy-three percent of the National Forest in Alternative A will be managed

to provide motorized recreation opportunities. This includes 55 percent in urban, rural, and roaded natural ROS classes where urban influence areas, ski areas, large reservoirs, and high traffic volume or scenic drive corridors occur. Eighteen percent will be managed to provide semiprimitive motorized opportunities where trail bikes and 4-wheel drive vehicles will find varying degrees of solitude and challenge. The remaining 27 percent in Alternative A will be managed to provide low user density recreation opportunities away from motorized access.

TABLE IV-2

Forest-wide ROS Composition Projections by Alternative (Percent of Forest at End of 50 Year Planning Period)

Alt.	Primitive	Semiprimitive Nonmotorized	Semiprimitive Motorized	Roaded Natural	Rural	Urban
A	3%	24%	18%	53%	1%	1%
B	3%	23%	19%	53%	1%	1%
C	4%	26%	15%	53%	1%	1%
D	3%	19%	22%	54%	1%	1%
E	3%	20%	21%	54%	1%	1%

Existing Inventory

3%	22%	20%	53%	1%	1%
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Table IV-3 illustrates the existing and projected ROS composition by alternative for dispersed, nonwilderness recreation opportunity at the end of the 50-year planning period.

TABLE IV-3

Non-Wilderness ROS Class Composition by Alternative (Percent of Forest at End of 50 Year Planning Period)

Alt.	Primitive	Semiprimitive Nonmotorized	Semiprimitive Motorized	Roaded Natural	Rural	Urban
A	0%	13%	23%	62%	1%	1%
B	0%	15%	21%	62%	1%	1%
C	0%	14%	21%	63%	1%	1%
D	0%	12%	23%	63%	1%	1%
E	0%	12%	23%	63%	1%	1%

Existing Inventory

0%	13%	23%	62%	1%	1%
----	-----	-----	-----	----	----

The Forest-wide supply of undeveloped, nonwilderness recreation opportunity in each alternative will vary from existing supply because of increases in developed recreation supply (including ski areas). Those changes, rounded to the nearest percent, are as follows:

- Alternative A - one percent decrease
- Alternative B - no change
- Alternative C - two percent decrease
- Alternative D - one percent decrease
- Alternative E - one percent decrease

Shifts in ROS class composition are the results of changes in recreation emphasis prescriptions and increases or decreases in miles of local constant, collector, or arterial roads (see Facilities). Most of the shifts by roads occur in the middle part of the recreation opportunity spectrum (i.e., SPM to SPNM).

Table IV-4 shows average annual dispersed recreation use levels by decade for each alternative.

TABLE IV-4
AVERAGE ANNUAL DISPERSED RECREATION USE ^{1/}
(Millions of Recreation Visitor Days)

<u>Alternative</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	3.4	4.0	4.7	5.4	6.1
B	3.2	3.8	4.5	5.0	5.6
C	3.4	4.0	4.7	5.4	6.1
D	3.2	3.8	4.5	5.0	5.6
E	2.8	3.0	3.7	4.2	4.9

^{1/} This table does not include Wilderness use or use within areas recommended for wilderness.

The various management prescriptions provide for a variety of recreation opportunities. Table IV-5 displays restricted or permitted motorized use by alternative.

TABLE IV-5
RESTRICTED OR PERMITTED MOTORIZED USE
 (MAcres)

	ALTERNATIVE				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Motorized Use permitted over most (Includes 528,000 Grasslands Alternatives)	680	669	655	708	680
		of		approximately	area
	acres	on		National	all
		in			all
Motorized use prohibited over most of area	638	604	725	519	519
Motorized use may be either prohibited	1,433	1,478	1,371	1,524	1,552
		permitted			or

Dispersed recreation opportunities occur in all prescription management groupings except "developed recreation." Some limitations may be placed on dispersed recreators if conflicts occur in areas where the management emphasis is other than recreation (e.g., timber, wildlife, or range).

In all alternatives projected theoretical capacity is sufficient to meet projected use. Use projections are based on current use levels projected at rates of population growth in local, regional, and national user origin categories. Alternatives which increase or decrease access to the Forest (both motorized and nonmotorized) will also increase or decrease, respectively, the current use projected. Capacity estimates are calculations based on projected acres by ROS class applied to capacity coefficients for each respective class (see FSH 1909.12, and ROS Users Guide).

In each alternative, approximately 95 percent of the total capacity is attributed to the roaded natural, rural, and urban ROS classes. This is where management objectives allow for higher recreation use densities. As described earlier, the percent of Forest acres falling into these ROS objectives does not change greatly from one alternative to the next. Because of this high amount of capacity and small amount of change in roaded natural, rural and urban classes between alternatives, capacity change due to shifts in other ROS classes tends to be slight.

In Alternative A - There will be a small decrease in nonwilderness areas where motorized recreation is emphasized or compatible. On the Management Plan Map for Alternative A (and all alternatives), dispersed motorized recreation could occur on any area other than those designated 3A (nonmotorized recreation) or 8B and 8C (wilderness). Site specific closures could be made for safety or resource protection based on criteria described in the Facilities section of this chapter. Specific areas open, closed, or limited to motorized recreation use are described in the Forest Travel Map which is published every three to five years. The regulation of motorized recreation will change with each publication of the map to reflect current resource management activities, however, on-the-ground management of motorized recreation will follow the guidance of management prescriptions in the Forest Plan, Chapter III, and illustrated on the Management Area Map.

Of the area where motorized recreation is emphasized or compatible, twenty percent is aimed at providing semiprimitive opportunities where four-wheel drive and other vehicles can experience varying degrees of solitude and challenge. Approximately 1,395 miles of Forest System roads will be maintained primarily to afford resource protection and provide primitive road access on the Forest. An equal number will be maintained at a level capable of supporting two-wheel drive vehicles for sightseeing or other activities occurring in roaded natural or rural settings.

The Forest System roads also provide winter trails for snowmobiles in areas where wintering big game are not threatened and safety problems do not exist. Over 200 miles of motorized trails off of Forest System roads will also be open for two-wheeled motorized vehicles.

The potential for conflict between recreation and nonrecreational vehicles will increase as recreational traffic and traffic to achieve other resource management objectives increases. Increased vegetation disturbance, noise, and dust from resource development could result in reduction in quality of the recreation experience during the resource development activity.

Areas outside of wilderness where nonmotorized recreation use will be emphasized will be slightly increased in Alternative A. Areas where Prescription 3A (nonmotorized recreation) appear on the Management Plan Map for Alternative A will be managed to provide low density, undeveloped nonmotorized recreation. Other management activities may occur in some nonmotorized areas, but the activities will be constrained to protect nonmotorized recreation values. Resource management actions occurring in non-motorized areas such as fire control activities may create temporary conflicts with nonmotorized recreation. These actions will typically result in vegetation and soil

disturbance, increases in noise and human contacts, and the need for nonrecreational motorized access. While these impacts will be localized and short-term, they could lower the quality of the nonmotorized recreation experience opportunity during the period of the action.

Trail mileage on Forest System trails will increase in Alternative A. Approximately 1,488 miles of trail will be maintained (see Facilities). At least 200 miles will be managed for motorized use. Trails with low use may be removed from the schedule of trails maintained by the Forest Service. Unmaintained trails would not be closed to public use unless the trail in question posed a safety threat to users or was causing unacceptable resource damage. A trail not on the Forest Service maintenance schedule could continue as a Forest System trail when volunteers maintain the trail to Forest Service standards.

Increases in dispersed recreation use will result in increased litter, soil erosion, road and trail deterioration and ecosystem disturbance. Management costs for enforcement and resource rehabilitation will also increase.

In Alternative B - The impacts on motorized and nonmotorized recreation opportunities will be similar to those described in Alternative A. Approximately 2,760 miles of road will be maintained for two-wheel drive vehicles and as primitive roads for 4x4 vehicles. Trail mileage would increase to 1,408 miles with over 200 miles providing for motorized recreation.

In Alternative C - The impacts on dispersed motorized and nonmotorized recreation opportunities will be similar to those described in Alternative A. Forest System roads open to the public will increase to a total of 2,808 miles. The Forest trail system (motorized and nonmotorized) would expand 36 miles to a total of 1,748 miles. While better accommodating increased use, additions to the system would also help reduce conflicts between users and provide better access to the Forest.

An increase in roads open to public use and an increase in trails will lead to an increase in projected use. The increased use could result in increased litter and the potential for resource degradation. These problems would extend over larger areas due to significant increases in motorized and foot access. Management costs for enforcement and resource rehabilitation will correspondingly increase.

For Alternative D - There will be an increase in nonwilderness areas where motorized recreation is emphasized or is compatible. The emphasis on commodity production will result in an increase in road construction and an overall increase in roads open to the public. Approximately 2,800 miles will be maintained for two-wheel drive access and as primitive roads for 4x4 vehicles.

The potential for conflicts between recreation and nonrecreational traffic will increase. Vegetation manipulation, soil disturbance, noise, and dust associated with resource development for commodity production could reduce the quality of the recreation experience in the vicinity and for the duration of these management activities.

The increase in Forest System roads open to the public is the primary cause for a reduction in areas outside of wilderness where nonmotorized recreation is emphasized or compatible. Resource management actions in nonmotorized areas will create temporary conflicts with nonmotorized recreationists. Vegetation treatment soil disturbance, noise, dust, and use of motorized equipment will reduce the quality of the nonmotorized recreation experience.

Motorized and nonmotorized trail mileage will be increased by approximately 9 percent, from 1,288 miles to 1,408 miles.

While dispersed recreation is not being emphasized in this alternative, the increase in open roads will lead to a one to three percent increase in dispersed use over projected use trends. Increased litter, dust, and the potential for resource degradation from use along trails and roads will result. Management costs for resource rehabilitation and enforcement will also increase.

In Alternative E - Impacts to dispersed recreation opportunities are similar to those described in Alternatives A and C. Approximately 70 percent of dispersed recreation opportunities outside of wilderness will be managed so that motorized recreation is emphasized or compatible. A total of 2,750 miles of roads will be open to the recreating public; for two-wheel drive vehicles and as primitive roads for 4x4 vehicles.

Nonmotorized opportunities outside of the wilderness will decrease. Approximately 30 percent of nonwilderness area will be managed to emphasize or be compatible with nonmotorized recreation use, with one percent of this area providing primitive opportunities.

Motorized and nonmotorized Forest System trails will remain at 1,288 miles.

Developed Recreation (Other than Downhill Skiing)

Alternative E provides for substantially less developed site capacity than current management due to reduced budget and commodity emphasis. Alternatives A and C are correlated more closely with demand. Significant adverse effects would not be expected in Alternatives A or C because the emphasis includes meeting recreation demands with resource protection. Under

Alternative E, some low use and small capacity sites will be closed immediately. Since less funding would be available for facility maintenance, other sites with high maintenance costs would gradually deteriorate and be closed. The planned capacity of camping and picnicking units is shown in Table IV-6. Use shown in Table IV-7 for Alternative E would probably stay the same with people concentrating in the remaining facilities. This would increase impacts on undeveloped sites, and those developed sites which would remain open because increased use will not be matched by increased development of facilities. Increased vegetation damage and soil loss would occur in heavily used sites.

Alternatives B and D represent current management direction and will provide for use at about 80 percent of demand. Increased crowding, increased physical deterioration of sites, and increased pressure on the Forest's undeveloped areas and other entities (private, State and Federal) facilities will result. The potential for physical and social degradation of the Forest's recreation environment would be significant. There would also be negative economic impacts on communities currently serving the Forest recreating public such as loss of jobs and revenue.

Alternatives A and C are designed to meet the projected use demand for developed sites based upon 40 percent occupancy rate. Actual construction may lag behind demand in Alternative A because of lower budgets while under Alternative C, construction would be completed by the time needed. Increased capacity can also be met by increasing the practical capacity to greater than 40 percent of the theoretical capacity through more intensive management institution of reservation system or incentives to increase weekday versus weekend use.

In consideration of consequences and factors discussed in Appendix I in connection with the Quail Mountain winter sports site, Twin Lakes and the lands on the north side of Twin Lakes have been identified in all alternatives as a management area for emphasizing rural and roaded natural recreation opportunities. The applicable management direction allows a moderately wide range of recreation activities. The direction also allows a level of facilities and support services development that is consistent and compatible with the intended management emphasis. This level has been reached in terms of scope (number and kinds of sites) and intensity (acres committed to sites and capacity). Future management actions would focus on improving the quality and durability of existing sites and facilities. For example, roads should be hard surfaced to reduce dust and annual maintenance costs. Future management actions would also focus on insuring that all areas disturbed by Fryingpan-Arkansas project construction activities are successfully and attractively stabilized and revegetated.

Where it is determined to be cost effective and will meet resource needs, developed recreation sites would be closed seasonally during low use periods. Camping generally occurs from Memorial Day through Labor Day on most sites, whereas picnicking may occur year-round. Sites will be individually evaluated to determine the cost compared with the need of keeping the site open during lower use seasons. Protection of other resources is considered. Seasonal closures would continue to support the goals of the alternative in respect to meeting demand levels.

Management standards and guidelines provide direction and priorities for closures, reductions in services, reconstruction, rehabilitation, and new construction or expansion of facilities to meet budget levels and goals and objectives of the alternative. (See the sections Forest Direction and Management Area Prescriptions, Chapter III, Forest Plan.)

TABLE IV-6
PLANNED CAPACITY CAMPING AND PICNICKING UNITS

<u>ALTERNATIVE</u>	<u>DECADES</u>											
	1984		1		2		3		4		5	
	UNITS	PAOT	UNITS	PAOT	UNITS	PAOT	UNITS	PAOT	UNITS	PAOT	UNITS	PAOT
A	2427	12135	2427	12135	2562	12810	3445	17225	4627	23135	6218	31090
B	2427	12135	2427	12135	2565	12825	3445	17225	3445	17225	3445	17225
C	2427	12135	2427	12135	2362	12810	3445	17225	4627	23135	6218	31090
D	2427	12135	2427	12135	2565	12825	3445	17225	3445	17225	3445	17225
E	2427	12135	2129	10643	2129	10643	1971	9855	1971	9855	1774	8870

Persons at One Time (PAOT)

NOTE. A camp and picnic unit is comprised of a table and grill designed for one family use and a maximum of 5 people

The following table shows predicted average annual camp and picnic use by decade, for each alternative.

TABLE IV-7
PREDICTED AVERAGE ANNUAL CAMP AND PICNIC USE
 (Millions of Recreation Visitor Days)

<u>ALTERNATIVE</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	.63	.85	1.14	1.53	2.06
B	.63	.68	.91	1.22	1.65
C	.63	.85	1.14	1.53	2.06
D	.63	.68	.91	1.22	1.65
E	.60	.60	.60	.60	.60

Downhill Skiing

TABLE IV-8
AVERAGE ANNUAL DOWNHILL SKIING USE
(1000 Visitor Days)

<u>ALTERNATIVE</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	183	474	904	1100	1150
B	183	474	904	1100	1150
C	183	481	904	1100	1150
D	183	474	904	1100	1150
E	183	410	441	450	450

All of the five remaining inventoried downhill skiing sites on the Pike and San Isabel National Forests were evaluated in accordance with planning direction provided by the Rocky Mountain Regional Guide. Table IV-8 shows the average annual downhill skiing use. A detailed discussion of those evaluations is contained in Part II of Appendix I. Based on those evaluations, two inventoried sites are classified as Priority 2. These two sites have been assigned a special management prescription which will maintain essential land characteristics and preserve, on a tentative basis, opportunity for future ski area development. The three other sites are determined to be incapable and/or unsuitable for ski area development and are eliminated from the inventory and from further consideration for downhill skiing use.

Sites Classified as Priority 2

Burning Bear - Park County

This area is located five miles south of the Geneva Basin Ski Area. A rating of "good" was the result of reconnaissance trips from 1969-1972. The reports indicate a more than adequate range of beginner and intermediate slopes and less than optimum advanced terrain. Slope orientation is favorable. Snow depths were inconclusive but appeared adequate. Vertical rise is 1,600 feet. The area encompasses 2,600 acres with a maximum capacity of 9,000 SAOT.

Quail Mountain - Lake and Chaffee Counties

This site incorporates the Flume Creek and Twin Lakes #2 sites. The ratings for the two sites indicated limited opportunities. In 1982 a desk review of the previous studies was conducted with a composite rating of "good". This rating is dependent upon verification of the physical attributes - wind, erodability, snowfall, geology of the site. The vertical rise is 2,000 feet. Maximum capacity is 8,000 SAOT. The supply/demand opportunities for the regional and national market appears favorable.

Sites Eliminated From Further Consideration For Downhill Skiing Use

Michigan Creek - Park County

It has been concluded that the 1970 rating of "good" is no longer an accurate portrayal of the site's physical characteristics as they relate to ability to attract and satisfy skiers. The site is considered incapable of competing with existing ski areas in the same market area at the present time. Moreover, supply and demand projections indicate that more ski areas will probably not be needed on the Forest to meet demand by the end of the year 2000. In any event, the site's capabilities are such that it would not make a significant or suitable contribution toward meeting in either the short-term or the long-term.

Anderson Bowl - Teller County

This site is located approximately one mile east of the existing Pikes Peak Ski Area. Inventories conducted from 1968-70 indicated marginal snow depth, inadequate slope protection and high winds. The site is located within the Colorado Springs municipal watershed. A longstanding written agreement on measures to protect the watershed has been executed by the U.S. Department of Agriculture and Colorado Springs. Because of the poor physical capability and the competition with water resource management along with the lack of attractive supply/ demand opportunities, the site has been removed from consideration.

West Bowl - Teller County

This site is located three miles southwest of the Pikes Peak Ski Area. Field reconnaissance trips to evaluate the site were conducted during 1968-69 and 1969 -70. The trips reported limiting site conditions such as marginal snow depth, inadequate slope protection and high winds. Average snow depth recorded in 1970-71 was three inches. The area is located within the range of a major bighorn sheep herd. The area has been removed from consideration because of the poor physical capability and competition with the wildlife resource. A general lack of supply/demand opportunities is apparent.

Alternatives A, B and D would attempt to meet demand for downhill skiing to the extent that capable and suitable lands are available. During the first decade, demand can be met by available capacity at existing sites and through the development of the additional potential capacity that exists within existing permit boundaries. During the second decade, demand can be met by developing approximately one half of the expansion capacity available on lands adjacent to the existing sites. During the third decade, demand could be more than met by developing the

remaining expansion capacity and through the development of two potential new sites (Burning Bear and Quail Mountain, - assuming the two prove to be feasible). Demand is predicted to exceed supply beyond the third decade. This will occur because additional sources of supply, meaning new sites that are capable and suitable for downhill ski area development, have not been identified.

Alternative C is basically the same as Alternatives A, B and D, except that action would be taken to encourage more expansion on lands adjacent to existing sites during the second decade. This would be done to insure that there would be no gap between supply and demand at the end of that decade.

Alternative D would not keep pace with demand after the first decade. Additional use would be accommodated to the extent of present available capacity at existing sites and expansion potential within existing site permit boundaries. Funding for further expansion or new site development would be low or no priority.

Potential Consequences of Downhill Skiing on Other Resources

The National Forest System lands used for downhill skiing are intensively developed. The impacts on other resources on these and adjacent National Forest System lands is usually significant. Most of the effects come from the development of adjacent private lands for commercial and residential purposes. The specific effects include:

Vegetation. The development of new ski areas and the expansion of existing sites will influence vegetation management on the Forest. The clearing of vegetation for ski trails will increase the short-term supply of harvestable trees, but will eliminate the long-term growth potential on the sites affected. Population growth can be expected to increase the demand for firewood and resistance to commercial hauling through residential areas. Ski area development can have positive impacts on vegetation if a plan is developed to manage the stands to control insect infestation and disease, maintain visual resources, and to protect the public safety by removing dead and dying trees.

Recreation. Ski area development can also have substantial effects on the overall recreation use of the Forest. The influx of people using the ski areas has some effect during the ski season. However, the greatest potential is the exposure of the Forest to thousands of people who may return during the non-ski season to participate in other activities.

Visual Resources. Ski areas can create impacts which may detract from the natural scenic beauty of the National Forest. Potential visual impacts can often be reduced, however, by using special visual management techniques to screen or soften the impacts of development.

Wildlife. Ski area development usually creates changes in wildlife habitat. These changes can be either beneficial or detrimental, depending on the species affected. The clearing of vegetation for ski trails provides additional edge and habitat for some species. The Colorado Division of Wildlife considers most ski areas to be detrimental for wildlife.

Range. Ski area development can result in the loss of rangelands for summer grazing of domestic livestock. The greatest potential for change usually takes place on private lands. Ranch lands adjacent to developed sites often become more valuable for uses other than ranching. On some existing ski areas summer grazing and winter recreation are compatible.

Water. The direct effects on water from development are not expected to be significant. Water quality must meet standards under all alternatives. Development would consume water on-site for snowmaking and off-site for residential use. The potential for encroachment into wetlands and floodplains could be significant on private land.

Minerals. The withdrawal of ski areas from mineral entry will have a negative effect on the development of any mineral resources on these sites.

Historical and Cultural Resources. Historic and cultural resources can be destroyed during the construction and maintenance of ski areas and other recreation developments such as campgrounds. Subsequent public use of these sites, as well as increased dispersed recreation under all alternatives, can contribute to the loss of historic and cultural resources through activities such as relic collecting and site vandalism. Measures to protect these resources by conducting cultural resource surveys in advance of ground disturbance, identifying such resources through National Register recognition, and collecting information from historical and cultural resources will mitigate these effects. These are discussed in the Cultural Resource Management activity in the Forest Direction (Chapter III, Forest Plan).

Other. The effect on support elements is not expected to be significant on National Forest System lands. Private land development could have significant effects. For example, the potential to violate air quality standards in mountain valleys from vehicle and fireplace emissions would be increased. Probably the greatest effects from ski area development will be economic and social. A detailed discussion on these consequences is included in the Economic and Social section.

VISUAL RESOURCES

The existing visual quality of the Pike and San Isabel National Forests is high. The visual variety created by contrasting

landforms and alternating vegetation patterns provides a high quality scenic background. An inventory of the visual resource was prepared to stratify the general Forest area into areas of highest and lowest public concern. Areas having the highest scenic quality, which are visible to the greatest numbers of people were considered to be the most sensitive from a visual management standpoint. Remote areas of the Forest with fewer scenic attractions were identified as areas which were less sensitive and could receive more intensive management. The inventoried visual quality objectives are recommended standards to which the Forest is expected to be managed. Under current conditions, shown in Table IV-9, the number of acres shown in each category is the theoretical number of acres which can be managed in each category without creating objectionable man-made changes. The visual management inventory can be used to identify management opportunities as well as constraints.

Visual impacts can have either short-term or long-term consequences. Generally, roads, structures, and utilities have long-term visual impacts. Vegetation management, on the other hand, usually results in short-term visual impacts. Vegetation management plans are designed with the visual consequences in mind. The results of adequate project planning for vegetation can often be made to enhance scenic quality.

Those acres which were inventoried as the visual quality objectives are more detailed and are considered to be the actual or net number of acres which could be managed under each objective for all of the alternatives. Although it does not present a true picture of the actual number of acres to be managed under each category, the total number of acres to be managed for visual modification can be calculated, based on the actual number of acres expected to be clearcut for timber sales, roads, and ski areas. Vegetation changes will take place throughout the life of the plan, even if no management takes place. Areas which are modified initially will be replaced by new vegetation. As each succeeding decade arrives, new trees will replace the existing ones. An estimate of the average number of acres to be visually modified during each decade is shown in Table IV-9.

Except for some small changes, the inventoried visual quality objectives will still be met in all management activities. Currently, it is difficult to predict how the modification activities will be spatially arranged within each capability area, but adequate lands have been inventoried to accomplish all of the alternatives.

In Alternative A, the existing visual inventory will be modified each decade for new roads, timber sales, utilities, recreation sites, wildlife habitat improvement, buildings, ski areas, watershed projects, and grazing improvement. Some of the im-

provements, such as buildings, utilities, and roads, will result in a long-term commitment of resources. Other management activities, such as grazing and wildlife habitat improvement, will have only a short-term impact on the landscape. Areas which are cleared for timber sales will eventually be replaced by younger vegetation. Visual resources will be an integral part of the planning process and will be given equal consideration with the other resources. Visual impacts will be mitigated by applying the principles of landscape management to all Forest activities. Visual impacts will be reduced, by carefully locating management activities away from highly visible zones, by shaping forest openings to appear as natural occurrences, and by blending facilities with the natural forms, lines, colors, and textures of the natural environment. Forest management will be used to enhance landscape diversity where appropriate.

In Alternative B, management activities which are currently taking place, or have been planned and approved, will continue to take place. Some areas will be further impacted by new roads, timber sales, utilities, ski areas, and other management activities which will take place in the future. Visual impacts in some areas would be decreased as some existing roads are closed.

In Alternative C, goods and services would be provided at the levels assigned in the Rocky Mountain Regional Guide and the Pike and San Isabel National Forests portion of the Resources Planning Act (RPA), 1980 program targets. Emphasis would be placed on wildlife and fish habitat improvement, wilderness, dispersed and developed recreation, and land acquisition. Visual impacts will be modified by these management activities.

The high levels of outputs associated with Alternative D could result in some adverse visual impacts, if the management activities are not specially allocated to conform to the inventoried visual quality objectives. This alternative emphasizes opportunities to increase timber, range and mineral outputs that are market oriented.

The low level of goods and services to be provided in Alternative E would result in the visual modification of land associated with range and timber outputs.

Under all alternatives, the specific visual quality management requirements (Chapter III, Forest Plan) will ensure changes are environmentally acceptable.

Changes from inventoried to adopted visual quality objective are shown in Table IV-9. Although adverse impacts on quality are occurring in some areas, mitigation measures as provided for in

the management prescriptions will also improve visual quality in many areas. Vegetation manipulation to improve diversity for wildlife may, at the same time, improve the visual quality and improve the overall resistance of forested areas to insects and disease. Road construction will increase viewing opportunities. Vegetative treatment can also open vistas. The major impacts of resource utilization and management activities are often short term in respect to visual quality and occur during actual construction or development phases before mitigation and restoration processes are completed. Leasing recommendations and stipulations for oil, gas and other mineral activities are designed to lessen adverse visual effects.

TABLE IV-9
CHANGES FROM INVENTORIED TO ADOPTED VISUAL QUALITY OBJECTIVE

Visual Resource - 50-Year Plan

1982 Inventoried Visual Quality Objectives (Net Acres) <u>1/</u>	Alternatives by Prescription <u>2/</u>				
	A	B	C	D	E
	Adopted Visual Quality Objective (Net Acres)				
Preservation (Wilderness) 260,100	383,300	383,300	444,700	260,100	260,100
Retention 747,722	10,022	8,722	8,722	8,722	8,722
Partial Retention 1,237,745	752,445	905,945	804,945	884,445	927,845
Modification 250,802	1,607,502	1,466,602	1,469,002	1,574,102	1,530,702
Maximum Modification 255,367	0	0	0	0	0

1/ Inventoried or recommended achievement for all Alternatives A through E, in net acres.

2/ Net number of acres assigned to each prescription by capability areas. Management activities will be spacially arranged within each prescription area to meet the inventoried visual quality objectives.

Special Areas

Characteristics of special recreation areas and classifications are preserved to retain the qualities for which they have been established under all alternatives. The Lost Creek and Spanish Peaks National Natural Landmarks, Windy Ridge Bristlecone Pine Scenic Area, Devils Head and Pikes Peak National Recreation

Trails, Continental Divide National Scenic Trail corridor, research Natural Areas, and the South Platte River potential Wild and Scenic River corridor are recognized and provided for in the management direction.

Cultural Resources

Table IV-10 shows the average annual cultural resource surveys. Those alternatives which provide the greatest degree of resource activity such as a high level of timber harvest pose the greatest potential for disturbance of cultural resources. Appropriate survey and mitigation, however, at the same time provides the greatest opportunity for recognition, preservation and development of the cultural resource for public benefit. A high level of recreation development also provides opportunity to interpret and manage cultural resources for visitors and scientific study. Alternatives A, C and D provide the best benefits for this resource. Alternative E provides the least. In addition to historic and prehistoric cultural resource values, native American religious sites and cultural values are to be preserved.

TABLE IV-10
AVERAGE ANNUAL CULTURAL RESOURCE SURVEYS
 (1000 Acres)

<u>ALTERNATIVE</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	16.8	17.6	18.0	20.0	20.0
B	10.0	12.0	12.8	14.8	16.0
C	13.2	16.0	16.0	16.0	16.0
D	13.2	17.6	17.6	17.6	20.0
E	10.0	12.0	12.0	12.0	12.0

WILDERNESS

Wilderness acres under the various alternatives, along with associated use capacity levels, are shown in Table IV-11. Management in congressionally designated Wilderness Study Areas will continue to maintain the wilderness characteristics of the areas until Congress has made a determination regarding their addition to the National Wilderness Preservation System. Wilderness Study Areas include Buffalo Peaks, Greenhorn Mountain, Spanish Peaks and Sangre de Cristo. Existing wilderness includes Mount Evans, Collegiate Peaks, Holy Cross, Lost Creek and Mount Massive. The existing wilderness consists of 257,420 acres on the Pike and San Isabel National Forests and 38,050 of the Mt. Evans Wilderness on the Arapaho and Roosevelt National Forest. Suitability determination for the Sangre de Cristo Wilderness Study Area include 130,700 acres of this area on the Rio Grande National Forest.

Average annual wilderness use shown in Table IV-11 reflects a moderate use level. Maximum theoretical capacities are about 60 percent higher. Nonwilderness capacities vary from 20 percent to 130 percent higher than wilderness capacities.

Management of existing wilderness would vary little between alternatives other than the level of intensity of use. The additional acres determined suitable in the alternatives would be managed essentially the same as existing wildernesses. Nonconforming uses, other than motorized use where it previously existed, have not been permitted in study areas since their early recognition for wilderness potential under RARE-I. Four intensities of management are proposed in wilderness related to use capacity and experience levels in the area, and the degree of solitude and naturalness encountered. These wilderness management prescriptions are: 8D) Transition areas around heavily used recreation sites or trailheads with a higher degree of outside influences, 8C) Semiprimitive areas with somewhat less use but still including major use areas and trails or travel routes where encounters with others are frequent, 8B) Primitive areas which are lightly-used and provide relatively few outside influences, and 8A) Pristine areas with very light use and essentially no evidence of other people or outside influences. Table IV-13 shows the total acres of wilderness proposed under the alternatives.

Exclusive of the National Grasslands, wilderness would make up the following proportions of the total Pike and San Isabel National Forest lands: Alternative A, 17 percent; Alternative B, 15 percent; Alternative C, 21 percent; and Alternatives D and E, 12 percent. The result is fewer acres to meet anticipated demands and needs for nonwilderness associated resources of an expanding society. Conversely, increased wilderness can provide increased opportunity for wilderness associated benefits. Appendix C summarizes the Wilderness Study and Further Planning Area reports with corresponding effects.

Anticipated needs for new utility corridors do not conflict with potential wilderness. There are no foreseeable needs for corridors identified in the study areas. Some concern, however, has been expressed that the extended length of the Sangre de Cristo Study Area would block potential corridor routes to the San Luis Valley though no needs or proposals have been identified. Outfitter guide operations would not be significantly affected as the activity is not a major enterprise on the Forests. Wilderness designation would tend to attract some increased demand for that activity, but the increase is expected to be minor.

TABLE IV-11
AVERAGE ANNUAL WILDERNESS USE
 (Thousand Recreation Visitor Days Per Year)

<u>ALTERNATIVE</u>	<u>ACRES</u>	<u>DECADE</u>				
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
<u>A Existing</u>						
P&SI NF	257,420	258	258	386	386	386
AR NF	40,274	40	40	60	60	60
<u>Recommended</u>						
P&SI NF	120,017	120	120	180	180	180
RG NF	125,512	126	126	188	188	188
<u>B Existing</u>						
P&SI NF	257,420	258	258	386	386	386
AR NF	40,274	40	40	60	60	60
<u>Recommended</u>						
P&SI NF	86,000	86	86	129	129	129
RG NF	130,700	131	131	196	196	196
<u>C Existing</u>						
P&SI NF	257,420	258	258	386	386	386
AR NF	40,274	40	40	60	60	60
<u>Recommended</u>						
P&SI NF	205,543	206	206	309	309	309
RG NF	130,700	131	131	196	196	196
<u>D Existing</u>						
P&SI NF	257,420	258	258	386	386	386
AR NF	40,274	40	40	60	60	60
<u>Recommended</u>						
P&SI NF	0	0	0	0	0	0
RG NF	0	0	0	0	0	0
<u>E Existing</u>						
P&SI NF	257,420	258	258	386	386	386
AR NF	40,274	40	40	60	60	60
<u>Recommended</u>						
P&SI NF	0	0	0	0	0	0
RG NF	0	0	0	0	0	0

Planned wilderness use capacity is 1.0 recreation visitor day per acre for the first two decades and 1.5 recreation visitor day per acre after the year 2000 on the Pike and San Isabel and Rio Grande National Forests.

P&SI NF - Pike and San Isabel National Forests
 AR NF - Arapaho and Roosevelt National Forest
 RG NF - Rio Grande National Forest

Permit systems, except for outfitter guide operations, are not anticipated in the near future. Conflicts from overuse of preferred wilderness designation sites are expected to increase in later decades. This may necessitate a permit system to achieve a desirable distribution of use. Land use allocation proposals for these wilderness management prescriptions are shown in Table IV-12.

TABLE IV-12
WILDERNESS MANAGEMENT

MANAGEMENT PRESCRIPTION	AREA BY ALTERNATIVE (Thousands of Acres)				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
8A Pristine					
<u>Existing</u>					
P&SI NF	0	0	0	0	0
AR NF	0	0	0	0	0
<u>Recommended</u>					
P&SI NF	0	0	0	0	0
RG NF	6	6	6	0	0
8B Primitive					
<u>Existing</u>					
P&SI NF	179	145	139	97	18
AR NF	36	36	36	36	36
<u>Recommended</u>					
P&SI NF	106	35	54	0	0
RG NF	18	17	17	0	0
8C Semiprimitive					
<u>Existing</u>					
P&SI NF	79	112	119	159	240
AR NF	4	4	4	4	4
<u>Recommended</u>					
P&SI NF	14	51	151	0	0
RG NF	102	107	107	0	0
8D Transition					
<u>Existing</u>					
P&SI NF	0	0	0	1	0
AR NF	0	0	0	0	0
<u>Recommended</u>					
P&SI NF	0	0	0	0	0
RG NF	0	0	0	0	0
P&SI NF - Pike and San Isabel National Forests AR NF - Arapaho and Roosevelt National Forest RG NF - Rio Grande National Forest					

TABLE IV-13
Wilderness Allocation By Alternative

<u>AREA</u>	<u>ALTERNATIVE</u>				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Existing Wilderness					
Pike & San Isabel	257,420	257,420	257,420	257,420	257,420
Arapaho Roosevelt	40,274	40,274	40,274	40,274	40,274
Recommended Suitable					
Buffalo Peaks	36,060	0	56,950	0	0
Greenhorn Mtn	22,300	0	22,300	0	0
Sangre de Cristo					
Pike & San Isabel	61,657	86,000	86,000	0	0
Rio Grande	125,512	130,700	130,700	0	0
Spanish Peaks	0	0	19,570	0	0
Lost Creek	0	0	20,723	0	0
Total Pike & San Isabel	377,437	343,420	462,963	257,420	257,420
Total Rio Grande	125,512	130,700	130,700	0	0
Total Arapaho/Roosevelt	40,274	40,274	40,274	40,274	40,274
Total in Plan	543,223	514,394	633,937	297,694	297,694

SUITABILITY EVALUATIONS

Wilderness Study Areas and Further Planning Area

The suitability analysis for the four Wilderness Study Areas and the Further Planning Area considered the capability, availability and need as three major criteria for the suitability evaluation. These criteria are defined in Chapter II. The following is a summary of the suitability evaluation for each of the Wilderness Study Areas and the Further Planning Area.

Buffalo Peaks WSA

Is the area capable of wilderness designation?

Both physical characteristics and manageability of the area were evaluated. The Wilderness Attribute Rating for Buffalo Peaks is 18 which is below the average rating of 21.9 under the proposed action in the RARE II Final Environmental Impact Statement of January 1979.

The minerals potential may create needs for access and uses incompatible with maintenance of the wilderness environment. The continuation of nonwilderness management is compatible with the capability and protection of the resources. Although conflicts are present, most can be avoided by boundary adjustments.

Is the area available for wilderness?

Past activity and estimated potential indicates that the area may be capable of producing mineral resources.

A determination of wilderness suitability will withdraw the area from mineral entry and leasing and permit the exercise of existing rights. Development of mining claims and mineral leases subject to valid existing rights established prior to January 1, 1984 will be conducted in compliance with Forest Service regulations designed to protect the wilderness resource. A nonwilderness determination will result with the mineral resources being managed the same as on other National Forest lands.

Local demand for fuelwood in the Leadville area is approximately 2,000 cords per year. This demand has increased significantly as a result of increased cost of petroleum products for heating. The commercial forest land within the Buffalo Peaks WSA is needed to help meet this demand.

Buffalo Peaks WSA has the potential for increasing water yield by 2,810 acre-feet per year. This potential increase is important for domestic and agricultural users both locally and downstream.

Competing wildlife needs include winter range habitat maintenance and improvement and maintenance of habitat diversity. Habitat improvement and maintenance are required to meet the projected wildlife needs on the Pike and San Isabel National Forest. The need for winter range management is increasing due to the encroachment by private land development on winter range located on private land.

Is the area needed for wilderness?

The Pike and San Isabel National Forests contain 257,420 acres of wilderness. In addition, other wildernesses with approximately 298,800 acres are adjacent to the Forest.

Approximately 15,200 acres of the WSA are in Lake County which encompasses an area of about 243,000 acres, 72 percent is federally owned and 16 percent is designated wilderness. A wilderness designation for Buffalo Peaks would add another six percent to the total wilderness acreage in Lake County.

The Statewide Comprehensive Outdoor Recreation Plan and Lake, Chaffee, and Park County Comprehensive Plan goals do not reflect a need for additional wilderness in this area.

The WSA is not needed to improve the representation of landforms and ecosystems in the National Wilderness Preservation System as those within the Buffalo Peaks area are common to other existing wildernesses. No threatened or endangered plant or wildlife species have been identified. No vegetative or wildlife species have been identified in the area that require a wilderness environment for survival.

Greenhorn Mountain WSA

Is the area capable of wilderness designation?

Both physical characteristics and manageability of the area were evaluated. The Wilderness Attribute Rating for Greenhorn Mountain is 19 which is below the average rating of 21.9 under the proposed action in the RARE II Final Environmental Impact Statement of January 1979.

The area has been managed for dispersed nonmotorized recreation, wildlife, and water yield in the past. The continuation of this management is compatible with the capability of the resources. Management of the area as wilderness would also be compatible with resource capability.

The WSA has evidence and a history of the occurrence of large fires. The potential for damage by insects and disease is moderate. The effect of these factors on protection is moderate although fire protection is a serious concern of people living along the base of the mountains. Either wilderness management or the continuation of nonwilderness management is compatible with protection of the resources and resolution of these concerns.

The minerals potential may create needs for access and uses incompatible with the maintenance of the wilderness environment. None of the area would be available for leasing under the mineral leasing recommendations with the suitable alternative.

Is the area available for wilderness?

Past activity and estimated potential indicates that the area may be capable of producing mineral resources.

A determination of wilderness suitability could withdraw the area from mineral entry and leasing and permit the exercise of existing rights, subject to stipulations which would not prohibit but would have an effect on utilization of the resources. The exercise of these rights may result in activities not compatible with maintenance of the wilderness environment. A nonwilderness determination will result in the mineral resources being managed the same as on other National Forest lands.

Through the land management planning process 2,700 acres of existing deer and elk winter range have been identified within the Wilderness Study Area. Much of this habitat needs improvement and maintenance to meet projected wildlife needs but the predominance of steep slopes limit the feasibility for improvement.

The impact of not having the commercial forest land available for wood production would not have a dramatic impact on dependent local industries or communities.

The effect of the suitable alternative on mineral leasing would be to reduce the area available for leasing by 36,060 acres.

The Greenhorn Mountain WSA has the capability for increasing water yield by 600 acre-feet per year. This potential water yield increase is important for domestic and agricultural users both locally and downstream. However, the steep slopes and many rock outcrops severely limit management opportunities including water yield improvement and would greatly increase the cost of intensive management activities.

The private land within the area has a low potential for adverse effects as it is located near the WSA boundary.

The current nonmotorized recreation opportunities would continue under the suitable alternative and would continue under the unsuitable alternative depending upon the selected management prescriptions to be applied.

Is the area needed for wilderness?

The Pike and San Isabel National Forests contain 257,420 acres of wilderness. In addition, other wildernesses with approximately 298,810 acres are adjacent to the Forest.

However, wilderness is not readily available to the population of southeastern Colorado. The Collegiate Peaks and Great Sand Dunes Wildernesses are both about 2½ plus hours driving time from Pueblo. The eastern boundary of this WSA is about 1 hour driving time from Pueblo. The WSA would improve the geographic distribution of units of the National Wilderness Preservation System in the southeastern Colorado area.

The Statewide Comprehensive Outdoor Recreation Plan for Region 7 recommends the Forest Service place increased priority on picnicking and four-wheel drive opportunities. Due to the steep terrain, this WSA is not conducive to providing for this need. There is no apparent conflict between either alternative and the Huerfano and Pueblo County Plan goals.

The WSA is not needed to improve representation of landforms and ecosystems in the National Wilderness Preservation System as those within the Greenhorn Mountain area are common to other existing wildernesses. The WSA provides existing and potential habitat for the greenback cutthroat trout which is federally classified as a threatened species. Potential habitat for the peregrine falcon, which is federally classified as an endangered species, is also found within the WSA.

Spanish Peaks WSA

Is the area capable of wilderness designation?

Both physical characteristics and manageability of the area were evaluated. The Wilderness Attribute Rating for Spanish Peaks is 16 which is below the average rating of 21.9 under the proposed action in the RARE II Final Environmental Impact Statement of January 1979.

The private inholdings, mineral potential, and susceptibility of the WSA to external impacts may severely affect the ability of the Forest Service to manage the area as an enduring wilderness resource. This severity is increased by the fact that these factors involve private legal rights. Although the existing area has moderate to high wilderness attributes, it is questionable if these attributes can be maintained on the entire area.

Is the area available for wilderness?

Past activity and estimated potential indicates that the area may be capable of producing mineral resources.

A determination of wilderness suitability will withdraw the area from mineral entry and leasing and permit the exercise of existing rights, subject to stipulations which would not prohibit but would have an effect on utilization of the resources. The exercise of these rights may result in activities not compatible with maintenance of the wilderness environment. A nonwilderness determination will result in the mineral resources being managed the same as on other National Forest lands.

The effect of the suitable alternative on mineral leasing would be to reduce the area available for leasing by 19,600 acres.

Vegetation manipulation is needed to help control insects and disease on areas where it is feasible. With present technology, this is generally limited to slopes of 45 percent or less. This control is important from an integrated pest control aspect on both National Forest lands and lands of other ownership.

Spanish Peaks WSA has the potential for increasing water yield by 923 acre-feet per year. This potential increase is important for domestic and agricultural users both locally and downstream.

Competing wildlife needs include winter range habitat maintenance and improvement and maintenance of habitat diversity. This habitat needs improvement and maintenance to

meet the projected wildlife demands on the Pike and San Isabel National Forests.

The need for winter range management is increasing due to the encroachment by private land development on the winter range located on private land.

Is the area needed for wilderness?

The Pike and San Isabel National Forests contain 257,420 acres of wilderness. In addition, other wildernesses with approximately 1,400,000 acres are located within 150 miles of this WSA.

However, wilderness is not readily available to the population of southeastern Colorado. The Collegiate Peaks and Great Sand Dunes Wildernesses are both about 2½ plus hours driving time from Pueblo. The northern boundary of this WSA is about 1½ hours driving time from Pueblo. The suitable alternative will help provide for this need. However, through the land management planning process it was determined that this need could be better met by the Sangre de Cristo and Greenhorn Mountain WSA's.

The Statewide Comprehensive Outdoor Recreation Plan does not reflect a need for additional wilderness in this area. There is no apparent conflict between either the suitable or unsuitable alternatives and the goals of the Huerfano and Las Animas County Master and Development Plan goals.

The WSA is not needed to improve the representation of landforms and ecosystems in the National Wilderness Preservation System as those within the Spanish Peaks area are common to other existing wildernesses. No threatened or endangered plant or wildlife species have been identified. No vegetative or wildlife species have been identified in the area that require a wilderness environment for survival.

Sangre de Cristo WSA

Is the area capable of wilderness designation?

Both the physical characteristics and the manageability of the area were evaluated. The Wilderness Attribute Rating for Sangre de Cristo WSA is 24 which is well above the average rating of 21.9 under the proposed action in the RARE II Final Environmental Impact Statement of January 1979.

Management for wilderness with the present WSA boundary may create conflicts with use of patented mining claim inholdings. These conflicts can be reduced with the modified boundary and no new conflicts would be created under the unsuitable alternative. Three topographically isolated tracts south of Medano Pass on the eastern side of the WSA will be difficult to manage as wilderness due to their small size, isolation, and proximity to lands with detracting uses and activities outside the WSA. Also, portions of the WSA will be difficult to manage as wilderness because they project from the main body of the area or are isolated by private inholdings. The manageability will be improved with the modified boundary alternative as these unmanageable areas will be eliminated from the area determined suitable for wilderness. No new conflicts will be created with the nonwilderness alternatives.

Is the area available for wilderness?

Past activity and estimated potential indicates that the area may be capable of producing mineral resources.

Potential competing demands for mineral resources will affect and be affected by land management allocations for this area. The effect of a determination of wilderness suitability, with either the suitable or suitable with modified boundary alternative would be to withdraw the area from mineral entry and leasing and to permit the exercise of existing rights, subject to stipulations which would not prohibit but would have an effect on utilization of the resources. The exercise of these rights may result in activities not compatible with maintenance of the wilderness environment. The effect of an unsuitable determination will be to manage the mineral resources the same as on other National Forest lands as they are now being managed.

The suitable alternative would place approximately 689 acres of patented lands on the Rio Grande National Forest within the area determined suitable for wilderness, of which 290 acres are high priority for acquisition. The suitable with boundary modification alternative would reduce the private lands to 519

acres but still include the high priority tracts. These two tracts will still be high priority for acquisition with the unsuitable alternative.

The suitable alternative would place approximately 140 acres of patented lands on the San Isabel National Forest within the area determined suitable for wilderness. The suitable with boundary modification alternative would eliminate these lands from the area determined suitable for wilderness. The unsuitable alternative will have no new effects on these private lands.

The selection of the suitable alternative would preclude the use of the productive forest land to help meet the need and demand for high quality commercial forest products. Under the suitable with modified boundary alternative 7,000 acres of productive forest land with slopes less than 45 percent with a long-term sustained yield of 3.0 MMBF per year would be available. The unsuitable alternative would allow utilization of this resource with a long-term sustained yield of 5.8 MMBF on productive forest lands on slopes less than 45 percent.

The Sangre de Cristo WSA has the potential for increasing water yield by 3,000 acre-feet per year with the unsuitable alternative and by 2,300 acre-feet per year with the suitable with modified boundary alternative. This potential increase is important for domestic and agricultural users both locally and downstream.

Competing wildlife needs include winter range habitat maintenance and improvement and maintenance of habitat diversity. This habitat needs improvement and maintenance to meet the projected wildlife demands on the Pike and San Isabel National Forests. The need for winter range management is increasing due to the encroachment by private land development on the winter range located on private land.

Is the area needed for wilderness?

The Pike and San Isabel National Forests contain 257,420 acres of wilderness. In addition, other wildernesses with approximately 2,400,000 acres occur within 150 miles of this WSA.

However, wilderness is not readily available to the population of southeastern Colorado. The Collegiate Peaks and Great Sand

Dunes Wildernesses are both about 2½ hours driving time from Pueblo. The eastern boundary of this WSA is about 1½ hours driving time from Pueblo. The suitable or suitable with modified boundary alternative will help provide for this need.

The WSA is not needed to improve the representation of landforms and ecosystems in the National Wilderness Preservation System as those within the Sangre de Cristo WSA are common to other existing wildernesses. No threatened or endangered plant or wildlife species have been identified. No vegetative or wildlife species have been identified in the area that require a wilderness environment for survival.

Lost Creek FPA

Is the area capable of wilderness designation?

Both the physical characteristics and the manageability of the area were evaluated. The Wilderness Attribute Rating for the Lost Creek FPA is a low rating of 14 which is well below the average rating of 21.9 under the proposed action in RARE II. This rating is for the remaining portion of the Further Planning Area after the Colorado Wilderness Act of 1980 removed the major portion of the original area which was rated in RARE II.

The continuation of nonwilderness management is compatible with the protection of the resources. Natural integrity and apparent naturalness reflected in the WARS rating indicate the level of incompatible evidences of man's past activities including roads, timber harvest, and planted areas. The relatively low rating in opportunity for solitude and primitive recreation do not indicate outstanding opportunities. Supplemental attributes are only average. The area is manageable as wilderness.

Is the area available for wilderness designation?

The estimated potential indicates the area is capable of producing significant outputs of nonwilderness resource benefits.

The recreation capacity levels for a nonwilderness dispersed recreation experience opportunity is significantly higher than could be provided under a wilderness recreation experience opportunity.

Encumbrances on the land are significant in that the State has reserved mineral rights on 3,840 acres in the core of the area.

Is the area needed for wilderness?

This area adjoins the 106,000 acre Lost Creek Wilderness and is within three miles of the 73,000 acre Mount Evans Wilderness. The Pike and San Isabel National Forests include 257,420 acres of wilderness at this time and 184,800 acres of wilderness study areas currently under consideration. In addition, there are approximately 298,800 acres of wilderness adjoining the Forest.

The Further Planning Area is not needed to improve the representation of landforms and ecosystems in the National Wilderness Preservation System. No vegetative or wildlife species have been identified in the area which require a wilderness environment for survival. Also, there are no known threatened or endangered species in the area.

The area would not add substantial wilderness recreation use capacity to the locale nor provide a unique or outstanding opportunity.

FISH AND WILDLIFE

Summary of Changes Between Draft and Final EIS

This section has been revised to clarify some items of concern which resulted from both Forest Service and public review of the Draft EIS and Proposed Forest Plan. New analysis was done of current habitat conditions, wildlife and fish habitat requirements, and the effects of management practices and the various alternatives on habitat quality. As a result, the following effects have changed under all alternatives: acres of habitat improved, amount of structural fish and wildlife habitat improvement, impacts on Management Indicator Species habitats, habitat diversity levels and habitat effectiveness.

Wildlife Habitat Improvement

Improvement of wildlife habitats will be attained primarily through silvicultural activities, improved range management, prescribed fire and other vegetation treatment practices. When

wildlife habitat protection and improvement is emphasized (Management Areas 4B and 5B) such practices will be specifically designed to improve habitat for wildlife. Commercial timber sales will be designed to meet wildlife habitat needs. A large portion of the improvements are to be accomplished through coordination with other resources, (e.g. timber harvesting, reforestation, range improvements and recreation and travel management. Prescribed fire will be used in various situations to prepare a seedbed for desired plant species, improve forage vigor and productivity, provide more available nutrients to existing perennial plants, and to set back natural succession to earlier seral stages. Table IV-14 displays the acres of wildlife habitat improvement under each alternative. Table IV-15 displays the number of fish and wildlife habitat improvement structures to be built annually.

TABLE IV-14
ACRES OF WILDLIFE HABITAT IMPROVED ANNUALLY
 (MAcres)

<u>Alternative</u>	<u>Current 1980</u>	<u>1981- 1985</u>	<u>1986- 1990</u>	<u>1991- 2000</u>	<u>2001- 2010</u>	<u>2011- 2020</u>	<u>2021- 2030</u>
A	3.2	7.4	7.4	10.6	9.6	10.1	9.6
B	3.2	3.5	3.5	4.9	4.1	3.7	3.7
C	3.2	6.5	6.5	7.2	5.4	5.4	6.1
D	3.2	6.4	6.4	5.2	5.0	5.5	5.7
E	3.2	.8	.8	1.2	.8	.9	1.1

TABLE IV-15
Annual Wildlife and Fish Structural Habitat Improvement
Structures

<u>Alternative</u>	<u>Wildlife Structures</u>	<u>Fish Structures</u>
A	83	60
B (Current)	50	40
C	63	54
D	50	24
E	45	10

Alternatives A and C provide for significant wildlife habitat improvements. Alternative B continues the current program. Alternative D provides for much vegetation treatment, but a smaller percentage of the acres treated would be primarily for habitat improvement purposes than would be the case under Alternatives A and C. Alternative E provides for very little wildlife habitat improvement.

Management Indicator Species

Projected habitat capability trends of Management Indicator Species were evaluated by species group and alternative, and

are displayed in Table IV-16. Overall, Alternatives B, D and E would not significantly change the current habitat capability trend for most species groups. Alternatives A and C would significantly increase habitat capability for several species groups. This is primarily because, under these two alternative, more vegetative treatment projects are designed specifically to improve wildlife habitat, with other resource outputs (such as wood fiber and livestock forage) being secondary benefits.

TABLE IV-16
HABITAT CAPABILITY TREND OF MANAGEMENT INDICATOR SPECIES GROUPS

Species Group	Alternative				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Big Game	+	0	+	0	0
Small Game	+	0	+	0	-
Furbearers	+	0	+	0	0
Raptors	+	0	+	0	0
Woodpeckers	0	0	0	-	0
Passerine Birds	0	0	0	0	0
Other Mammals	+	0	+	0	0
Fish	+	0	+	-	-
Threatened, Endangered Species	+	+	+	+	+
Rank	<u>1</u>	<u>3</u>	<u>2</u>	<u>5</u>	<u>4</u>

- Downward Trend

+ Upward Trend

0 Not more than a 5% change from existing habitat capability

Deer and Elk Winter Range

Table IV-17 displays winter range habitat capability for deer and elk by the end of each period under each alternative. Alternatives A, C and B provide for increases of 49%, 39% and 36% respectively. All alternatives would increase habitat capability over the current level.

TABLE IV-17
DEER & ELK WINTER RANGE HABITAT CAPABILITY AT THE END OF EACH PERIOD
(Thousands of Animals; 80% are deer, 20% are elk)

Alternative	Current 1983	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
A	14.9	14.9	15.8	16.7	18.5	20.3	22.2
B	14.9	14.9	15.5	16.1	17.3	18.5	19.7
C	14.9	14.9	15.6	16.3	17.8	19.2	20.7
D	14.9	14.9	15.2	15.6	16.3	17.0	17.7
E	14.9	14.9	15.2	15.5	16.1	16.7	17.4

The differences between alternatives results from a different number of acres being treated.

Winter range habitat improvement treatments will primarily be done to increase the quality and quantity of available forage, while at the same time protecting adjacent hiding and thermal cover. Forage quality will be improved primarily by cutting overstory trees and using prescribed fire on sites where desirable shrubs, grasses and forbs will increase in quantity and vigor. Range management practices on lands used by big game will provide for forage plant vigor, livestock use, and wildlife use. Where the big game winter range management emphasis prescription applies, available forage needed to achieve deer and elk populations identified in the Statewide Comprehensive Wildlife Management Plans will be allocated to deer and elk, and remaining forage production will be available for livestock use. Managing for sustained levels of both quality habitat and big game populations will result in higher big game related recreation potential.

Habitat Diversity

The conditions limiting desired habitat diversity (poor forest structural stage representation, few habitat types, poor distribution of different habitat types and seral stages and poor regeneration of various habitat types) would be changed significantly under each alternative except in Alternative E.

Increased habitat diversity would result from implementing Alternatives A, B, C or D and decreased diversity would result under Alternative E. Increased diversity would be best under Alternatives A and C, as under these alternatives more habitat improvement projects would be located in diversity units which have the lowest diversity ratings.

Silvicultural treatments, rangeland treatments to improve forage, prescribed fire, and water developments are the primary practices which will be used to increase habitat diversity.

Habitat Effectiveness

Habitats are most effectively used by wildlife when wildlife is not disturbed by human activities. The total area available to human use by roaded access is an indication of effective wildlife habitat. Average annual miles of road construction and reconstruction under each alternative is given in Table IV-18. The most road mileage would be added and improved under Alternative A or C, and very little construction and reconstruction would occur under Alternative E. Wildlife habitat effectiveness would be highest under Alternative E, and lowest under Alternative A and C. Under all alternatives all new and reconstructed arterial roads will be left open, as will 10 percent of the new and reconstructed collector and local roads. After an average of five years, use for silvicultural

treatments, about 90 percent of new and reconstructed local roads will be closed and managed in Level 1 maintenance status. Short term impacts on several wildlife species may be disruptive, but long-term negative effects will be very low due to return of activity conditions similar to former, unroaded conditions. Road management direction is given in the Forest Direction and Management Area Prescriptions in Chapter III of the Forest Plan, under the heading Transportation System Management.

TABLE IV-18
Average Annual Miles of Road Construction and Reconstruction
By Alternative

Alternative	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Miles	32	24	30	23	5

Fish Habitat

The effects of the various alternatives on fishery resources depend on the level of activity of Forest management practices and Forest uses that affect fish habitat, coordination of fish habitat management objectives with other resources, fish habitat improvement programs, and implementation of Forest Direction which protects fish habitat.

The following criteria were used to evaluate the alternatives for their impact on fish habitat:

Sediment - Sediment production from road building, roads and timber harvest would be the primary effect on fish habitat on the National Forest. Sediment can have an adverse effect on trout habitat including spawning habitat and food production.

Livestock grazing systems - Intensive grazing systems such as deferred rotation and rest rotation generally provide for better streamside vegetation conditions and streambank stability than does season-long grazing.

Fish habitat improvement - Fish habitat improvement can be accomplished directly through habitat improvement projects and indirectly through coordination of fish habitat objectives with other resource activities. Simple log and rock dams, rock deflectors, boulder placement, rip-rap, and streamside vegetation manipulation (seeding, planting, and cutting) will be used (Table IV-15). Such treatments can improve the quality of pools (for cover, especially during low flows and overwinter), and spawning beds, stabilize banks, and provide better angler access.

Alternatives A and C would result in a higher amount of road construction and reconstruction and therefore, higher potential

sediment increases in National Forest streams. Road location, road type, and streamside vegetation management are measures that can be taken to mitigate possible adverse impacts. Alternative A and C provide for the most structural fish habitat improvement and Alternative E the least amount of habitat improvement.

Threatened and Endangered Species

The Forest Service will not, under any alternative, authorize fund, or carry out any action to jeopardize the continued existence of any Federally or State listed T&E species, or result in the destruction or adverse modification of legally designated critical habitat for such species.

Threatened and endangered species habitats will be maintained and protected under all alternatives. Activities which have potential to positively affect threatened and endangered species habitat will be evaluated on a project basis according to Management Direction, Standards and Guidelines given in the Forest Plan. The level of threatened and endangered habitat improvement would be highest in Alternative A and least in Alternatives B, D, and E.

Some streams have been identified for greenback cutthroat trout reintroduction and additional streams will be evaluated for their potential in the recovery of this species. Reintroduction of peregrine falcon to historic nest sites will be done on the planning unit as birds become available. Management on lesser prairie chicken habitat of the Comanche National Grassland will be to improve the habitat conditions required by this species.

Consequences of Fish and Wildlife Management

Wildlife management activities generally have consequences on nonwildlife resources. Where wildlife benefits are derived mostly as a result of specific timber or range management work, consequences can be found under the discussion of those particular resource elements elsewhere in this chapter. Although there is some duplication of the timber and range discussions, this section will focus mainly on consequences resulting from those practices specifically designed for wildlife management purposes. These include prescribed burning, mechanical treatments and structural improvements.

Vegetation. Vegetation treatment practices interrupt the process of natural succession and provide for earlier seral stages than would not otherwise prevail. These have the effect of altering vegetation composition, increasing the proportion of browse species, enhancing area diversity, and creating additional "edge" along the boundaries of project areas. Such practices can prevent timber stands from reaching overmature

stages that often result in losses to insect and disease infestation. Alternatives A, C and D have the greatest level of treatment.

Other methods of managing for wildlife may involve intentionally allowing natural succession to continue with the objective of producing old growth stands. Although areas of overmature timber may be necessary for certain wildlife species, the resulting stands tend to be vulnerable to insect and disease infestation. When prescriptions provide for old growth stands, for trees to be left as cover for wildlife, or migration corridors, the timber volume that can be removed from these areas is somewhat less than could be harvested by applying prescriptions for maximum timber production. Managing to provide for adequate wildlife hiding cover may also result in slight reductions in timber harvest levels.

In nonforested areas, vegetation treatment practices may destroy less desirable vegetation either by physically removing plants from the soil (e.g. chaining) or by creating conditions which prevent further growth of less desirable species (e.g. prescribed burning). These practices can encourage the growth and composition of species more favorable to wildlife.

Recreation. Vegetation treatments and associated access development activities may affect recreation opportunities by visually modifying the area and creating a more developed condition. This may change recreational capacity and use and correspondingly decrease solitude. When roads are built to facilitate vegetation treatment activities, improved accessibility may result in increased motorized use, both on and off roads, although most newly constructed roads will be closed on completion of the use for which they were originally constructed.

Since a primary objective of fish and wildlife habitat improvement is to provide high quality wildlife and fish related recreation opportunities, many additional recreation benefits will occur from habitat improvement projects. Wildlife recreation opportunities which are dependent upon the levels of viable animal populations include big game hunting, small game hunting, fishing, and viewing and photographing wildlife.

Structural improvements such as log and rock structures in streams increase stream depth and tend to increase fish population. Riparian developments provide additional nesting habitat for waterfowl, shorebirds, and amphibians as well as feeding sites for numerous song birds. These and other structural developments such as small game food plots or hiding cover, increase opportunities for viewing wildlife, and enhance fish and wildlife related recreation opportunities.

Visual Resources. Visual quality of natural landscapes is affected by habitat management activities. Vegetation treatment

accomplished by mechanical means, prescribed burning, and timber harvest often result in noticeable short-term alterations in the natural landscape by imposing unnatural contrast, line, color, or texture or the viewed setting. However, the long-term effect of maintaining landscape diversity (i.e., preventing the development of vast areas of the same age and size class) and promoting healthy, vigorous stands of timber, shrubs and grasses should actually improve visual quality in many areas over time. Mitigation measures spelled out in the Visual Resources management activity of the Forest Direction provide for maintaining visual impacts within acceptable limits.

Some specific wildlife and fish habitat improvement structures tend to enhance visual quality. Well designed log and rock structures create visually pleasing pools in streams; snags left in limited numbers in cut-over timber stands tend to mitigate the visual impacts of the timber harvest activity.

Range. Habitat management affords a variety of opportunities to benefit the range resource. Vegetation treatment practices that increase the amount and diversity of vegetation can benefit the range resource if increased forage production is usable by domestic livestock.

Nevertheless, certain trade-offs between wildlife habitat and livestock forage must be considered. Key winter game range is often essential to the maintenance of healthy populations of deer and elk and must be kept in productive condition. Domestic livestock can share use of this winter range so long as sufficient residual forage remains to support wintering wildlife. When utilization standards which assure sufficient winter wildlife forage have been reached, mitigation measures call for moving livestock off the area. These mitigating measures can be found in the prescription for Management Area 5B.

Minerals. In 5B Management Areas access for mineral exploration is permitted but may be restricted during periods of big game use. Stipulations to protect wildlife would be part of each lease or permit. Roads may be closed or obliterated after their use for mineral activity.

Soils. As a general rule, the greater the intensity and extent of vegetation treatment, the higher the potential levels of soil erosion. Various measures are used to mitigate impacts of vegetation treatment on the soil resource. These are discussed in the Forest Direction under the Timber, Range and Soil Resource management activities. In some cases, the mitigation measures designed to reduce soil loss also benefit wildlife. For example, small check dams which reduce soil loss during periods of high run-off also benefit wildlife by enhancing riparian vegetation growth and providing water sources.

Historic and Cultural Resources. Vegetation treatment activities designed to improve wildlife habitat are often ground disturbing in nature, and have the potential to damage or destroy historic and cultural resources. These potential adverse effects will be mitigated through measures described under the Cultural Resource management activity in the Forest Direction. These measures require complete cultural resource surveys prior to ground disturbing activities and also require that known cultural resources be left undisturbed until they are determined to be insignificant. Significant cultural resources may have to be collected or excavated, or may have to continue to be left undisturbed.

RANGE

Summary of Changes Between Draft and Final EIS

In response to public comment a description of current and expected range conditions has been added.

-Range prescriptions have changed; management standards and guidelines are more specific.

-Range yield tables were revised to reflect better data.

Range Program

The range program includes: (1) the production of vegetation for protection of the watershed; (2) production of plants to provide cover and food for wildlife, insects and fish; (3) forage (food) for livestock; and (4) production of a wide variety of plants for the enjoyment and use by visitors to the Forests and Grasslands.

The range program is managed by developing and implementing Allotment Management Plans (AMP's). The AMP's define management objectives, actions to meet objectives, and evaluation and/or monitoring requirements. Stated AMP objectives can define needed changes in management for such things as controlling livestock numbers and distribution; allocating forage for big game; require vegetation treatment by mechanical practices, prescribed burning, or chemicals; plan control of noxious weeds, or plants poisonous to animals, and implementation of livestock grazing systems. Grazing permits are issued to livestock operators which authorize specific numbers, kinds, and class of livestock for a specific season of use.

Intensive grazing systems such as rest rotation or deferred rotation are more effective than season-long grazing in producing a greater quantity of desirable forage and improving or maintaining range condition. Most of the rangeland on the planning area is in satisfactory condition.

All rangeland in less than satisfactory condition will be improved as directed by the Federal Land Policy and Management

Act of 1976. The time required to improve deteriorated (unsatisfactory) range conditions will depend on the level of authorized grazing use, the intensity of grazing management, site productivity and the priority and availability of funds to manage these rangelands.

Effects on Range by Alternative

Table IV-19 shows permitted grazing use by alternative. Livestock grazing on the Forest will remain an important use under all alternatives except Alternative E. Differences in long-term effects on the range resource between alternatives except Alternative E are not significant on the Comanche and Cimarron National Grasslands. Outputs on the National Grasslands for all alternatives except Alternative E increase 10-15 percent over the planning period. On the Pike and San Isabel National Forests, Alternative A would increase the animal unit months (AUM) output by 37.5 percent over the planning period by increasing available forage through vegetation treatment and implementation of improved management systems. The other alternatives, except Alternative E, would produce little difference from current management. In the short-term effects, Alternatives A and D would increase outputs early in the planning period. The changes occur as a result of increased application of intensive grazing management practices under those two alternatives along with increased availability of forage through vegetation treatment activities.

Current permitted grazing use is about 205,000 AUM's (165,000 AUM's on the two National Grasslands and 40,000 AUM's on the two National Forests). The following table shows planned grazing outputs by alternative.

TABLE IV-19
PERMITTED GRAZING USE BY ALTERNATIVE
(MAUM's Per Year)

<u>ALTERNATIVE</u>		<u>DECADE</u>				
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	NF	42.0	46.0	50.2	52.0	55.0
	NG	170.5	174.3	178.2	181.1	185.0
B	NF	42.9	43.0	45.0	48.9	50.0
	NG	165.0	172.0	177.0	179.9	185.0
C	NF	41.2	43.0	45.0	45.0	45.0
	NG	162.0	172.0	178.0	180.8	184.6
D	NF	49.3	48.0	57.8	63.6	61.5
	NG	165.0	175.0	180.0	185.0	190.6
E	NF	19.6	17.0	25.8	31.3	32.3
	NG	66.0	69.0	71.0	72.0	74.0

National Forests (NF)
National Grasslands (NG)

Alternatives A, B, C and D provide for more land being managed under intensive grazing practices. The intensive grazing practices provide for a greater amount of structural improvements such as water developments; range improvement treatments such as reseeding, prescribed burning, rangeland pitting, etc.; and grazing system applications such as deferred rotation. These practices provide for improved range and forage conditions and, therefore, increased outputs in animal unit months.

The local livestock industry would be subject to severe adverse economic effects under Alternative E, the reduced budget alternative. Range conditions would probably deteriorate although the drastically reduced stocking might offset the reduced emphasis on management.

Under Alternatives A, B, C and D increasing levels of intensive management is expected to result in improved vegetation condition and a decrease in soil loss. Riparian areas in allotments under intensive management should achieve the designed upper mid-seral condition. Management direction and standards for range activities are given in Chapter III of the Forest Plan.

Consequences of Range Management

Recreation. Livestock grazing, bedding or watering in or around campgrounds, picnic grounds, or fishing areas may damage these resources. Fencing and grazing allotment plans will eliminate most of the potential for serious damage to developed sites and recreation areas. Range fences and movement of stock on and off allotments may cause temporary annoyance to hikers and campers, but these effects are minor.

Visual Resources. Range management activities will have a minor impact on the visual resource. Proper planning of location and design of improvements will mitigate adverse effects and can enhance the visual resource.

Wilderness. Grazing livestock within wilderness, if established prior to Congressional designation, is a permitted use. Grazing is also allowed within Wilderness Study Areas under the Colorado Wilderness Act of 1980. Intensive grazing management systems are allowed; however, forage production is not increased for domestic livestock. In wilderness the numbers of livestock already permitted are maintained where possible.

Fish and Wildlife. Use of intensive grazing systems such as deferred rotation and rest rotation could improve and protect riparian areas, and improve streambank stability. This would have a beneficial effect on all species that use riparian habitat.

Allotment Management Plans will be formulated in accordance with the Range Resource Management Activities in the Forest Direction (Chapter III of the Plan). Different grazing systems and range types determine use levels. Individual prescriptions carry a management objective which determines the resolution of conflicts between livestock and big game animals. For example, many areas critical to big game herds (winter range, calving areas, movement corridors, etc.) will be managed under Prescriptions 4B and 5B, which require conflict resolution in favor of wildlife. Areas managed under Prescription 6B require resolution in favor of livestock. The alternative maps indicate the areas under each prescription.

Effects of range management on threatened and endangered wildlife species will be insignificant. Currently there are not plant species on the Planning Area that are classified as threatened or endangered. Several plant species are being studied for possible classification. Known locations of species being studied are being protected until the studies are completed. If classification as threatened or endangered occurs, critical habitat will be determined and appropriate protection measures established. No adverse effects from range management are expected.

Timber. Range management activities have little or no effect on established stands of trees. The major effects involve regeneration. The increased forage which is available in cut areas attracts domestic and wild herbivores, and the young trees may be trampled or browsed. Forest Direction provides for protection of regeneration. If damage cannot be avoided by other means, areas of regeneration will be fenced. Under all alternatives the effects of range management on regeneration are expected to be minor.

Water. The major impacts from range on water quality result from livestock grazing and trampling in riparian areas.

Use of intensive grazing systems under Alternatives A, B, C and D would reduce effects of range activity to acceptable levels. Formulation of allotment management plans will be in accordance with Range Resource Management activities in the Forest Direction (Chapter III of the Plan). Adherence to allotment management plans, restricting grazing to areas where range conditions do not violate the allowable soil disturbance or recovery criteria, will eliminate most adverse impacts on water quality.

Minerals. Range management will not have a significant effect on the minerals resource. Certain site-specific conflicts may result when mineral proposals involve pastures or range improvement structures. Under all alternatives, no major effects are expected

Lands. Range use may cause conflicts with proposals for land use or exchange; however, these will be resolved on a site-specific basis. No significant effects are expected under any alternative.

Soils. Livestock grazing, when properly managed, has little adverse effect on soils. Range management concepts under any alternative would follow the Forest Direction which is designed to prevent overgrazing and damage to the watershed.

Many range management activities are designed to improve range conditions which also improve watershed conditions. Activities such as burning and seeding tend to increase water infiltration, plant production, and plant density which decrease soil erosion and improve water quality. Gully control activities may also be performed to improve the range and watershed conditions. Intensive grazing systems should improve watershed condition.

Areas treated to increase livestock forage may expose bare soil for a short period of time. Should an extreme rainfall event occur at this time, soil erosion could occur. However, with competing vegetation removed, grasses rapidly occupy these bare areas and protect the soils.

Soils in riparian areas in allotments will be susceptible to erosion and compaction in all alternatives. Wet soils can easily be compacted by concentrated use. Streambanks will be subject to erosion because of livestock trampling. These effects can be mitigated by application of intensive grazing systems. Riparian areas are given adequate protection in all alternatives. Site-specific impacts in riparian areas will occur under all alternatives. Allotment Management Plans will identify these impacts and implement mitigating measures.

Facilities. Livestock congregating along roads and trails can cause sloughing of banks and cut-and-fill slopes. Through proper design and location of roads and trails, reseeding of disturbed areas with nonpalatable forage species, and proper allotment management, the effects of range activity can be mitigated.

Protection. Air quality can be affected when range forage improvement is implemented by burning. These effects will be of short duration and will not be significant under any alternative.

The risk of wildfire arises from treatment of vegetation with prescribed burning. Proper fire plans and control will insure that the risk of fire damage from range burning is minimized in all alternatives.

Range effects on pest management should be beneficial. Control of noxious weeds will follow the guidelines under the Range Resource management activity section of the Forest Direction in Chapter III of the Plan. Adverse impacts will be minor. Long-term effects will be beneficial under all alternatives.

Historic and Cultural Resources. Historic and cultural resources could be damaged or destroyed by soil disturbing activities such as water development construction and vegetation treatment. Livestock grazing could also be destructive in areas where stock concentrate such as corrals and salting grounds.

Adverse effects on historic and cultural resources can be significantly reduced by planning to avoid significant archaeological and historical sites. Cultural Resource Management activities in the Forest Direction (Chapter III of the Plan) require completion of a cultural resource survey prior to surface disturbance. Discovery of significant sites would require extensive mitigation or relocation of a planned activity.

TIMBER

Summary of Changes Between Draft and Final EIS

Forested analysis area acreages were revised after a new forest-wide LMP data base was constructed in May, 1984. This modified the areas, by type and stand size, that were available for vegetation management.

Board foot/cubic foot ratios were computed, by stratum (Douglas-fir sawtimber, ponderosa pine poletimber, etc.), for all forested types. This significantly reduced board-foot outputs because all recomputed ratios were lower than those used for the DEIS.

Yield tables were modified (in FORPLAN) so that:

- The shelterwood method (both 2-step and 3-step) was available for the spruce/fir type;
- Rotation lengths and other standards were in accordance with the UFMPs;
- More alternatives for selection cutting were provided (30- year cutting cycles in addition to 20-year ones);
- Fuelwood yield tables were prepared in accordance with Prescription 7D standards;
- Clearcut tables were prepared for the Douglas-fir/white fir type for Prescription 9B; and
- All tables pertaining to regenerated vegetation were revised to account for timber defect, nonstockable area and UFMP standards and guidelines. Initial tables (DEIS) were prepared using version 1 of RMYLD model; all new tables utilized version 2 to consider defect and nonstockable area.

Costs were included for steep slopes (40%+ slopes) and FORPLAN was allowed to allocated them if economically efficient to do so. It did (70,000 acres in 240 years). In the DEIS, all steep slopes were categorically excluded.

Timber benefits and costs were reanalyzed and revised. In the DEIS, only two groups were used - ponderosa pine and all other species. In the FEIS, more species groups were used (Douglas-fir and ponderosa pine; lodgepole pine and aspen; spruce and fir).

Allocations were modified so that Alternative A reflected a better balance of vegetation treatment for wildlife habitat diversity, water yield, aspen harvest, etc.

Vegetation management in the form of commercial and noncommercial timber harvest and silvicultural treatment will have a significant effect on the environment. Many other resource outputs are interrelated with the management of forested vegetation. Commercial timber harvest is the most efficient method for managing forested lands.

There are several management practices within the even-aged and uneven-aged silvicultural systems. They are described in the following paragraphs:

Intermediate cutting is an entry into a stand between the time of its formation and its regeneration. In the context of this Plan, the intermediate cutting refers to commercial thinning. Very little commercial thinning is programmed in any of the alternatives because (1) with a large percent of the timber stands greater than 80 years old, there is little opportunity for effective commercial thinning because natural, unmanaged trees of 80 years and older are biologically not able to respond to and benefit from thinning; and (2) regeneration cutting contributes more to balancing the age class distribution. Intermediate cutting will be more important in later decades when regenerated, managed stands are available for entry.

Clearcutting removes all trees meeting utilization standards from a stand or portion of a stand in one entry. The objectives of using the clearcut method are: to create new even-aged stands, to create openings in the Forest to benefit other resource values, to protect adjacent stands from insects and disease. Clearcutting may be an appropriate method in all Forest types, but it is most applicable to aspen and lodgepole pine types.

Shelterwood cutting is an even-aged regeneration method requiring two or three entries to regenerate a stand. A portion of the old stand is left to provide seed and a sheltered micro-environment for natural regeneration. The final entry to

remove the last of the old stand is made after a new stand is established. Two or three step shelterwoods may be applied depending on initial stand density, windthrow hazard, and other site conditions

Selection cutting is an uneven-aged regeneration method used to propagate and manage a Forest stand when continuous Forest cover is desired. As used here, the selection method includes both single tree selection and group selection. The selection method is very difficult to apply properly due to regeneration requirements and diameter (age) class regulations. Therefore, it is generally not an efficient method to apply except in special situations. Some of those situations may occur in areas where vertical diversity or continuous tree cover is desired, such as in campgrounds or other developed recreation sites.

The fuelwood issue has created significant impacts on the Forest, particularly along or near the Front Range urban corridor. The present policy is that fuelwood for personal use requires a permit. Permits are issued for designated areas. The policy is to charge fair market value for all fuelwood. In general over the years ahead, nearly all of the fuelwood supply must come from green or live trees.

When the public is selecting live trees, it must be done under a managed situation so that the tree stands are improved, not decimated, hence the need for a permit system. The use of fuelwood does permit the intensive management of tree stands which otherwise are marginal economically. It permits the use of wood residues left over from logging and the use of trees from 5 to 7 inches in diameter as thinnings.

The management requirements related to the silvicultural prescriptions are included in Chapter III of the Forest Plan.

Effects of Timber Management on Other Resources and Activities

Timber management is included as a resource element in all alternatives. It provides a potential for direct and indirect effects in a number of other resource areas. The type and magnitude of the effects are related to the level of timber activity and the mix of management practices in each alternative

Vegetation - In general, effects are caused by timber management activities which reverse or slow successional trends. Regeneration cutting, for example, removes mature and overmature timber stands and creates suitable environmental conditions for a new, young stand to become established. Timber stand thinning provides optimum growing conditions which delays the onset of decadence associated with aging timber stands. Some timber management activities may speed successional trends - artificial reforestation, for example.

No less important is the effect of management prescriptions which do not allow or significantly restrict tree removal. Wilderness management prescriptions allow the ever-present processes of natural succession to be the dominant cause of changes in the Forest environment. The resulting climax tree stands are composed of slow growing, mature trees that suffer high levels of mortality due to insects, diseases and wildfires. These agents tend to cause widespread damage when large areas of forest are overmature and lack vigor. Once forest vegetation has been killed by these agents, younger stands develop and earlier successional stages become reestablished. Wilderness areas may also serve as "reservoirs" of insects and diseases that periodically spread to adjacent lands.

Soils - In the short term, soil erosion may increase and productivity may decrease. However, research has shown that most soil erosion is associated with road development rather than timber management practices. Productivity will not suffer a long-term decline if compaction and accelerated soil erosion are controlled.

Water - Water quality may suffer temporary degradation, primarily because road development may increase sediment production. Water yield can be increased with small patch clearcutting when applied to spruce/fir, aspen, lodgepole pine or Douglas-fir/white fir stands located on specified aspects at certain elevations. The size and orientation of created openings must also be carefully controlled.

Fuels - Existing stands have natural fuel loadings that are generally moderate to low. When timber management practices create activity fuels, the combined (total) fuel loading may need treatment according to specifications contained in Forest Direction.

Windthrow Hazard - The windthrow hazard in Forest stands can be influenced by timber management practices. In general, exposing trees to wind forces not previously experienced will result in increased levels of windthrow. Windthrow hazard can be controlled through the placement, size and shape of created openings, and limiting the exposure of residual trees.

Insects and Diseases - The population level of insects and diseases can be managed through the application of timber management practices. Generally, practices are used which increase stand health and vigor by providing optimum growing conditions and contributing to an improved resistance level. This strategy should reduce the risk of future insect or disease epidemics.

Wildlife Habitat - Timber management may affect a number of factors related to wildlife habitat. Wildlife isolation may be impacted by increased levels of human activity, diversity of species, and and size classes may be changed, and natural

successional trends may be altered. Many of these effects will be an objective of timber management on this Forest.

Fish Habitat - Fish habitat may be affected by timber management practices if streamflow or water quality is altered.

Air Quality - Timber management may cause a temporary degradation in air quality, although the main effect would be from prescribed burning to reduce activity fuels created by management practices.

Esthetic Values - The visual quality of natural conditions may be affected by timber management. However, specified visual quality objectives should not be exceeded and visual quality in sensitive areas can be enhanced. Management practices designed to regenerate aspen should help perpetuate scenic beauty by halting succession to conifer forests.

Forage Production - Timber harvests provide an increase in forage production that is available for use by domestic livestock and wildlife.

Recreation - Recreation opportunities may be influenced by timber management practices. Specifically, changes in road density and standards, vegetation removal and increased levels of human activity may change present recreational use patterns. The creation of more vigorous and healthy stands will have a positive effect on recreation opportunity over the longterm. Access development may improve motorized recreation while degrading primitive dispersed recreation.

Growth and Mortality - In general, timber management practices are designed to increase or maintain tree growth and to decrease tree mortality. The result is a higher net tree growth.

Stocking Levels - Stocking levels are controlled through initial reforestation levels, pre-commercial and commercial thinning, and partial cutting practices.

Tree Removal on Lands Not Suitable for Timber Production

Lands not suitable are typically in areas with steep slopes where road construction and management costs are high. Administrative and developed recreation sites (excluding winter sports sites) are also considered not suitable. The unsuitable lands were not used to calculate the allowable sale quantity or long-term sustained yield capacity. While these lands are not managed for timber production, tree removal may occur to meet other resource objectives. Any volume removed from lands classified as not suitable is not chargeable to the allowable sale quantity. Tree removal from unsuitable lands is appropriate under the following conditions:

- Salvage or sanitation of stands which are damaged by fire, windthrow, or other catastrophe, or which are in imminent danger from insect or disease attack.
- Cutting of trees for research to gain knowledge about tree growth, insect or disease organism, or the effect of such harvesting on other resources.
- Removal of trees to promote safety of Forest users such as hazard tree removal in camp and picnic grounds, administrative sites, and along roads open to the public.
- Tree cutting to meet specific habitat needs of threatened or endangered animal or plant species, or to improve and/or protect the habitat of other wildlife.
- Tree cutting to improve the scenic resource by opening scenic vistas or improving visual variety.
- Tree cutting to regenerate aspen to perpetuate the type for wildlife habitat, visual quality and scenic diversity.
- Removal of dead material for firewood, fence posts, poles, and props.
- Cutting of Christmas trees and removal of transplants.
- Harvesting timber to improve water yields when permanent openings are created. (No investment in reforestation practices will be made.)
- Creation of openings for powerlines, roads and other facilities.

Tree Removal on Suitable Lands

The goals and objectives of each alternative provide the basis for constraints used in the FORPLAN model which in turn determine the average annual live timber volume available for sale. Resource management objectives, the area of suitable land, and the silvicultural activities applied determines the volume produced. Table IV-21 displays the outputs of commercial timber sales by alternative. Live volume removed from suitable lands is both regulated and chargeable against the allowable sale quantity.

Alternatives B and D produce the greatest commercial volume in timber sales and fuelwood harvest, while Alternative E produces the least. Alternatives A and C provide for moderate levels of commercial timber sales and fuelwood harvest. Timber harvest is the basis for outputs and effects in other resource elements as well. Wildlife habitat and diversity are most directly affected. Water yield increase is largely dependent on vegetation management. Recreation is only indirectly affected

through accessibility. Range receives short-term benefits from temporarily increased forage in treated stands

Table IV-20 displays the area of forest land that would be treated in the first decade for each alternative.

TABLE IV-20
AREA OF COMMERCIAL TREATMENT IN THE FIRST DECADE

<u>Area Acres Treated</u> <u>Per Year</u>		<u>ALTERNATIVE</u>				
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Ponderosa Pine	Regen. <u>1/</u>	2550	5190	1200	400	0
	Interm.	110	0	0	0	0
Douglas-Fir	Regen. <u>2/</u>	3600	1500	1800	3000	0
	Interm.	0	0	0	0	0
Spruce/Fir	Regen. <u>2/</u>	1460	1140	2800	5400	510
	Interm.	380	1000	0	100	0
Lodgepole Pine	Regen. <u>3/</u>	1510	2200	2200	1710	0
	Interm.	260	400	0	210	0
Aspen	Regen. <u>3/</u>	370	500	200	4730	2870
	(Intermediate cuts not done in aspen)					
Total	Regen.	9490	10530	8200	15420	3380
	Interm.	750	1400	0	310	0
Total Treated		10240	11930	8200	15550	3380

1/ Regeneration accomplished by shelterwood and group selection cutting.

2/ Regeneration accomplished by shelterwood, small patch clearcut and group selection cutting.

3/ Regeneration accomplished by clearcutting only.

The overall effect of the alternatives is a more even and favorable distribution of vegetative age classes on the Forest. The current age class distribution is heavily skewed toward the older age classes (100 years or older). The result of improving the age class distribution is a healthier, more vigorous forest that would be less susceptible to insect and disease infestations and of greater benefit to wildlife.

Alternative D would produce the greatest volume of wood fiber products over the planning period. It would regenerate and manage more area in the early decades than other alternatives. Outputs would meet the predicted demand for wood fiber, and

managing more acres would improve wildlife habitat diversity and increase water yield.

Alternatives A and C would generate less total volume of wood fiber products over the planning period and would regenerate and manage less area than Alternative D. Outputs would meet the predicted demand for wood fiber. These alternatives would improve wildlife habitat diversity and increase water yield, but not at the level of Alternative D.

Alternative B would produce less volume of wood fiber products in the first decade than Alternative D. It regenerates and manages more area than Alternatives A and C, and less area than Alternative D. Outputs would meet the predicted demand for wood fiber. Alternatives A and B would improve wildlife habitat diversity and increase water yield to a greater extent than Alternatives C and E, and to a lesser extent than Alternative D.

Alternative E would produce the smallest volume of wood fiber products over the planning period. It regenerates and manages the least area of any alternative. Outputs would not meet the predicted demand for wood fiber, but rather would continue at the current production level. Alternative E would not improve wildlife habitat diversity or increase water yield over their current levels.

TABLE IV-21
OUTPUTS OF COMMERCIAL TIMBER SALES BY ALTERNATIVE
 (MMBF per year) ^{1/}

<u>ALTERNATIVE</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	26	36	40	42	42
B	29	43	43	43	43
C	35	35	35	35	37
D	67	67	69	69	69
E	11	35	35	35	35

^{1/} Volumes shown include chargeable volumes only (including lands managed for fuelwood production). Nonchargeable volume will also be produced (topwood, submerchantable poletimber, removals from unsuitable lands, etc.).

The demand projections for the Forest assumed a horizontal demand curve, which means that increases or decreases in timber volumes sold has no effect on timber prices. The rationale for this assumption is documented in the Forest planning records. Basically, it was determined that National Forest stumpage outputs were not great enough to affect a noticeable change in timber prices in the Forests' market area.

TABLE IV-22
LONG-TERM SUSTAINED YIELD CAPACITY

	<u>ALTERNATIVE</u>				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Million Board Feet Per Year	43	44	37	75	40

Long-term sustained yield (Table IV-22) is a reflection of acres being managed for wood fiber in each alternative. It is significantly higher in Alternative D than other alternatives because more area is brought into intensive management earlier in the planning period.

Potential adverse effects include increased sediment yield from harvested areas, disturbance from road construction, decreased visual quality, and wildlife and recreation disturbance during harvest. These effects are all directly related to the area harvested. The adverse effects are temporary, and when mitigation measures are applied, the effects are within acceptable limits.

All alternatives considered timber production on the most productive timber sites. Alternatives A, B and D include more treatments in less productive stands to improve wildlife habitat and for insect and disease control.

WATER

The timing and yield of runoff from the Forest can be managed by modifying vegetation and snowpack conditions. Two primary management practices are available to accomplish these modifications. They are structural controls such as snow fences and vegetation management. Both of these management practices increase runoff by reducing the amount of moisture lost to evaporation, transpiration, and sublimation. More water is available for runoff and increased streamflows can occur.

Research has shown that patch cutting in subalpine forests can increase water yields. Snow accumulation patterns are optimum when openings are: (1) less than eight tree heights in diameter; (2) protected from wind; and (3) interspersed so that they are five to eight tree heights apart. Due to the considerable length of time it takes for coniferous subalpine forests to grow to maturity, increased water yields from patchcutting can go essentially undiminished for perhaps 20 years or longer. When a forest is harvested in large clearcut blocks, or by selectively

cutting individual trees, overall water yield increases are far less than those attained if the same amount of timber volume is removed by patch cutting.

The water yield prescription was applied on the spruce/fir, lodgepole pine, and Douglas-fir timber types. The water yields are related to the amount of these three timber types that were treated. There had to be at least sixty percent of those three timber types in the poletimber and sawtimber size class at the end of each planning period in order to provide the necessary shelter for the water yield patch cuts.

Estimated water yield in thousand acre-feet annually is displayed in Table IV-23. Alternatives A and B produces the smallest increase in water yield compared to the other four alternatives. The average annual water yield increase over the 50 year planning period is only 745 acre feet. The smallest volume of timber is clearcut in this alternative. All sediment increases associated with water yield increases will be within the threshold sediment limits, i.e., sediment levels in streams will not be allowed to increase to the point where the channel stability is degraded.

TABLE IV-23
ESTIMATED WATER YIELD
(Thousand Acre Feet Per Year)

<u>ALTERNATIVE</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	1277	1278	1278	1278	1278
B	1277	1278	1278	1278	1278
C	1278	1278	1278	1278	1278
D	1279	1279	1280	1280	1281
E	1277	1278	1278	1279	1279

Increased timber and mining activities with their associated transportation systems and increased recreation use have the potential to adversely affect water quality. Alternative A provides for twice the amount of water resource improvement work compared with Alternative B. This work includes repair of watersheds currently yielding excessive sediment and mitigating possible adverse effects of planned resource activity.

TABLE IV-24
WATER RESOURCE IMPROVEMENT
 (Acres Treated/Year)

<u>ALTERNATIVE</u>	<u>DECADE</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
A	1200	1200	1200	1200	1200
B	575	575	575	575	575
C	1000	1000	1000	1000	1000
D	1000	1000	1000	1000	1000
E	575	575	575	575	575

Watersheds which do not meet water quality standards and those yielding excessive sediment have been identified and are listed in the Analysis of the Management Situation. All alternatives recognize and provide for improvement and protection of those areas. Water resource improvement work is also planned in areas where improvement will provide a positive benefit. Table IV-24 displays acres of land to be treated annually for water resource improvement by alternative.

Watershed improvement activities include seeding of logging roads, rangeland pitting, contour furrowing, check dams and other water holding or erosion reducing measures. Ever-increasing needs for water, particularly in areas of rapidly expanding populations, have made water production an important consideration. Opportunities to increase yields include timber cutting in spruce/fir and lodgepole pine stands above 9,000 feet elevation. Water yield outputs under the alternatives reflect the timber harvest activities in those stands. Other opportunities for water yield increases are the placement of retaining structures such as snow fences to capture blowing snow, vegetation treatment on noncommercial forest land, and providing for special uses such as impoundments on National Forest System lands. The methods of increasing water yield described above will have an effect on visual quality. The small openings required in the spruce/fir and lodgepole pine stands will improve vegetative diversity and benefit wildlife. Wetlands, also important to wildlife, are considered in Forest management direction of the Forest Plan and are similarly protected in all alternatives.

Effects on Wetlands and Flood Plains

There are wetlands and riparian areas in the Forest. They occupy less than one percent of the total Forest area. Riparian areas are defined as transition areas that occur between the aquatic ecosystem and the adjacent terrestrial ecosystem. They are characterized by certain soil characteristics and distinctive vegetation communities that require free or unbound water.

Wetlands are those areas that are inundated by surface or ground water with a frequency sufficient to support a prevalence of vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, sloughs, potholes, wet meadows and river overflows.

Riparian areas are of great importance in acting as filters to trap pollutants such as sediment and preventing them from reaching the aquatic ecosystem. Riparian areas also reduce the impacts of floods by providing areas where the flood waters can spread out thereby reducing their erosive velocities. Ox-bow ponds and lakes in floodplains are rich in life because they are rejuvenated, restocked and refertilized by periodic flooding.

The riparian and wetland areas provide a classic example of the ecological principle of "edge effect". Both density and diversity of plant and animal species tend to be higher in these areas.

Environmental consequences can be expected in riparian areas due to impacts from livestock, timber, minerals and facilities management.

Livestock grazing can cause bank erosion and pollution, as well as destroy habitat for small animals and birds. Forest Direction in the Plan requires that livestock grazing in these areas be at a level that will assure maintenance of the vigor and regenerative capacity of the riparian plant communities.

Timber harvest and associated roads can increase the sediment as well as reduce the buffering capacity of the land. Harvest methods will be either group or single tree selection with clearcutting allowed only in aspen. The purpose of harvesting within a riparian area is to perpetuate tree cover, provide healthy stands and improve wildlife diversity. Roads should be located outside riparian and wetland areas unless alternative routes have been reviewed and rejected as being more environmentally damaging. Mitigating measures include not paralleling streams, crossing streams at right angles, and locating crossings at points of low bank slope and firm surfaces. Vehicular traffic will be limited on roads and trails at times when the ecosystem would be unacceptably damaged.

Mining activities within wetland and riparian areas can destroy fish and wildlife habitat and cause pollution of streams and lakes. Measures designed to reduce these impacts include timely and effective rehabilitation of disturbed areas, sediment ponds, buffer strips and locating mineral processing activities outside of riparian areas.

Forest Direction standards and guidelines contained in the Forest Plan give specific direction for the management of these areas. Forest management activities in any wetland, riparian

area, and flood plain, will be designed to prevent long and short-term adverse impacts, in accordance with Executive Orders 11988 and 11990, the direction outlined in Forest Service Manual, sections 2526, 2527 and 2633, and in Management Prescription 9A in this Plan.

Management Prescription 9A in the Forest Plan provides direction for managing and protecting riparian areas. This direction is specific for all resources and uses, including requirements for limiting transportation systems and other facility development, limiting grazing activities, specific procedures for perpetuating riparian vegetation, special considerations for wildlife use, and requirements for stream channel stability.

MINERALS

Withdrawals of National Forest System lands from mineral activities under the 1872 mining and 1920 Leasing Laws differ by alternative. Alternatives A, B and C (no mineral entry and leasing in recommended Wilderness Areas) will have a significant effect on the availability of leasable energy and nonenergy resources which may occur in these areas. Alternatives D and E will not have a significant effect on the availability of mineral resources.

Mineral resources, energy and nonenergy, are considered valuable assets of public land. The location and extraction of the mineral resources are important for the future growth of the Nation and independence from the need to import these materials to meet our energy and other mineral needs. General direction in minerals area management is provided in the Forest Direction section of the Forest Plan. Appropriate mitigation measures are identified, and only a minimal amount of significant long-term effects are anticipated on the surface resources managed on National Forest System lands. All mining related operations will be conducted, insofar as feasible, to minimize adverse environmental impacts on National Forest System lands.

Demand for access to National Forest System lands for the purposes of mineral exploration and development is expected to continue to increase over the long term. Most System lands are available for mineral activities and requests for access must be processed in a timely manner. Proposals involving mineral activities are processed as prescribed by applicable laws, regulations, and policies (See Chapter III, Affected Environments, Mineral section).

Management requirements for minerals in the Forest Plan (Chapter III Management Direction) are based on statutory and regulatory direction for locatable, leasable, and salable minerals. Also considered are statutory and other management criteria for surface protection appropriate to the lands involved to prevent or control adverse environmental impacts. The mineral-related

management requirements (Forest Plan, Chapter III, Management Direction, pages III-52 through III-68 are presented in three categories to cover environmental impacts typically associated with exploration and development operations for the various mineral commodities.

The first category is Mining Law Compliance and Administration (Forest Plan, Chapter III Management Direction, pages III-53 through III-54 for locatable minerals. Access to lands open to operations under the General Mining Laws is a statutory right granted by Congress. The Forest Service reviews proposed plans of operations to insure that operations will meet Federal environmental protection standards. These standards include those for air and water as prescribed by Federal and State laws and regulations. In addition, the plan of operation must provide for prompt reclamation or restoration of disturbed lands, to the degree practicable, for the planned uses of the area.

The remaining two categories, Mineral Management -- Oil, Gas and Geothermal (Forest Plan, Chapter III Management Direction, pages III-54 through III-61) and Minerals Management -- Coal, Leasable Uranium, Nonenergy, Common Mineral Materials (Forest Plan, Chapter III, Management Direction, pages III-61 through III-68), cover leasable and salable minerals. For these two categories, reasonable access to Forest lands is also guaranteed once the discretionary decision is made to issue a lease, permit, or license allowing surface use and occupancy. Permits are issued by the Forest Service for initial geophysical prospecting (seismic operations for oil and gas, shallow drilling for geothermal temperature gradient measurement, and geologic investigations for solid minerals). Permits are for the land uses only and grant no rights to the permittees to the minerals involved. The Forest Service has total discretion for disposal of common (salable) varieties of mineral materials. The BLM issues all other leases, licenses, or permits for exploratory drilling and production of valuable leasable minerals.

BLM proposals to issue a license, permit, or lease for leasable minerals in National Forest System lands are forwarded to the Forest Service asking whether or not the lands are available for mineral exploration and development. If the lands are determined by the Forest Service to be available, standard and special stipulations necessary for the management of the surface resources are identified. Management direction for leasable minerals as to availability and surface resource management stipulations for lands available for leasing, are part of the management requirements (Forest Plan, Chapter III, Management Direction, pages III-55 through III-68.)

Recommendations for mineral leasing on available lands are based on whether oil and gas development activities could be implemented on those National Forest System lands and meet the management requirements for minerals in the Forest Plan. Recommendations for lease denials in lands that do not meet the criteria for leasing with surface occupancy or leasing with no surface occupancy will be made only after a site-specific analysis of the lease application area has been made. The mineral management requirements reflect surface resource protection and restoration requirements. A determination of wilderness suitability will withdraw the area from mineral entry and leasing and permit the exercise of existing rights, subject to stipulations which would not prohibit but would have an effect on utilization of the resources. A nonwilderness determination will result with the mineral resources being managed the same as on other National Forest lands.

Special areas, such as research natural areas and archaeological areas, can only be recommended for leasing without surface occupancy since disturbance of the surface resources would damage the special characteristics of the land for which they were classified.

Availability of unclassified lands for mineral leasing with surface occupancy is based on whether reclamation, following abandonment of the operation, can be accomplished within the uses and direction set forth in the Forest Plan.

Oil, gas, and geothermal resource exploration and development involve the construction and use of roads, pipelines, drill pads, and the ancillary facilities necessary for development, production, and transportation. The major on-site physical and biological impacts of these activities are soil erosion, water pollution, and air pollution. (See the Soils; Water; and Protection, Air Quality sections of this chapter.)

Other mineral and mineral materials exploration, development, and production will also have impacts associated with the construction and use of roads, powerlines, and other necessary ancillary facilities, overburden and waste removal and placement for surface or underground mining and concentrating mills. The major potential on-site physical and biological environmental impacts of these activities would be soil erosion and air and water pollution.

All operating plans will include the requirement that currently available technology be used to insure that operations conform to applicable Federal and State environmental protection standards.

Should mining operations under the 1872 Mining Law be approved in wilderness, there would be impacts upon the wilderness characteristics of solitude and on the pristine character of the land. The impact on solitude is limited to the duration of the mineral development activities. The duration of the impact upon the pristine character of the lands will last until natural vegetation and appearance are restored.

Exploration and development of privately owned minerals located on National Forest System lands will have impacts associated with all construction phases including such as that necessary for roads, pipelines, drill pads and ancillary facilities needed for development, production and transportation. The major potential on-site physical and biological impacts of these activities are soil erosion, water pollution, air pollution and disturbance of wildlife habitats, such as the lesser prairie chicken on the Grassland areas.

Generally, the rights of the mineral owners are governed by the terms of the acquisition documents (deed).

Most acts of Congress authorizing the acquisition of lands for national forest purposes provide for acceptance of title subject to a reservation of mineral or an outstanding mineral right. State laws generally recognize separation of the surface and subsurface into separate ownerships. Mineral ownerships may carry with them the right to use so much of the surface as may be necessary to carry on reasonable mining operations; however they may vary from the right to destroy or collapse the surface to no more than the right to place mine openings on the surface or remove oil and gas by directional drilling. The United States cannot defeat the rights of the owner of a reserved or outstanding mineral interest to remove the mineral deposits, but may prevent or challenge methods of operation not provided for in the deed separating the mineral interest. Such challenge may require legal proceedings to determine the rights of the parties.

Oil, Gas and Geothermal Leasing Recommendations

Recommendations for oil, gas and geothermal leasing activities are made on a site specific, case-by-case basis for all National Forest System lands on the Pike and San Isabel National Forests, except for Wilderness Areas.

Geophysical investigations include survey and data collection operations concerning the mineral resource. The Forest Service would issue geophysical investigation permits that include specific stipulations concerning this activity. The geophysical data collected would be made available to federal agencies and Congress for use in making future decisions.

Leasing with surface occupancy would permit a full range of exploration, development, and production operations.

Leasing with no surface occupancy would permit directional drilling or other techniques which will not disturb surface resource values for exploration, development, and production of operations from adjacent lands that are recommended for leasing with surface occupancy. Current technology and reasonable accessibility considerations limit these operations to lands within a one-half mile perimeter of areas leasable with surface occupancy.

Recommendations for lease denials or withholding of consent will be made only after a site-specific analysis of the lease application area has been done. General management direction and standards and guidelines are provided in the Forest Direction section of the Proposed Forest Plan for all mineral activities. In addition, the specific management requirements for individual management areas will guide the stipulations that will be attached to operating plans for leasing activities. Standard stipulations covering all forms of mineral activities are included in Appendix F of the Forest Plan.

Lands designated by Congress as Wilderness are withdrawn from leasing subject to the exercise of existing rights. The exercise of these rights may result in activities not compatible with maintenance of the wilderness environment. If lands are not designated as Wilderness by Congress, leasing recommendations that apply on unclassified National Forest System lands will apply.

Recommendations for leasing with no surface occupancy on special classified lands are the same for each alternative considered in detail. These lands include:

- Municipal watersheds
- Designated Natural Areas
- Designated Scenic Areas
- Eligible Wild and Scenic River Segment Corridors
- Geologic Areas
- Existing and Potential Ski Areas
(Regional Priority System Levels 1 and 2)

Oil and gas leasing recommendations on nonclassified lands are based on the following considerations:

Geophysical Investigations

- Allow using airlift or ground transportation methods.

Exploratory Drilling and Leasing With Surface Occupancy

- Lands in the 60 percent slope class or less.

-High to moderate probability of rehabilitation to a productive condition following disturbance.

Moderate to low erosion hazard
Moderate to high inherent soil fertility
Moderate to low geologic hazard (mass movement potential)

-Lands not considered as essential habitat for federally and/or state classified threatened or endangered species.

-Mostly good to marginal suitability (with some poor suitability where mitigation is conceivable) for occupancy without water quality degradation.

-Low to high visual sensitivity

Maintain at least a visual quality objective of retention

-High to moderate visual absorption capacity

-Accessible from contiguous nonwilderness land

Leasing With No Surface Occupancy

-Lands within one-half mile of the perimeter of areas available for leasing with surface occupancy

Withhold Consent or Recommend Denial

-Lands that do not meet the criteria for leasing with surface occupancy or leasing with no surface occupancy when protection of the surface resources cannot be insured by the utilization of stipulations found in Appendix F of the Forest Plan.

All leasing recommendations on nonclassified lands will include stipulations to provide mitigation measures during all operations, and contain requirements for disturbed areas to be rehabilitated to a productive forest condition following all operations. Recommendations for lease denials in lands that do not meet the criteria for leasing with surface occupancy or leasing with no surface occupancy should be made only after a site-specific analysis of the lease application area has been made.

Only leasing with no surface occupancy is recommended in Wilderness Study Areas until such time as Congress acts on the disposition of these areas, designates them wilderness or releases them to multiple use management. If they are released for multiple use management, leasing recommendations that apply on nonclassified National Forest System lands will apply.

The potential effects of these recommendations are displayed below. The spatial distribution of these recommendations may be found on each Alternative Map in the map packet that accompanies this document. Summary displays for oil and gas leasing (potential) suitability recommendations follow on Table IV-25.

TABLE IV-25
OIL & GAS LEASING POTENTIAL RECOMMENDATIONS BY ALTERNATIVE
 (MAcres)

	<u>Alternatives</u>				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
<u>Entire Forest Area*</u>					
Geophysical Investigation <u>1/</u>	2,361.8	2,390.6	2,271.1	2,607.3	2,607.3
Lease w/o <u>2/</u> Surface Occupancy	2,342.3	2,371.0	2,251.5	2,587.7	2,587.7
Lease w/o Surface Occupancy <u>3/</u>	19.6	19.6	19.6	19.6	19.6
No Leasing <u>4/</u> **	254.4	225.6	354.4	8.9	8.9

* Includes all recommended Wilderness Study Areas on the Pike and San Isabel and the Sangre de Cristo Wilderness Study Area portion of the Rio Grande National Forest. Since December 31, 1983 Wilderness Areas have been withdrawn from leasing except where valid mineral rights existed prior to January 1, 1984. Lands not recommended for Wilderness will be managed as other nonclassified lands.

1/ All National Forest System lands available for oil and gas activities.

2/ All National Forest System lands available for oil and gas activities except for certain special classified lands.

3/ Certain special classified lands (ski, wild and scenic river segments, scenic, natural and geologic areas).

4/ All National Forest System land recommended for Wilderness and the Air Force Academy. ** Those lands designated as wilderness will be withdrawn from mineral entry and leasing.

HUMAN AND COMMUNITY DEVELOPMENT

The human resource programs of the Pike and San Isabel National Forests are affected by the level and type of budget allowances, rather than resource management alternatives of the Forest Plan. It is anticipated, however, that the Youth Conservation Corps (YCC) Program and the Senior Citizen Service Employment Program (SCSEP) will be funded through 1985 for all alternatives except E, the reduced budget alternative. It is assumed that no human resource programs would be funded under Alternative E. No significant difference in enrollee years is expected between the alternatives budgeted for human resource programs.

LANDS

Significant adjustments in the Forest land base are not proposed in Alternatives A, B, D and E. Effects are negligible. A large land acquisition program is planned for the first decade in Alternative C. Land adjustments would be relatively small for specific resource needs with rights-of-way acquisitions as necessary to carry out management activities and to provide public access for specific purposes. Overall, public access to large expanses of public land will not change.

Special land classifications such as scenic areas, natural areas, or mineral withdrawals do not differ between alternatives. Suitability of the South Platte River for Wild, Scenic or Recreation River classification is considered outside of this plan, as is the on-the-ground location of the Continental Divide National Scenic Trail.

Special land uses are provided for in all alternatives as long as they are compatible with the overall management emphasis of the management area.

There are approximately 9,150 miles of property boundaries on the Forest. About 7,500 miles of these boundaries need to be marked and posted. Alternative C includes 180 miles of property boundary location per year and would eliminate the backlog. All other alternatives include 50 miles of property boundary location per year which is necessary to protect adjacent private lands and Forest lands from trespass, resolve trespass problems, and meet other resource activity needs.

SOILS

Management practices that remove vegetation (grazing, timber harvest, prescribed burning) or disturb the integrity (soil structure, infiltration capacity, permeability) of the soil (road, trail, and facility construction) can lead to soil erosion that temporarily exceeds tolerable limits. Left unmanaged, a loss in soil productivity as well as increases in sedimentation can result. In some cases, soil may be transported directly into lakes and streams reducing water quality.

Effects of an alternative on the soil resource include both direct and indirect effects, depending on soil capability and the activities involved. For example, cutting trees results in indirect effects, whereas road construction results in direct effects. Timber harvest, road construction, water transmission, grazing, surface exploration and mining, recreation, and wildlife habitat improvement are the major activities that may cause soil erosion or soil compaction which can reduce productivity on the Forest. The management requirements to mitigate these potential effects are listed in Chapter III of the Forest Plan.

Associated with timber harvest, road construction, mining activities and recreational use are specific effects on soil. This includes compaction of the soil from heavy equipment, which reduces the soil's ability for infiltration of rainfall. Water then moves over the surface rather than into the soil profile. This causes surface soil movement (erosion). Another effect is the removal of duff and litter which provides protection for soil. Exposed surface soils can be eroded more easily, may lose their ability to infiltrate water and may be reduced in soil nutrient holding capability (this reduces soil productivity).

Exposure of the mineral soil surface and minor mixing of litter and soil by dragging logs or equipment moving over dry ground are common to some kinds and intensities of logging. Some surface disturbance is necessary to prepare the site for natural regeneration of certain tree species. In contrast, disruption or penetration below the permeable soil surface can reduce the infiltration rate and storage capacity of the soil resulting in increased erosion.

Soil and site conditions are not the same in different areas within the Forest. Whether or not surface erosion actually follows disturbance depends on soil factors. Some of these soil factors are soil properties, rainfall or snowmelt intensities, slope and ground cover. Generally, surface disturbance caused by felling, hauling, or skidding, apart from skidroad and road construction, does not lead to appreciable soil erosion. Proper timber sale preparation, and sale administration, can prevent or minimize soil erosion.

In addition to soil loss by accelerated erosion, reduction in soil productivity may occur from loss of nutrients from tree removal, and retardation of plant growth caused by compaction.

Removal of logs in timber harvest represents a small and temporary net loss of nutrients since only a minor proportion of the nutrients taken up by a tree is stored in the bole. Clearcutting forests results in a greater immediate loss than individual tree selection, but over a rotation the losses would balance out by more frequent cuts under the selection system. Furthermore, nutrients lost after clearcutting should be replaced in 10 to 20 years through natural cycling as regeneration becomes established.

Loss of productivity caused by compaction varies according to the soil type, its moisture content, and the frequency of traffic. Natural frost action appears to mitigate any long-term effect of compaction of the Forest.

Most sediment caused by man's activities that reaches streams originates from constructed roads. Chief sources of sediment are roads that disrupt or infringe upon natural stream channels and roads that have steep gradients or lack adequate drainage. The sources of increased sediment entering stream courses include direct movement of soil during construction and maintenance, surface erosion, and mass movement.

Typically, erosion is at maximum during construction and initial use, and declines rapidly with time. Proper location, construction, revegetation, and maintenance of Forest roads should cause no significant increase in sediment reaching stream courses.

Location, construction, and operation of water transmission facilities including irrigation ditches on the Forest are a potential source of sediment. Ditches located on steep or unstable terrain are extremely susceptible to mass failure.

Grazing can increase runoff and erosion by reducing plant cover density, redistributing the litter cover and compacting or detaching surface soils. Selective grazing by livestock may also affect runoff and erosion by changing species composition to less effective soil stabilizers.

Sites vary greatly in their ability to withstand the impact of grazing. In addition, variations in growing conditions from year to year complicate the management problem.

Implementation of improved range management practices should result in improved vegetation and soil conditions. Specific practices are discussed in the Range section of the Plan.

Exploration and mining activities can severely disturb vegetation and soil. In addition to the actual exploration or mine sites, potential sources of erosion and sediment include ore haul roads and spoil piles. In some cases, spoil material may contain toxic substances.

Erosion can be reduced by properly locating, constructing, and revegetating roads. In addition, erosion and chemical pollution from mine spoils can be greatly reduced or eliminated by regrading the spoils after mining to gentle slopes where possible; by burying toxic spoil material during mining or construction of spoil dumps; by removing original topsoil before mining and replacing it when mining has been completed; and by revegetating mine areas and exploration sites as quickly as possible.

Soil erosion caused by compaction and trampling of vegetation can occur in Forest campgrounds, picnic areas, and on hiking trails. In wilderness areas, use from backpackers and trail riders can cause measurable deterioration of vegetation with resultant soil erosion.

Off-road use of four-wheel drive vehicles and motorbikes, especially during wet periods, causes soil disturbance that results in increased erosion.

Development and expansion of ski areas can cause the disturbance of Forest land. This land is generally steep and receives large amounts of moisture resulting in high potential for increased erosion when lifts, trails, roads and other facilities are constructed.

Areas damaged because of concentrated recreational use from off-road vehicles can be protected by placing restrictions on where and when these activities may occur. Also, methods of correcting and preventing soil resource damage from ski area development are available and are included as an element in ski area master plans.

Prescribed burning is a planned activity used for wildlife habitat improvement. Fire can increase the potential for soil erosion which results in losses in plant nutrients. However, properly planned and implemented, prescribed burning causes no long-term significant soil disturbance. Burning is done under controlled conditions with only a portion of the protective soil litter and vegetation being burned.

Potential for soil erosion and reduced productivity increases with the amount of soil disturbing activities. Table IV-26 displays the amount of estimated soil disturbance from timber harvest and road construction activities planned for the next decade. These two activities have been selected rather than the other activities discussed above because they represent the largest number of acres of significantly disturbed lands that the Forest itself generates through its land management activities.

TABLE IV-26
ESTIMATED ACRES OF MINERAL SOIL EXPOSED FROM ROAD CONSTRUCTION
AND TIMBER HARVEST ACTIVITIES IN THE FIRST DECADE

<u>Alternative</u>	<u>Acres of Soil Exposed By Road Construction</u>	<u>Acres of Soil Exposed 1/ By Timber Harvest</u>
A	800	2500
B	400	1200
C	600	1500
D	600	2000
E	400	1200

1/ All acres of soil exposed are not disturbed. Acres are estimated based on 20 and 40 percent soil exposure occurring during partial and clearcuts respectively.

Potential accelerated erosion has been estimated. For all alternatives, the potential accelerated erosion is 3.1 tons per acre per year for the National Forest, and 5 tons per acre per year on the National Grassland. This potential rate is considered an unacceptable level and is what could be expected to occur if no mitigation measures were applied in resource development and utilization. An average acceptable level is considered to be 2 tons per acre per year for the National Forests; and 4 tons per acre per year for the National Grasslands under all alternatives. This is a low - moderate erosion rate and is close to natural occurrence. Two tons per acre per year amounts to about .0128 inches of soil loss. This loss is decreased through the natural soil building processes.

Specific mitigation measures to reduce or prevent soil erosion include revegetation of ground disturbed areas during construction phases, limiting use within riparian areas, limiting road construction on highly erosive soils and steep slopes, intensive management of grazing activities to maintain acceptable levels of vegetation, and rehabilitating areas currently producing unacceptable soil loss.

Soil and water improvement activities planned for each alternative are displayed in Table IV-27. Some of these soil and water improvement activities are seeding of logging roads, rangeland pitting, check dams and waterbars.

TABLE IV-27
Soil and Water Improvement

<u>Alternative</u>	<u>Acres Treated</u>
A	1,200
B	575
C	1,000
D	1,000
E	575

Effects on Prime Farmlands

There are no prime farmlands within the Pike and San Isabel National Forest nor is there any prime farmland on the Comanche and Cimarron National Grasslands. None of the alternatives will affect prime farmlands off Forest or Grassland lands. These lands were considered and no effects on them are anticipated.

FACILITIES

Facilities are a support item and are directly related to the level of activity which they serve. Roads are provided for the harvest and treatment of timber and other resource management activities. Table IV-28 displays the projected roads and trails construction/reconstruction per decade. Alternative A requires the most road construction/reconstruction, especially in the early periods, to provide access for increased timber harvest and other resource management activities.

The increase in road construction/reconstruction compared with current management will generate an increase in some adverse effects on other resource values. Possible effects on resources are temporary disturbance of wildlife, short-term increases above natural levels in soil erosion and stream siltation, and possible increased wildfire. Mitigation measures outlined in the management direction section of the Forest Plan will keep adverse effects to an acceptable level. These measures include road location and design requirements to assure proper drainage to minimize erosion, revegetation of disturbed ground even during construction phases, closing or restricting use of roads into important wildlife areas, limiting construction on soils of high erosion hazard and in riparian areas, and increased fuel reduction activities and managing road use to stay within road maintenance capabilities.

There is an increased possibility of damage to cultural resources, however, prior to all ground disturbing activity a cultural resource inventory is required by a qualified individual.

The increased transportation system will provide more access to the National Forest for recreation, fuelwood gathering, and

necessary resource work. The increased road network will help meet the need for dispersed recreation, including off-road vehicle use, provide hunting and fishing access, and access to the trail system. The network will enable resource work such as maintenance of a healthy Forest, increased diversity of vegetation for wildlife, management of big game winter range, insect and disease control work, and wildfire control.

The increased transportation network in the Forest and, therefore, should not noticeably cause a problem to local communities of increased traffic and increased noise.

Road and travel management activities will vary between alternatives due to the allocation of different acres to the specific management area prescriptions. Travel management regarding off-road vehicles was summarized in the dispersed recreation section of this Chapter.

Road management practices include seasonal road closures for resource and critical wildlife habitat protection. Access into the semiprimitive nonmotorized ROS classified areas for resource management activities will be temporary, and the roads will be closed after project completion. Local intermittent roads will be closed after access is no longer required in all management areas. Location of arterial and collector roads will consider county and state transportation systems.

Planning for economically-efficient road maintenance will insure that the road system meets resource management and public access needs. Dispersed recreation use capacities planned and budgeted for will be reflected in road maintenance and travel management activities.

Trails generally serve dispersed recreation needs. A high level of construction is indicated for Alternative C (46 miles), but would be less in Alternatives A (20 miles), B (12 miles), and D (12 miles) to realistically meet demands. Alternative E would provide no trail construction. Other facilities would not vary appreciably between alternatives.

The trail program in Alternative A is designed to meet expected demands and is consistent with other agency plans and progress. New trails will be located to avoid conflicts with cultural resource sites and important wildlife habitats.

Major utility corridors are shown on the Forest Plan map. There is no major difference in utility corridors between alternatives.

Energy and water needs are currently being met for residents within the planning area. Portions of the existing electrical distribution lines are proposed for upgrading. Upgrading will

consist of converting distribution lines to accommodate more power to meet the anticipated increased electrical needs. No new major utility construction activities are planned at this time, however there may be a need for small spur lines and additional small corridors in the future.

A joint utility corridor study is being conducted by the Forest Service and the Bureau of Land Management. As a part of the study, utility companies are being asked to participate, along with State representatives, in developing standards and guidelines for corridor selections. The standards and guidelines for corridor selection and designation are required by the National Forest Management Act and the Federal Land Policy and Management Act. Decisions on corridors involve utility companies, State and local governments, and other Federal agencies, as well as the Forest Service. The Western Utilities Group has provided State maps identifying existing and potential utility corridors. The goal of all groups is to avoid a proliferation of corridors across Federal lands and to combine compatible uses where possible.

Use of National Forest land for public service improvements is subject to the following considerations. Existing corridors will be used where environmentally and economically practical. Analysis of proposed utility lines will include consideration of esthetics, placement on private lands, burial of new electric or telephone lines, conflicts with existing facilities or uses, conflicts with other landowners and agencies, and economics of the proposal and alternatives. Each specific proposal will be evaluated in accordance with the NEPA process.

Developed recreation sites, winter sports sites, unroaded areas where primitive recreation opportunities are emphasized, riparian areas, Experimental Forests, Special Interest Areas and municipal water supply and municipal watersheds will generally be avoided for utility corridor location.

Table IV-28
FACILITIES
ROADS AND TRAILS
(Miles Constructed/Reconstructed Per Year)

<u>ALTERNATIVE</u>	<u>DECADE</u>					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	
A AR & Coll. <u>1/</u>	15	15	15	15	15	
	Local <u>2/</u>	17	17	17	17	
	Trails	20	20	20	20	
B AR & Coll.	5	5	5	5	5	
	Local	20	19	23	15	16
	Trails	12	14	16	18	20
C AR & Coll.	19	19	19	19	19	
	Local	14	10	8	11	11
	Trails	46	55	55	55	55
D AR & Coll.	5	5	5	5	5	
	Local	26	18	15	15	15
	Trails	12	14	16	18	20
E AR & Coll.	0	0	0	0	0	
	Local	6	6	5	4	10
	Trails	0	0	0	0	0

1/ AR & Coll. = Arterial and Collector Roads

2/ Local = Local Roads

PROTECTION

Protection in the form of fire prevention and control, integrated pest control measures, and trespass prevention or law enforcement is related generally to the specific resource activity it supports. Fire hazard reduction activity increases with vegetation manipulation. In general, those alternatives which involve larger acreages of vegetation management are more effective in developing forest vegetation that is resistant to insect and disease attack.

Harvesting of older, overmature trees is effective in preventing epidemic populations of englemann spruce bark beetles and mountain pine beetles in lodgepole pine. Thinning is especially effective in preventing mountain pine beetle attacks of ponderosa pine.

Clearcutting and starting a replacement stand of trees is effective in control of mistletoe infections. Harvesting of older, overmature trees is effective in reducing losses to heartrot fungi.

Fire hazard reduction under the various alternatives is expressed in acres of fuels treated. Alternatives A and D provide for treating 2,000 acres per year. Alternatives B and E would accomplish 1,500 acres per year. Alternative C provides for treating 5,760 acres in the first period, 4,900 in the second, and 3,900 acres in the third, fourth and fifth time periods.

The increased road system will increase public use of the forest which generates an increased risk of fire. This possible adverse effect is reduced by these same roads providing access for wildfire control. The increased roads open areas for fuelwood gathering and vegetative management activities, including fuel treatment. These activities will reduce fuels and help reduce the numbers of fires and fire intensities.

The Regional Forester is responsible for analyzing air pollution impacts on air quality related values for those sources subject to the Prevention of Significant Deterioration (PSD) regulations (Clean Air Act of 1977, as amended). This analysis will include a determination of impacts on visibility. Secondary mineral processing, energy conversion facilities, and oil and gas treatment facilities will be prohibited in wilderness. Therefore, it is highly unlikely that any source will be developed within a wilderness that will be subject to PSD.

Air pollution impacts likely to occur from exploration and development within wilderness and unclassified areas include the following:

<u>Impacts</u>	<u>Source</u>
Fugitive dust	Unpaved roads Exposed areas Drilling and blasting Stockpiles and waste piles Loading and hauling Mechanical disturbance
Odor	Vehicle emissions Fuel storage Leaks in valves, etc. Emergency venting

Mitigation measures for fugitive dust include watering, oiling, applying dust suppressor, paving, covering, and operating techniques.

Mitigation measures for controlling odors include proper maintenance and controls on all gas vents.

All air pollution sources within wilderness area will be required to use Best Available Control Technology (BACT).

BACT determinations include a review of environmental impacts. In areas that have special environmental characteristics (such as wilderness or natural areas), the Forest Service can require strict mitigation measures.

The determination of BACT will be done in a site specific analyses for individual operating plans. State air quality regulating authorities and EPA will be consulted in determining BACT.

After appropriate mitigation measures have been applied, the remaining air quality impacts resulting from exploration and development activities on NFS lands will be minor amounts of fugitive dust and odor.

Before any oil and gas development activities can begin on leased lands, the lease holder must submit a proposed operating plan to the Forest Service for review and approval. During the review, the Forest Service will determine if air pollution resulting from activities on federal land will comply with the applicable State Implementation Plan (Section 176(c), Clear Air Act of 1977, as amended).

INTERRELATIONSHIPS BETWEEN PROGRAM ELEMENTS

The management practices that have the most significant effects contained in the alternatives are vegetation manipulation and road construction.

Vegetation Management

Silvicultural treatments of tree stands can vary greatly in their effects on other resources depending on the species treated, and the timing, location, duration and intensity of application.

Vegetation management will increase wildlife habitat diversity, improve the age class distribution and vigor of the stands treated, create browse for livestock and wildlife, increase water yield, and improve the visual diversity of the landscape.

Managing vegetation also creates the need for access roads into

the stands to be treated. This may increase sediment yield and the potential for soil loss. In addition, increased vegetation management may require more treatment of activity fuels.

Road Construction and Management

Constructing roads in a forested environment allows access for resource management and development activities which can provide needed goods and services to the general public. It is a necessary tool to gain access for vegetation manipulation activities which may have many positive overall indirect consequences.

Road management activities such as road maintenance standards and total or seasonal closures of roads will be consistent with the management area prescription applied to the area. Specific effects of road management include protection of the soil and water resources, protection of critical wildlife habitats, providing for off-road vehicle use, providing access for dispersed recreation use, and maintaining the Recreation Opportunity Spectrum classification.

Providing public access to areas on the Forest previously unaccessible may increase road maintenance and other costs associated with managing the increased recreation use. Economically efficient road management activities will be coordinated with budget levels, ROS classification of lands and the planned recreation use capacity of the management areas.

SOCIAL EFFECTS

Some social changes will take place in the eighteen county area that the Forest lies in regardless of which alternative is implemented. These changes are related to the influx of people to the State of Colorado, primarily the rapid growing Front Range area, and the development of mineral resources. The alternatives affect the social descriptors of the Human Resource Units described in Chapter III to varying degrees, but the changes and effects are minimal.

SOCIAL EFFECTS OF ALTERNATIVES BY HUMAN RESOURCE UNIT

South Platte and Pikes Peak Human Resource Units - None of the alternatives will have major effects on lifestyles, social organization, attitudes, or land use in these HRU's. This is primarily due to the metropolitan atmosphere in these Units and the availability of private land and facilities to complement services provided by the Forest. Alternatives A and C will have a slight positive effect on providing fuelwood and increased recreation opportunities while Alternatives B, D and E would have a slight negative effect in this regard.

Comanche and Cimarron Human Resource Units - There are no major differences in social effects between alternatives where these two HRU's are concerned. The dominant land use is ranching and agricultural activities. All alternatives complement the social descriptors by providing increased use of the National Grassland Units on the Forest for increased forage production.

Leadville, Salida, South Park, Sangre de Cristo-Wet Mountains and Spanish Peaks Human Resource Units - These Human Resource Units represent the area of the Forest where most of the social effects will occur. Increases in timber and recreation outputs for Alternatives A, C and D may affect changes in the rural lifestyles of these HRU's. Cultural descriptors that may also be affected from implementing any of the alternatives include recreational services, supporting services such as medical, educational, and community services, land use and work routines. These cultural descriptors will be affected most by the implementation of Alternatives A or C, to a lesser extent by the implementation of Alternatives B or D. Alternative E will have the least effect. Increases in outputs from National Forest lands will occur gradually and communities should have ample time to respond to the predicted growth. Increases in population will increase the tax base in order to supply additional services. Communities that will experience the most growth include Canon City, Salida, Buena Vista, Leadville, Fairplay, Westcliffe and La Veta.

EFFECTS ON MINORITIES AND WOMEN

None of the alternatives will have major effects on the minorities and women in the planning area. The Forest Service is an Equal Opportunity Employer and does not discriminate in any activity it carries out with respect to race, color, religion, sex, national origin, politics, marital status, physical handicap, or age.

ECONOMIC EFFECTS

Cost Efficiency Analysis

The planning process, specified in the NFMA regulations, requires consideration of economic efficiency as a basic principle of planning (36 CFR 219.1(b)(13)), in the formulation of alternatives (36 CFR 219.5(f)(1)(v)), in estimating the effects of alternatives (36 CFR 219.5(g)(9)), and in evaluating the alternatives (36 CFR 219.5(h)).

In addition to the NFMA requirements, the congressionally revised Resources Planning Act Statement of Policy states that "...forests and rangeland, in all ownerships, should be managed to maximize their net social and economic contributions to the Nation's well being, in an environmentally sound manner..."

Further, "The Secretary of Agriculture shall continue his efforts to evaluate the cost-effectiveness of the renewable resource program." The application of the Forest-wide Management Requirements to all alternatives insures that multiple use management will be applied "in an environmentally sound manner."

The main criterion used in the efficiency analysis is present net value (PNV), which is defined as discounted benefits less discounted costs, including only those outputs to which monetary values can be assigned. In the linear programming model, FORPLAN, each alternative was originally run to maximize present net value over five decades. This insured that the original tentative allocation for each alternative was composed of the most cost-efficient set of management prescriptions. When FORPLAN had more than one option, all of which satisfied the constraints to at least a certain extent, it would select the most economically efficient set of prescriptions. This, combined with the fact that all prescriptions are composed of the most cost-efficient set of practices to achieve the desired ends, allows the conclusion that each alternative is an economically efficient allocation.

The most efficient alternative is one which maximizes net public benefits, which is defined as the overall value to the Nation of all benefits less associated inputs and costs, regardless of whether or not they can be quantitatively valued. For this reason, the resource values and costs shown in Tables IV-29 and IV-30 reflect only the monetary portion of the analysis used to evaluate alternatives. This is discussed in greater detail in Chapter II. Also refer to Appendix D for constraints that were used in formulating the alternatives and had an affect on the present net value.

An incremental analysis was conducted to show the additional benefits and costs necessary to provide outputs, goods, and services for each alternative above those derived from minimum level management. The Minimum Level Benchmark (No. 1) is a baseline. It represents the set of minimum unavoidable activities mandated solely by virtue of public landownership. The only significant outputs of minimum level management are dispersed recreation use, wilderness use and water yield. The only costs are those associated with protecting the life, health, and safety of incidental National Forest users and preventing impairment of the productivity of land. The minimum level benchmark provides a base for comparing the incremental costs and benefits of those alternatives analyzed in detail. This insures that the economic parameters being used in evaluation of alternatives are the result of actual increments above the "fixed" benefits and costs associated with minimum level management. See Appendix E for more detail on BM#1.

TABLE IV-29
RESOURCE VALUES USED IN ECONOMIC ANALYSIS

<u>Activity</u>	<u>Unit</u>	<u>Value</u>
<u>Forage *</u>		
Extensive grazing	AUM	10.50
Intensive grazing	AUM	10.50
<u>Recreation</u>		
Dispersed *	RVD	5.01
Developed	RVD	3.00
<u>Developed Recreation</u>		
Wilderness (min. level)	RVD	8.00
-Other	RVD	8.00
Winter Sports	RVD	3.00
<u>Wildlife</u>		
Habitat Improvement	Acre	186.00
<u>Water *</u>		
Yield Increase	Acre Foot	19.70
<u>Timber *</u>		
Aspen	MCF	82.00
Douglas-fir	MCF	53.00
Lodgepole pine	MCF	82.00
Ponderosa pine	MCF	53.00
Spruce/fir	MCF	73.00
Fuelwood	MBF	33.03

* Used in FORPLAN

TABLE IV-30 COST EFFICIENCY ANALYSIS (1978 Constant Value First Quarter Dollars)

Period 1 - Non-discounted Benefits and Costs (1981-1990) Millions of Dollars

	BENCHMARKS		ALTERNATIVES				
	BM#1	BM#3	A	B	C	D	E
Benefits, Incremental	380.8	133.9	125.1	144.4	131.0	104.2	67.3
Assigned Values, Less Receipts	380.8	127.4	116.0	104.8	120.7	89.1	60.8
Federal Receipts	0	6.5	9.1	9.6	10.3	15.1	6.5
Costs, Incremental	6.9	64.1	68.5	67.3	86.7	77.7	45.4
Forest Service							
Long-range Fixed <u>2/</u>	6.9	0	0	0	0	0	0
Investment	0	7.1	3.5	2.6	8.4	4.8	1.3
Operational	0	36.8	42.4	42.3	42.7	48.8	25.4
General Administration	0	10.2	10.6	10.4	11.6	12.1	6.7
Non-Forest Service Cooperator Costs	0	12.0	12.0	12.0	24.0	12.0	12.0

Period 2 - Non-discounted Benefits and Costs (1991-2000) Millions of Dollars

	BENCHMARKS		ALTERNATIVES				
	BM#1	BM#3	A	B	C	D	E
Benefits, Incremental	402.4	157.5	150.6	133.9	156.4	124.2	65.9
Assigned Values, Less Receipts	402.4	147.2	136.4	119.1	142.3	105.8	54.3
Federal Receipts	0	10.3	14.2	14.8	14.1	18.4	11.6
Costs, Incremental	8.1	63.5	70.0	69.8	68.5	77.4	42.7
Forest Service							
Long-range Fixed <u>2/</u>	8.1	0	0	0	0	0	0
Investment	0	7.0	3.5	4.0	5.1	5.6	2.0
Operational	0	41.2	51.8	50.3	49.0	54.2	30.6
General Administration	0	11.3	12.7	12.5	12.4	13.6	8.1
Non-Forest Service Cooperator Costs	0	4.0	2.0	3.0	2.0	4.0	2.0

Period 3 - Non-discounted Benefits and Costs (2001-2010) Millions of Dollars

	BENCHMARKS		ALTERNATIVES				
	BM#1	BM#3	A	B	C	D	E
Benefits, Incremental	426.7	206.9	981.9	180.4	207.6	166.9	89.3
Assigned Values, Less Receipts	426.7	194.6	182.0	163.6	191.5	146.2	77.2
Federal Receipts	0	12.3	16.9	16.8	16.1	20.7	12.1
Costs, Incremental	9.5	71.3	84.5	84.0	78.1	85.5	46.9
Forest Service							
Long-range Fixed <u>2/</u>	9.5	0	0	0	0	0	0
Investment	0	5.5	7.2	7.3	5.8	4.4	0.6
Operational	0	49.8	59.1	58.6	56.0	61.1	35.2
General Administration	0	13.0	15.2	15.1	14.3	15.9	9.1
Non-Forest Service Cooperator Costs	0	3.0	3.0	3.0	2.0	5.0	2.0

Period 4 - Non-discounted Benefits and Costs (2011-2020) Millions of Dollars

	BENCHMARKS		ALTERNATIVES				
	BM#1	BM#3	A	B	C	D	E
Benefits, Incremental	452.1	237.2	229.9	197.2	236.1	183.6	91.1
Assigned Values, Less Receipts	452.1	223.0	210.9	178.8	218.2	161.3	78.6
Federal Receipts	0	14.2	19.0	18.4	17.9	22.3	12.5
Costs, Incremental	10.9	85.3	97.1	87.7	94.1	98.6	50.3
Forest Service							
Long-range Fixed <u>2/</u>	10.9	0	0	0	0	0	0
Investment	0	8.0	7.9	6.6	9.3	6.1	0.8
Operational	0	58.8	68.7	62.2	65.6	70.1	37.6
General Administration	0	15.5	17.5	15.9	17.2	17.4	9.9
Non-Forest Service Cooperator Costs	0	3.0	3.0	3.0	2.0	5.0	2.0

TABLE IV-30 Continued

Period 5 - Non-discounted Benefits and Costs (2021-2030) Millions of Dollars

	BENCHMARKS		A	B	ALTERNATIVES		
	BM#1	1/ BM#3			C	D	E
Benefits, Incremental	480 0	260 7	253 0	213 7	261 2	200 5	98 2
Assigned values, less receipts	480 0	244 8	232 2	193 8	241 3	176 6	85 3
Federal Receipts	0	15 9	20 8	19 9	19 9	23 9	12 9
Costs, Incremental	12 4	98 5	113 5	101 2	107 6	114 2	54 8
Forest Service							
Long-range Fixed 2/ Investment	12 4	0	0	0	0	0	0
Operational	0	9 5	11 4	8 9	10 1	7 4	1 3
General Administration	0	67.2	77 8	70 0	75 8	81 5	40 6
Non-Forest Service Cooperator Costs	0	17 8	20 3	18 3	19 7	20 3	10 9
	0	4.0	4.0	4 0	2 0	5 0	2 0

1/ Benefits and costs are total all others are incremental from BM#1

TABLE IV-31 COST EFFICIENCY ANALYSIS
(First Quarter Constant Value 1978 Dollars)

All Periods - Discounted at 4% - Millions of Dollars

	BENCHMARKS		A	B	ALTERNATIVES		
	BM#1	1/ BM#3			C	D	E
Present Value Benefits, Incremental (PVB)	893 2	379 9	362 2	322 6	377 0	298 1	165 3
Assigned Values, Less Receipts	893 2	358 0	332 1	292 6	346 7	258 0	143.7
Federal Receipts	0	21.9	30 1	30 0	30 3	40 1	21 6
Present Value Costs, Incremental (PVC)	18.7	156 7	172 6	167 6	174 9	185 4	102 3
Forest Service							
Long-range Fixed Investment	18 7	0	0	0	0	0	0
Operational	0	15 4	11.5	10 3	16 0	11 7	2 8
General Administration	0	98.2	116.4	112 9	112.8	124 6	67 5
Non-Forest Service Cooperator Costs	0	26 5	29 3	28 4	29.5	31 0	17 8
	0	16 6	15 4	16 0	16 6	18 1	14 2
Present Net Value, Incremental (PNV)	874 5	223 2	189 6	155 0	202 1	112 7	63 0
Benefit-Cost Ratio, Incremental	47 8	2 4	2 1	1 9	2 2	1 6	1 6

All Periods - Discounted at 7-1/8% - Millions of Dollars

	BENCHMARKS		A	B	ALTERNATIVES		
	BM#1	1/ BM#3			C	D	E
Present Value Benefits, Incremental (PVB)	552 3	221 3	210.0	188.6	218.6	173 6	99 8
Assigned Values, Less Receipts	552 3	208 9	192 8	171 0	200 8	149 5	87 2
Federal Receipts	0	12 4	17.2	17 6	17 8	24 1	12.6
Present Value Costs, Incremental (PVC)	11 1	97.0	103.6	100.8	105 1	112 5	62 7
Forest Service							
Long-range Fixed Investment	11 1	0	0	0	0	0	0
Operational	0	9 7	6 5	6 0	9.1	6 5	1 9
General Administration	0	58 0	69 5	67 2	68 0	75 3	40 3
Non-Forest Service Cooperator Costs	0	15.8	15 0	14 6	15 4	16 4	8 4
	0	13 5	12 6	13 0	12 6	14.3	12.1
Present Net Value, Incremental (PNV)	541 2	124 3	106 4	87 8	113 5	61 1	37 1
Benefit-Cost Ratio, Incremental	49 9	2 3	2 0	1 9	2 1	1 5	1 6

1/ Benefits and costs are total; all others are incremental from BM#1.

The relative cost efficiency of each alternative is summarized in Table IV-30. Table IV-30 displays various undiscounted benefits and costs by decade for each alternative. Included in this table are estimates of non-Forest Service costs that would be incurred under each alternative to realize the benefits associated with Forest outputs. These estimates include the non-agency expenditures of range permittees, county road maintenance, and cooperative wildlife programs. Table IV-31 has a summary of discounted benefits and costs of each alternative along with incremental present net values and benefit-cost ratios. Chapter II describes this in more detail.

Resource Values

The benefits shown in Tables IV-30 and IV-31 result from placing specific dollar values on the timber, livestock forage, developed and dispersed recreation, wilderness, wildlife habitat improvement, and water yield outputs. These are the only outputs that were explicitly valued in the planning process. Timber values were calculated using historical Forest-level bid prices from timber sold. All other values were derived from data used in the 1980 RPA Update and Regional Guide efforts. The values used are in terms of first quarter 1978 dollars and are displayed in Table IV-29.

In the FORPLAN model, only timber, livestock grazing, dispersed recreation and water were allocated and valued. By using an investment analysis program known as MIVEST, the costs and benefits associated with developed recreation, wilderness and water outputs, as well as other costs were included in the economic efficiency analysis. This resulted in present net values that incorporated all types of resource outputs, as well as all Forest Service budgetary costs. Those costs incurred by other federal and nonfederal entities were estimated for each alternative, (Table IV-30) and were included as part of the efficiency analysis and the allocation and scheduling process.

The fact that some outputs and costs were not included directly in the FORPLAN allocation model does not mean that they were ignored as allocation decisions were being made. The way that constraints were formulated made it possible to place a high value on resources not specifically included. For example, an objective in Alternative A was to insure that increased water runoff was given high emphasis. To do this, output constraints were placed upon the spruce/fir and lodgepole pine timber types, in which a specific proportion of the area was required to be in a clearcut condition at any one time during each of the first five decades.

Several other outputs and social benefits derived from the Pike and San Isabel National Forest could not be taken into consideration in this analysis because of an inability to quantify benefits in dollar terms. Examples of such benefits include wildlife habitat diversity, visual quality, community stability, and minerals.

Estimations of the demand projections for all outputs were determined in Planning Action 4, the Analysis of the Management Situation. The timber, range, water, wilderness and recreation outputs were valued only to the levels of projected demand. The use capacities displayed for recreation and wilderness are planned capacities, not theoretical capacities. Planned capacities for these outputs were designed to not exceed projected demand assumptions for any alternative considered in detail.

Each of the alternatives was analyzed for cost efficiency over 50 years. Tables IV-30 and IV-31 display this analysis. Table IV-29 displays the resources that were valued in the benefit portion of the analysis.

The incremental present net values indicated in Table IV-31 are values in addition to the minimum level values. At the 4 percent discount rate the present net value for the minimum level management over the 50-year period is \$874.5 million. This value is based on valuing the uncontrollable outputs from the Forest and providing for expenditures to protect the productivity of the land within established laws and regulations. Costs under the minimum level of management are estimated to be \$18.7 million in the first decade. Discounted benefits accrued, without active Forest Service management, are estimated to be \$893.2 million from dispersed recreation, water, and wilderness use. See Appendix E and Table IV-30 for more information about the benchmark analysis.

PRESENT NET VALUE TRADEOFF ANALYSIS

Table IV-32 compares present net value of trade-offs by alternative using a 4 percent discount rate. Table IV-33 compares present net value of trade-offs by alternative using a 7 1/8 percent discount rate.

Using a 4 percent discount rate, Alternative C, the RPA Alternative, has the highest present net value (PNV) of all alternatives (refer to Tables IV-32 and IV-33). This alternative will be compared to Benchmark #3. Following the comparison, Alternative C will serve as the basis for comparing Alternative A (the Forest Plan), which has the next highest PNV among the alternatives. Each alternative will be compared in turn, based upon its PNV rank.

Alternative C's PNV is \$21.1 million (MM) less than that of Benchmark #3. Alternative C has a lower level of discounted benefits (PNB) and a higher level of discounted costs (PVC). The difference in PVB is due to lower grazing use and wildlife habitat improvement treatments. The difference in PVC is due primarily to a change in the vegetation treatment mix and other miscellaneous land management costs of Alternative C.

Alternative A, which is the Forest Plan, has a PNV which is \$12.5 MM less than Alternative C. It has both a lower PVB and PVC. This alternative did not identify as much wilderness as suitable and consequently has less wilderness use benefits than Alternative C. The PNB reduction in timber is due to the emphasis in Alternative A of treating Douglas fir to a greater extent than in Alternative C. Douglas fir treatment has a lower benefit/cost ratio than spruce/fir. The vegetation treatment mix of Alternative A is designed to provide greater diversity benefiting fiber production, wildlife habitat and visual quality.

Alternative B, the current management alternative, has a PNV which is \$34.6 MM less than Alternative A. This is due to a lower level of developed and dispersed recreation as well as area treated for wildlife habitat.

Alternative D, the commodity emphasis alternative, has a PNV which is \$42.3 MM less than Alternative B. Its reduction in PVB of \$24.5 MM is due primarily to the strategy of maintaining current wilderness acres. Its increase in PVC is due to the large increase in timber volume with its associated costs.

Alternative E, the reduced budget alternative, has a PNV which is \$49.7 MM less than Alternative D. The PVC is the lowest of all alternatives and is \$83.1 MM less than Alternative D. Its PVB is \$132.8 MM less than Alternative D, reflecting the relatively low levels of production of most resources uses.

TABLE IV-32 Present Net Value Trade-off Analysis - Summary All Periods 1/ (Millions of First Quarter 1978 Dollars, 4% Discount Rate)

	Benchmarks		Alternatives				
	#2	#3	C	A	B	D	E
Discounted Cost (PVC)	83.5	156.7	174.9	172.6	167.6	185.4	102.3
Discounted Benefits (PVB)	167.5	379.9	377.0	362.2	322.6	298.1	165.3
Present Net Value	84.0	223.2	202.1	189.6	155.0	112.7	63.0
difference in PNV (from BM#3)	-139.2		-21.1	-33.6	-68.2	-110.5	-160.2
difference in PVB (from BM#3)	-212.4		-2.9	-17.7	-57.3	-81.8	-214.6
difference in PVC (from BM#3)	-73.2		18.2	15.9	10.9	28.7	-54.4
Contributions Made to Total Discounted Benefits by Resource, Incremental							
Timber	14.3	12.5	13.9	13.1	13.8	11.1	10.9
Range	51.6	50.5	48.9	50.6	49.5	51.9	20.8
Developed Recreation	64.7	64.7	64.7	64.7	54.8	54.8	39.3
Dispersed Recreation	0	152.9	152.9	152.9	126.0	126.0	56.1
Winter Sports	36.9	36.9	36.9	36.9	36.9	36.9	22.1
Wilderness	0	55.6	55.6	40.1	40.1	15.3	15.3
Wildlife (Recreation Related Activities)	0	6.6	3.6	3.6	1.2	1.2	0.4
Water	0	0.2	0.5	0.3	0.3	0.9	0.4

1/ All Benefits and Costs are incremental from Benchmark #1.

TABLE IV-33 Present Net Value Trade-off Analysis - Summary All Periods ^{1/} (Millions of First Quarter 1978 Dollars, 7-1/8% Discount)

	Benchmarks			Alternatives			
	#2	#3	C	A	B	D	E
Discounted Cost (PVC)	49.2	97.0	105.1	103.6	100.8	112.5	62.7
Discounted Benefits (PVB)	95.3	221.3	218.6	210.0	188.6	173.6	99.8
Present Net Value (PNV)	46.1	124.3	113.5	106.4	87.8	61.1	37.1
difference in PNV (from BM#3)	-78.2		-10.8	-17.9	-36.5	-63.2	-87.2
difference in PVB (from BM#3)	-126.0		-2.7	-11.3	-32.7	-47.7	-121.5
difference in PVC (from BM#3)	-47.8		8.1	6.6	3.8	15.5	-34.3
Contributions Made to Total Discounted Benefits by Resource, Incremental							
Timber	8.9	7.9	8.5	8.0	8.5	6.9	6.9
Range	32.4	31.8	30.5	31.6	31.1	32.2	12.6
Developed Recreation	35.5	35.5	35.5	35.5	31.1	31.1	24.6
Dispersed Recreation	0	90.4	90.4	90.4	75.1	75.1	34.2
Winter Sports	18.5	18.5	18.5	18.5	18.5	18.5	12.5
Wilderness	0	32.7	32.7	23.5	23.5	8.6	8.6
Wildlife (Recreation Related Activities)	0	4.4	2.3	2.3	0.6	0.6	0.2
Water	0	0.1	0.2	0.2	0.2	0.6	0.2

^{1/} All Benefits and Costs are incremental from Benchmark #1.

Budget Estimates and Returns to the Treasury

The average annual budget by alternative within the first decade varies from a high of \$7.3 million for Alternative D to a low of \$4.0 million for Alternative E. Each of the alternative budgets include the variable costs and capital investments necessary to produce the incremental present net value listed above. The 1983 fiscal year budget was \$5.2 million.

The alternatives represent a wide range of outputs that could be produced at different funding levels. The alternative budget levels represented are based on long-term goals and objectives which provide a general guide for annual budget requests. Shortrange planning, however, may necessitate a change in budget requests based on shortterm needs, constraints and priorities. Outputs associated with each alternative are dependent upon the appropriate budget displayed. Reductions in budget levels will affect the production of outputs accordingly.

In fiscal year 1983, returns to the U.S. Treasury were approximately \$900,000. See Table IV-34. Each of the alternatives considered in detail except Alternative E is expected to increase returns to the U.S. Treasury by 1 to 67 percent within the first decade of implementation. Alternative E will decrease returns to the Treasury by 28 percent. The major portion of the receipts are expected to come from recreation fees and royalties from mineral leases.

TABLE IV-34 Average Annual Expenditures and Returns to the U S. Treasury (First Quarter 1978
"Constant" Dollars)

	A	B	Alternatives C	D	E
Current (1983)					
Budget Expenditures	\$5,200,000				
Returns to U.S. Treasury	\$900,000				
<u>Period 1 (1981-1990)</u>					
Budget Expenditures	6,340,000	6,220,000	6,960,000	7,260,000	4,030,000
Returns to U.S. Treasury	912,000	955,000	1,034,000	1,510,000	645,000
<u>Period 2 (1991-2000)</u>					
Budget Expenditures	7,610,000	7,480,000	7,460,000	8,150,000	4,880,000
Returns to U.S. Treasury	1,424,000	1,484,000	1,412,000	1,841,000	1,157,000
<u>Period 3 (2001-2010)</u>					
Budget Expenditures	9,100,000	9,050,000	8,560,000	9,000,000	5,440,000
Returns to U.S. Treasury	1,692,000	1,677,000	1,614,000	2,069,000	1,206,000
<u>Period 4 (2011-2020)</u>					
Budget Expenditures	10,500,000	9,560,000	10,300,000	10,450,000	5,920,000
Returns to U.S. Treasury	1,897,000	1,835,000	1,788,000	2,234,000	1,248,000
<u>Period 5 (2021-2030)</u>					
Budget Expenditures	12,190,000	10,960,000	11,800,000	12,160,000	6,520,000
Returns to U.S. Treasury	2,076,000	1,991,000	1,993,000	2,388,000	1,288,000

Employment, Population and Income

An economic impact analysis was prepared to predict the changes in population, income and employment that each alternative would stimulate if it was implemented. An input-output (I-O) model, IMPLAN System, was used for this analysis. The model calculated the direct, indirect and induced changes in employment and income. These effects would be indirect, and either beneficial or adverse, depending on the alternative. Changes attributable to the alternatives are probably numerically insignificant. However, they must be viewed in the context that any possible changes will be viewed with intense interest.

Three economic impact areas (EIA) make up the Pike and San Isabel National Forest's planning area. The economic impact analysis was run on each of these separately.

Results of those analyses are displayed in Tables IV-35, IV-36 and IV-37. A summary of all three tables is shown in Table IV-38. Also refer to Chapter III, Social and Economic Settings.

Trinidad-Lamar EIA. This area is comprised of Huerfano, Las Animas, Otero, Crowley, Kiowa, Bent, Prowers and Baca Counties in Colorado, and Morton and Stevens Counties in Kansas.

South Park EIA. This area is comprised of Park, Lake, Fremont, Custer and Chaffee Counties.

Colorado Springs - Pueblo EIA. This area is comprised of Teller, El Paso and Pueblo Counties.

Changes in population, income and employment are computed from a base year of 1977 and were predicted for a ten year period only. Possible changes in technology make further predictions purely speculative. Tables IV-35, IV-36, IV-37, and IV-38 show the results of implementing the alternatives on these economic impact indicators.

TABLE IV-35 Economic Impact Analysis (Second Period - 1991-2000)

TRINIDAD-LAMAR ECONOMIC IMPACT AREA

Forest Related Population, Employment and Income Impacts (Annual Figures)								
	Population	Employment				Total Income (MM\$)	Personal Income (MM\$)	Property Income (MM\$)
		Total Employment (No of Jobs)	Agriculture	Logging/ Sawmill	Tourism ^{1/}			
Forest Related Impacts (1983 Base)	1612	776	32	4	263	10 23	5.71	4 52
Forest Related Incremental Increases by Alternative (1995 Index Year)								
A	899	433	5	1	232	4 51	2.69	1 82
B	864	416	4	2	228	4.27	2.56	1.71
C	912	439	3	0	238	4 51	2 72	1 79
D	870	419	4	5	228	4.34	2 60	1.74
E	384	185	-14	2	150	0 99	0 93	0.07

Population is based upon a population/employment ratio of 2 077 to 1. (1984 Colorado statewide average; Colorado Department of Labor)

^{1/} Tourism is an aggregation of Hotel and Lodging Places, Eating and Drinking Places, and the Amusement and Recreation Sector

TABLE IV-36 Economic Impact Analysis (Second Period - 1991-2000)

SOUTH PARK ECONOMIC IMPACT AREA

Forest Related Population, Employment and Income Impacts (Annual Figures)

	Population	Employment			Tourism ^{1/}	Total Income (MM\$)	Personal Income (MM\$)	Property Income (MM\$)
		Total Employment (No. of Jobs)	Agriculture	Logging/ Sawmill				
Forest Related Impacts (1983 Base)	9002	4334	31	51	1839	55.53	32.28	23.25
Forest Related Incremental Increases by Alternative (1995 Index Year)								
A	7564	3642	26	22	1761	44.34	25.54	18.80
B	7317	3523	25	46	1715	42.89	24.68	18.21
C	7822	3766	35	23	1811	46.02	26.44	19.58
D	7469	3596	36	85	1717	44.36	25.43	18.93
E	4679	2253	20	33	1164	26.75	15.28	11.47

Population is based upon a population/employment ratio of 2.077 to 1.00 (1984 Colorado statewide average Colorado Department of Labor)

^{1/} Tourism is an aggregation of Hotel and Lodging Places, Eating and Drinking Places, and the Amusement and Recreation Sector

TABLE IV-37 Economic Impact Analysis (Second Period - 1991-2000)

COLORADO SPRINGS-PUEBLO ECONOMIC IMPACT AREA

Forest Related Population, Employment and Income Impacts (Annual Figures)

	Population	Employment			Tourism ^{1/}	Total Income (MM\$)	Personal Income (MM\$)	Property Income (MM\$)
		Total Employment (No. of Jobs)	Agriculture	Logging/ Sawmill				
Forest Related Impacts (1983 Base)	2395	1153	5	21	291	18 38	11 41	6 97
Forest Related Incremental Increases by Alternative (1995 Index Year)								
A	739	356	2	13	150	5 23	3 19	2 04
B	663	319	2	23	139	4 69	2 85	1 84
C	785	378	2	15	155	5 57	3 41	2 16
D	725	349	2	41	140	5 26	3.18	2.08
E	-66	-32	+0	12	52	-0.94	-0 64	-0 30

Population is based upon a population/employment ratio of 2 077 to 1.00 (1984 Colorado statewide average Colorado Department of Labor)

^{1/} Tourism is an aggregation of Hotel and Lodging Places, Eating and Drinking Places, and the Amusement and Recreation Sector

TABLE IV-38 Economic Impact Analysis (Second Period - 1991-2000)

TOTAL FOREST

Forest Related Population, Employment and Income Impacts (Annual Figures)

	Population	Employment			Tourism <u>1/</u>	Total Income (MM\$)	Personal Income (MM\$)	Property Income (MM\$)
		Total Employment (No. of Jobs)	Agriculture	Logging/ Sawmill				
Forest Related Impacts (1983 Base)	13008	6263	68	76	2393	84.14	49.40	34.74
Forest Related Incremental Increases by Alternative (1995 Index Year)								
A	9203	4431	32	36	2143	54.08	31.42	22.66
B	8844	4258	31	71	2082	51.85	30.09	21.76
C	9519	4583	40	38	2204	56.10	32.57	23.53
D	9064	4364	42	131	2085	53.96	31.21	22.75
E	4997	2406	6	47	1366	26.80	15.57	11.23

Population is based upon a population/employment ration of 2.077 to 1. (1984 Colorado statewide average, Colorado Department of Labor)

1/ Tourism is an aggregation of Hotel and Lodging Places, Eating and Drinking Places, and the Amusement and Recreation Sector

This analysis points out that over 82 percent in the change in employment, 82 percent in the change in total income, and 82 percent in the change in population predicted from implementing the alternatives is expected to occur in the South Park Economic Impact Area by 1995. The counties that make up the EIA contain 70 percent of the forested land in the planning area and represent 56 percent of the total Pike and San Isabel National Forest landbase of 2,751,736 acres. In the South Park EIA, changes in employment and population predicted from the implementation of the alternatives range from 52 percent to 86 percent of an increase over the base year totals. Changes in income range from 48 percent to 83 percent.

Alternative E results in decrease in employment in agriculture because of the large reduction in grazing.

Excluding Alternative E, over 9 percent in the change in employment, 6 percent in the change in total income, and 8 percent in the change in population is expected to occur in the Colorado Springs-Pueblo Economic Impact Area by 1995. Alternative E only affects the Forest totals by less than 1 percent in population and employment and 3 percent in total income. The counties that make up this EIA represent 23 percent of the forested land in the planning area and 19 percent of the total Forest landbase. In the Colorado Springs-Pueblo EIA, changes in employment and population predicted from implementation of the alternatives range from 3 percent to 33 percent of a difference between the base year totals. Changes in income range from -5 percent to 30 percent.

Approximately 9 percent of the change in employment, 8 percent in the change in income and 10 percent in the change in population predicted from implementing the alternatives is expected to occur in the Trinidad-Lamar Economic Impact Area by 1995. The counties that make up this EIA represent 7 percent of the forested land in the planning area and 25 percent of the total Forest landbase. In the Trinidad-Lamar EIA, changes in employment and population predicted from implementation of the alternatives range from 24 percent to 57 percent of an increase over the base year totals. Changes in income range from 10 percent to 44 percent.

Payments to Counties

By law, 25 percent of the revenue collected by the USDA Forest Service must be returned to the states to be used to schools and roads in the counties where National Forest System lands are located.

Table IV-39 displays the average annual estimated receipt shares to counties. Alternative D consistently returns a higher amount to the counties over the next five decades than any of the other alternatives. Alternative E consistently returns the smallest amount to the counties over the next five decades when compared to the other alternatives.

TABLE IV-39
Average Annual Estimated Receipt Shares to All Counties in Planning Area
 (Thousands of First Quarter 1977 Constant Dollars)

Alternative	-----Period-----				
	1	2	3	4	5
A	228,000	356,000	423,000	474,250	519,000
B	238,750	371,000	419,250	458,750	497,750
C	258,500	353,000	403,500	447,000	498,250
D	377,500	460,250	517,250	558,500	596,750
E	161,250	289,250	301,500	312,000	322,000

The following tables (Table IV-40, IV-41, and IV-42) display predicted payment to individual local, County, and State governments for 1981-1990 period.

TABLE IV-40 ECONOMIC IMPACT ANALYSIS SUMMARY First Period (1981-1990)

TRINIDAD-LAMAR ECONOMIC IMPACT AREA

PREDICTED PAYMENTS TO LOCAL, COUNTY AND STATE GOVERNMENTS, ANNUAL AVERAGE

	Huerfano	Las Animas	Otero	Baca	Morton County (KS)	Stevens County (KS)
Base Year						
1977	9,000	5,000	11,000	14,000	55,200	500
(\$)						
By Alternative						
A	8,870	4,880	10,910	13,750	54,030	530
B	10,260	5,130	11,290	14,370	56,660	510
C	10,050	5,620	12,320	15,670	61,605	540
D	14,700	8,075	17,930	22,770	89,955	810
E	6,240	3,500	7,605	9,740	38,645	305

TABLE IV-41 ECONOMIC IMPACT ANALYSIS SUMMARY First Period (1981-1990)

SOUTH PARK ECONOMIC IMPACT AREA

PREDICTED PAYMENTS TO LOCAL, COUNTY AND STATE GOVERNMENTS, ANNUAL AVERAGE

	Park	Lake	Fremont	Custer	Chaffee	Saguache
Base Year						
1977	44,300	10,000	6,400	10,500	29,000	1,000
(\$)						
By Alternative						
A	43,560	9,760	6,390	10,470	28,650	975
B	45,470	10,260	6,570	10,780	29,770	1,025
C	49,390	11,130	7,130	11,780	32,425	1,060
D	72,190	16,310	10,660	17,120	47,320	1,360
E	30,885	7,000	4,410	7,225	20,160	660

IMPACT ANALYSIS SUMMARY First Period (1981-1990)

COLORADO SPRINGS-PUEBLO ECONOMIC IMPACT AREA

LOCAL, COUNTY AND STATE GOVERNMENTS, ANNUAL AVERAGE						
	Clear Creek	Teller	El Paso	Pueblo	Jefferson	
0	2,400	8,200	6,600	7,100	1,000	
0	2,395	7,985	6,565	2,130	7,010	
0	2,460	8,420	6,775	2,155	7,290	
0	2,700	9,080	7,350	2,380	7,890	
0	3,875	13,405	10,820	3,390	11,630	
5	1,675	5,780	4,565	1,445	4,945	

POSSIBLE CONFLICTS

RESOURCES PLANNING ACT (RPA) PROGRAM OBJECTIVES

The projected targets, activities and costs assigned to the National Forests and National Grasslands in the Regional Guide are displayed in Table IV-43. They represent the Pike and San Isabel National Forests' and Cimarron and Comanche National Grasslands share of the RPA outputs assigned to the Rocky Mountain Region.

The data and analysis compiled for this planning effort confirmed some previous supply and inventory information and pointed out some discrepancies in other areas.

RPA program objectives for land acquisition, trail construction/reconstruction and the timber program are the three main areas of conflict with the alternatives considered in detail. (For comparison of output levels, refer to Chapter II.)

TABLE IV-43

Rocky Mountain Regional Guide Assignment of Outputs and Activities

RPA Planning Targets, Activities, and Costs for Pike and San Isabel National Forests											
Program Element and Activity	Unit of Measure	Annual Units									
		1981	1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation											
Developed Recreation Use	Thousand RVD's	1.80	1.90	1.90	1.80	1.80	1.80	2.30	2.80	2.80	2.60
Dispersed Recreation Use	Thousand RVD's	3.50	3.70	3.80	4.10	4.20	4.40	4.70	6.10	6.40	6.50
Trail Const./Reconst.	Miles	12.0	29.0	34.9	53.0	54.0	55.0	55.0	55.0	55.0	55.0
Wilderness											
Wilderness Management	Acres										
Wildlife and Fish											
Wildlife Habitat Improvement	M Acre-Equivalent	65	27	43	52	51	42	34	26	13	12
Range											
Grazing Use (Livestock)	Thousand AUM's	191	203	204	204	205	205	215	223	225	225
Timber											
Program Sales Offered	MM Board Feet	10	11	12	12	13	15	16	17	17	17
Reforestation	Thousand Acres	425	500	550	300	450	500	500	500	500	500
Timber Stand Improvement	Thousand Acres	8.23	2.40	3.20	2.00	2.20	0.80	0.50	1.50	1.40	1.70
Water											
Meeting Water Quality Goals	MM Acre-Feet	0.90	0.90	0.90	0.90	0.90	1.00	1.05	1.10	1.10	1.10
Minerals											
Leases and Permits	Operating Plans	270	300	300	314	324	353	409	468	545	551
Human and Community Development											
Human Resources Programs	Enrollee Years	7	43	43	43	43	-	-	-	-	-
Protection											
Fire Management Effectiveness Index	Dollars per Thousand Acres	183	183	183	261	260	254	254	254	252	251
Fuelbreaks and Fire Treatment	Thousand Acres	9.4	5.9	5.9	5.9	6.0	4.9	4.9	3.9	3.9	3.9
Lands											
Purchase and Acquisition (Excludes Exchange)	Thousand Acres	1.02	3.80	3.80	3.80	3.90	1.50	-	-	-	-
Soils											
Soil and Water Resource Imp.	Thousand Acres	1.335	1.197	1.197	1.197	1.197	1.197	1.197	0.945	0.945	0.945
Facilities											
Road Const./Reconst. (Arterial, Collector)	Miles	-	-	-	5.6	6.4	12.8	8.5	7.2	4.7	2.4
Returns to Treasury	Million Dollars	0.5	0.5	1.2	1.7	1.7	1.8	1.8	1.8	1.9	1.9
TOTAL Funds (1978 Dollars)	MM Dollars	15.7	9.1	7.7	10.0	10.2	8.7	9.1	8.8	8.9	8.7

A less intensive program in land acquisition than the RPA assigned objective was thought to be more appropriate to meet the objectives of each alternative. The 24,000 acres of land acquisition projected in the first decade by the RPA program was not necessary to implement any of the other alternatives. Moderate levels of land acquisition as key tracts became available were considered in Alternatives B and D.

To completely eliminate the backlog of property boundary posting, 180 miles of land line location per year is required through 2030. The proposed action schedules 50 miles per year to support resource management activities and eliminate the high priority conflict areas between private and adjacent Forest lands.

To meet the objectives of Alternatives A, B and D, capital investments in trail construction/reconstruction were more moderate than the 55 miles per year outlined in the RPA objective. It was determined that the increased level of road construction activity in the other alternatives would partially offset the need for so much trail construction/reconstruction, and that the more moderate levels of this activity could be concentrated on the more highly used trails.

Current levels of timber production do not adequately reflect the total program on the Pike and San Isabel National Forests. The demand for wood products to satisfy the roundwood needs for wood as a fuel is increasing dramatically along Colorado's populus Front Range area. Programmed sales offered under all alternatives considered in detail more accurately reflect the current and projected situation for providing wood products to the local area, for both industrial and domestic use. In addition, fuelwood will also be provided from the noncommercial forest land base from management activities such as fuels reduction, insect and disease salvage and control programs, timber stand improvement, wildlife habitat improvement, and vegetation manipulation for water yield increases. The road construction activity levels that accompany these revised timber outputs also deviate from the RPA goals.

Other, less significant differences between the RPA program objectives and the alternatives are:

- fewer acres of timber stand improvement is estimated for all alternatives. This management practice is tied to commercial timber sales program and all alternatives evaluated in detail concentrated on getting commercial forest land into intensive management through regeneration.

-fewer acres of fuel treatment is estimated for all alternatives. This difference is related to the fuelwood program on the Forest. Fuelwood collection is expected to reduce the need for this activity.

-a higher production capacity for livestock forage production is estimated for all alternatives. (Primarily due to the potential for forage production on the Cimarron and Comanche National Grasslands).

OBJECTIVES OF OTHER FEDERAL, STATE, COUNTY & LOCAL GOVERNMENTS

Plans and programs of other organizations, and county, state and federal agencies were requested and reviewed during the Forest's planning process. They are contained in the Forest's planning records. These organizations and agencies include:

- Other U.S. Forest Service Units*
- Farmers Home Administration
- Bureau of Mines
- National Park Service
- Environmental Protection Agency*
- Water Resources Council
- U.S. Geological Survey
- U.S. Fish and Wildlife Service*
- Soil Conservation Service*
- Agricultural Stabilization & Conservation Service
- Rocky Mountain Forest & Range Experimental Station
- Kansas State Forest Service*
- State Land Boards (Colorado and Kansas)
- Colorado Department of Natural Resources*
- Kansas Forestry, Fish and Game Commission*
- State Historic Preservation Offices (Kansas and Colorado)*
- U.S. Army Corps of Engineers
- Bureau of Reclamation
- Colorado Division of Wildlife*
- U.S. Air Force Academy
- Fort Carson
- State Water Boards (Kansas and Colorado)*
- State Planning Boards (Kansas and Colorado)*
- Conservancy Districts, City Water Boards*
- Councils of Government*
- County Commissioners Planning and Zoning*
- Colorado State Clearing House Colorado State Forest Service*
- Bureau of Land Management*

No conflicts with the objectives and missions of these organizations and agencies were surfaced during this review process. Coordination meetings with the organizations and agencies indicated with a * were held to discuss various aspects of the Forest planning process. Coordination activities were handled via written correspondence with all others. Many of the agencies requested a meeting be conducted after they have had a chance to review the Draft Environmental Impact Statement on the Land and Resource Management Plan.

Several opportunities to improve coordination between the Canon City District, Bureau of Land Management, and the Pike and San Isabel National Forests were surfaced. They include:

- coordination of planning efforts to avoid conflicting management direction on adjacent lands.
- coordination of outfitter guide fees where use in on both Bureau of Land Management and Forest Service lands.
- coordination of rights-of-way planning, priorities and acquisition.
- explore opportunities for land exchange between the two agencies where increased management efficiency and public service would result.
- coordination of policies regarding location and development of powerline corridors and electronic sites.
- coordination of road closures and off-road vehicle policies.
- coordination of fuelwood programs.
- coordinate range allotment planning.
- coordinate wildlife management programs.
- coordinate fire management programs.
- coordinate wilderness study area planning.

These coordination activities were considered in the assignment of management prescriptions to the land base for the alternatives in this DEIS. The Forest and BLM representatives met on numerous occasions to discuss these activities.

In addition, coordination efforts also included meetings between the Rio Grande National Forest and the Pike and San Isabel National Forests concerning the suitability evaluation of the Sangre de Cristo Wilderness Study Area, which is located on

portions of both Forests. Coordination with the Arapaho and Roosevelt, Grand Mesa-Uncompahgre and Gunnison, and White River National Forests on the management of existing wildernesses that are partially contained in the Pike and San Isabel National Forests has also taken place. Recommendations on the suitability of oil, gas and geothermal leasing activities, also required close coordination between adjacent National Forests.

Coordination efforts with the Colorado State Forest Service are frequent and include the areas of fire control, insect and disease management and coordination of fuelwood programs on private and state lands. Cooperative Management Demonstration Areas (CMDA's) have been established on the Forest in cooperation with the Colorado State Forest Service to provide the public with examples of forest management practices designed to combat the mountain pine beetle. The Forest also cooperates with the Colorado State Forest Service and cities and counties in the Front Range Vegetative Management Pilot Program.

The Badger Creek Watershed Restoration Project is another example of cooperation and coordination efforts with other agencies. The Soil Conservation Service, BLM, local governments and the Forest Service are currently involved in this project.

ENERGY REQUIREMENTS

Energy is consumed in the administration and use of natural resources on the National Forests. For the purpose of this planning action, energy sources are gasoline, diesel fuel, liquified petroleum, natural gas, electricity and wood. The main activities which consume energy are timber harvest, range use, recreation (both dispersed and developed), road construction or reconstruction, and administrative activities of the Forest Service.

Energy consumed in timber harvesting is the estimated amount required for felling, bucking, skidding, loading, hauling, performing road maintenance commensurate with the volume hauled, and the industrial traffic associated with logging activities.

Energy consumed in utilizing range vegetation is the estimated amount required for hauling cattle to and from the range, permittee range improvement activities, watering, salting and herding.

Recreation related energy consumption is based on the estimated number of dispersed and developed recreation visitor days and estimated trip lengths.

Energy consumed in road construction and reconstruction activities is that used by timber purchasers or contractors in completing road development work.

Energy consumed by Forest Service administration includes vehicle use for all administrative activities; building lighting, heating and air conditioning; road maintenance and construction projects performed by Forest Service personnel; and fuel used for small engines, burners, etc.

In relative terms, the alternatives considered in detail rank in the following order for energy consumed:

- A ranks first because it consumes the most energy due to the level of resource management activities proposed.
- D ranks second in energy consumed.
- C ranks third in energy consumed.
- B ranks fourth in energy consumed.
- E ranks lowest in energy consumption.

The capability of the Pike and San Isabel National Forest to produce energy exists in two major areas: 1) coal, oil, gas and uranium deposits, and 2) the consumption of wood products for energy production. In relative order, the alternatives' potential for energy production are:

- D ranks first due to the levels of vegetation management-timber output.
- A ranks second.
- C ranks third.
- E ranks fourth.
- B ranks fifth.

A determination of wilderness suitability under Alternatives A, B and C will withdraw those areas from mineral entry and leasing, subject to the exercise of valid existing rights. Since December 31, 1983, Wilderness Areas have been withdrawn from mineral entry under the 1872 Mining Laws and leasing under the 1920 Leasing Act except where valid mineral rights existed prior to January 1, 1984. Lands not recommended for wilderness under Alternatives D and E will allow a greater amount of land available for mineral entry and leasing activities. These activities are increasing in importance and have long been a major source of income and employment in the planning area.

It is anticipated that there will be a continued interest in energy needs as the population of the Front Range urban corridor grows. The National Grasslands are currently contributing the

most to this output area, with the Cimarron National Grasslands producing the majority of the gas and petroleum products for the entire Forest. Forest Direction for mineral development activities is contained in the Proposed Forest Plan. Criteria and recommendations for oil, gas and geothermal leasing have been previously disclosed in this Chapter.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to resources that are nonrenewable or renewable only over a long period of time. Actions such as road construction, timber harvest or range development generally are not considered irreversible. Removal of minerals or soil loss for instance are considered irreversible.

Alternatives D, B and A generally provide a higher rate of soil loss expressed previously in effects as tons of sediment. Commitment of resources such as constructing or surfacing roads would also show up highest in Alternatives D and B. In either case commitment is not considered excessive. Management direction in the prescriptions is designed to minimize unavoidable loss and to hold such commitment to acceptable levels.

Irretrievable commitment of resources is the production or use of renewable resources that are lost or consumed because of allocation decisions made. Included are the opportunities foregone that are not utilized. Productive timber that is not harvested and subsequently lost by mortality is an example of an opportunity foregone. The commitment could be reversible by changing management direction to provide for harvesting the renewable resource. Congressional designation of wilderness in Alternatives A, B and C would result in forgone opportunities for renewable natural resource production.

Utilization or development of any one resource to its maximum potential is generally accomplished only at the expense or disregard for other resources. No alternative considered in detail utilized a particular resource to its maximum potential. All alternatives provide for a balanced mix of resource uses.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The alternative formulation process considered a wide range of alternatives, some of which had major adverse environmental effects. Many of these effects were avoided by the criteria established for including alternatives that can be implemented. Thus, the five alternatives considered in detail represent a broad range of resource outputs, but also represent a reduction of the potential adverse environmental effects that cannot be avoided. Mitigation measures included in the Forest Direction

and Management Area direction of the Proposed Forest Plan are intended to minimize the adverse effects. However, some adverse effects that cannot be avoided are included in the proposed action. These effects are:

Scenic Values

Vegetation manipulation and road construction activities cause a temporary change in the landscape that is normally distasteful to the observer. Debris on the ground, understory vegetation disturbance, dust, and noise are normally experienced on an active project. These are short-term effects.

Fire Management.

During the short-term period of logging and thinning operations there would be a temporary increase in fire hazard from waste material left on the ground in the form of unmerchantable trees, tops, limbs, and needles.

Recreation.

Project activities such as timber sales and road construction temporarily disrupt recreation uses by reducing or changing the type of recreation uses that normally would occur on the area.

Livestock Forage.

Timber harvesting and fuelwood cutting may have a short-term disruptive effect on proper livestock distribution and utilization of the forage resource. There may also be a short-term decrease in available forage because of disturbance by logging equipment and accumulations of slash.

Transportation.

Construction and reconstruction of roads will affect esthetics, erosion, wildlife, noise levels and people using an area. In addition, increased public access to areas previously inaccessible may have adverse effects on wildlife and create the potential for conflict between visitors to the Forest.

Air Quality.

Vegetation manipulation and road construction activities will cause a slight temporary change in air quality. This change, which occurs only during the actual construction, harvesting and burning, will be in the form of increased dust in the air, noise and smoke.

Water Quality.

Soil loss and sediment yield potential will increase with

increasing levels of resource management activities. Soil loss will remain within acceptable tolerance levels and sediment yield below the maximum allowable stream loading through the application of mitigating measures.

Cultural Values.

There could be a disruption of prehistoric or historic evidence of human occupancy in the Pike and San Isabel National Forests.

Wildlife.

Increased human activities in project areas may temporarily displace wildlife. Improved roads may have a longer impact on wildlife due to ease of access into areas previously unroaded or roaded with a low standard natural surface type of access.

Community Values and Costs

With any long-term increase in timber production, communities with lumber mills could experience a slight population increase and additional costs. It is expected that most of the increase in primary manufacture would be made by existing industry.

SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

Short-term uses are those that generally occur on a yearly basis on some part of the Forest, such as livestock grazing as a use of the forage resource, timber harvest as a use of the wood resource, and recreation and irrigation as uses of the water resource.

Long-term here refers to longer than a 10-year period. Productivity refers to the capability of the land to provide resource outputs. Soil and water are the primary factors of productivity and represent the relationship between short-term uses and long-term productivity.

Standards and guidelines that apply Forest Direction in all alternatives were developed by the interdisciplinary team and are contained in the Proposed Forest Plan. Specific direction and mitigation measures were included in these standards and guidelines to assure that long-term productivity was not impaired by the application of short-term management practices.

Each alternative Forest Plan was analyzed to assure that the minimum standards and guidelines could be met. The alternative was changed if some aspect did not meet any minimum standard or guideline. Through this analysis, long-term productivity of the forest and grassland ecosystems is assured in all alternatives. Alternative D has the highest level of short-term uses, as

reflected by the acres of vegetation treatment, and, therefore, results in higher levels of short-term consequences such as visual impact, fire hazard and increased sedimentation. The remaining alternatives are shown in decreasing order of short-term uses: B, A, C and E.

While none of the alternatives commit future generations to the same direction, commitments would be made for this generation. The management prescriptions, management practices, and effects of plan implementation will be monitored to provide data for insuring that these standards and guidelines are met. Details on the monitoring program are included in the Proposed Forest Plan. Monitoring requirements apply to all alternatives, based on availability of funding to complete the monitoring activities. The purpose of monitoring is to assure that long-term productivity on the Forest will be maintained or improved by the application of management direction.

NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES

Natural resource requirements for implementing the proposed action or any of the other alternatives considered in detail require the basic soil and water resources and associated plant and animal communities that comprise the Forest and rangeland ecosystems. Lands allocated to various management prescriptions in this planning effort considered the multiple use benefits and coordinating requirements necessary to conserve these resources. Mitigation measures to insure resource conservation are included in the Forest and Management Area direction of the Proposed Forest Plan.

Depletable resource requirements include the removal of nonrenewable resources such as minerals or the depletion of a basic resource such as soils. In the case of the mineral resource, once the mineral has been extracted it is gone. Conservation of these resources might be defined as the planned rate of removal. Mitigating measures involved in the location, development and removal of these resources are considered and may be found in the Proposed Forest Plan. Soil depletion through natural or man-made disturbances is also considered and rehabilitation/conservation activities associated with the potential depletion of this resource is planned for in each alternative.

In addition, the extinction of a plant or animal species may also be thought of as depletion of a resource. Protection and improvement of threatened or endangered species habitat has been considered in all alternatives and management direction included in the Proposed Forest Plan.

URBAN QUALITY, HISTORIC AND CULTURAL RESOURCES; THE DESIGN
OF THE BUILT ENVIRONMENT

COMMUNITY STABILITY

Each alternative contributes to the productivity of the HRU's delineated on the Forest by providing sound land and resource management on National Forest System lands and a sustained yield of goods and services. An adverse impact on rural mountain lifestyles could occur where residents value peace, quiet and privacy. However, the predicted increase in recreational opportunities and wildlife habitat diversity associated with the alternatives to varying degrees could have a positive effect on lifestyles of an increased number and type of National Forest visitors.

The effects of implementing the alternatives on dependent industries, primarily the timber and livestock industries, will not be adverse. Range outputs are increased in each alternative. Commercial sawtimber production will at least maintain current output levels in each alternative. Alternative E will have a negative impact on communities dependent on recreation related industries, and Alternatives A and C will have a positive effect on these same industries. Increased resource management activities in Alternatives A, C and D will provide more revenue to local communities through the 25 percent fund return to local governments. Alternatives A, C and D also have the most positive effect on employment and income in the local communities.

HISTORICAL AND CULTURAL RESOURCES

Various laws and regulations reflect the concern and importance of protecting cultural values. The history and prehistory that make the planning area what it is today are important to everyone. Before any activity is undertaken or permitted, cultural resources are considered. A thorough survey is made to find or identify cultural values. If any are identified, they are evaluated to determine their significance. If they are determined to be significant, they are nominated to the National Register of Historic Places.

The National Register of Historic Places eligibility criteria and nomination procedures are set forth in 36 CFR 60. The procedures for seeking a determination of eligibility are described in 36 CFR 63. The Advisory Council on Historic Preservation Procedures (36 CFR 800) enumerates the general steps to be followed to achieve adequate consideration of cultural resources

The proposed activity is weighed against the criteria of effects. The following adverse effects are considered:

- Destruction or alteration of the property.
- Isolation from or alteration of the surrounding environment.
- Introduction of visual, audible or atmospheric elements that are out of character or alter the setting.
- Deterioration or destruction of a property because of neglect.
- Transfer or sale without provisions to preserve and protect the property.

Before the proposed action takes place, appropriate mitigation is designed in cooperation with the State Historic Preservation Officer to protect the resource. In unavoidable actions which cannot be relocated, salvage and recording of the resource is accomplished.

Management of the cultural resources on the Forest will be coordinated with the State Historic Preservation officers of Colorado and Kansas. General direction is provided in the Forest Direction section of the Proposed Forest Plan.

Existing inventories, surveys, and studies conducted for various purposes in the past, along with historical records have given an indication of where cultural resources are most likely to be found. Activities most often occurring in those areas with the greatest ground disturbing effects are the most likely to adversely affect cultural resources in the planning area. Road building, heavy recreation use and motorized use are activities which often occur in areas most likely to contain cultural resource values.

Information for all known sites has been summarized and recorded in the "High Plains Overview, 1981" and is stored in the Colorado State Historic Preservation Office computer files for access by qualified persons and for reference in project planning.

THE DESIGN OF THE BUILT ENVIRONMENT

All alternatives considered in detail in this planning process are designed to provide multiple-use resource management in the various ecosystems that comprise the Forest environment. The affected environment includes both natural and human resources of the planning area as described in Chapter III of this document. Comparison of Alternatives and the effects on the environment have been presented in this chapter and in Chapter II.

In general, the design of the built environment for each alternative is the composite of the goals, objectives and expected future conditions that describe that alternative. It is the response to issues and concerns, resource management needs, community stability requirements and the laws and regulations under which the Forest Service operates. The management, utilization and conservation of resources in a multiple use framework is the "grand design" of each alternative.



LIST OF PREPARERS

CHAPTER V
LIST OF PREPARERS

The Forest Management Team is designated by an asterisk (*) next to their name

David F. Barone - Interdisciplinary Planning Team Leader - B.S. Resource
(Currently Program Planner in Region 4) Management,
M.S. Resource
Economics

Eight years of Forest Service experience at District and Supervisor's Office levels. Responsible for coordinating all activities necessary to prepare Draft Environmental Impact Statement and Forest Plan.

Joseph V. Beck - Primary Staff Officer - Forest Engineer - B.S. Civil
(Retired) Engineering

Twenty-three years of Forest Service experience at District and Supervisor's Office levels in civil engineering. Provided technical expertise in engineering.

Gary M. Bedker - Economist - M.S. Agricultural Economics

One year of Forest Service experience at Supervisor's Office level (Black Hills National Forest); two years with Water & Power Resources Service, five years at North Dakota State University. Assisted in the economic efficiency analysis of alternative Forest Plans.

Thomas E. Bell - Recreation Staff Officer - B.S. Forest Management
(Retired)

Twenty-three years of Forest Service experience at District and Supervisor's Office levels in recreation planning, administration and management including developed sites and dispersed areas. Five years experience as District Ranger. Provided technical input to recreation.

* Robert D. Bishop - Primary Staff Officer - Forest Engineer - B.S. Civil
Engineering, B.A. Mathematics

Eighteen years of Forest Service experience at District and Supervisor's Office levels in Engineering. Provided technical leadership and direction in Engineering.

Marc Bosch - Wildlife Biologist - B.S. and M.S. Fish & Wildlife Management

Seven years of Forest Service experience at District and Supervisor's Office levels in wildlife, fish, and habitat management. Experience also includes three years with United Nations Development Program in Africa and two years with Iran Game and Fish Department. Provided technical input on wildlife and fish management. Member of interdisciplinary team.

Robert L. Butler - Primary Staff Officer - Program Budgeting and Land Management Planning - B.S. Forest Management
(Currently Program Planner on Panhandle NF's, Idaho)

Eighteen years of Forest Service experience at District, Supervisor's Office and Regional Office levels. Eight years of specialized experience in land management planning. Provided overall technical and administrative direction in the preparation of the Draft Environmental Impact Statement and Forest Plan.

Thomas Camp - Landscape Architect - B.S. Forest Recreation, M.S. Landscape Architecture

Twenty years of Forest Service experience at District and Supervisor's Office levels in recreation and landscape architecture. Served on planning team for one and one-half years. Provided technical input in visual resource management, recreation management and landscape architecture.

Harry Carmack - Aviation & Fire Management Staff
(Retired)

Twenty-two years of Forest Service experience at District and Supervisor's Office levels in timber and fire management. Provided technical input on fire management.

Lee Chavez - Hydrologist - B.S. Watershed Science

Nine years of Forest Service experience at District and Supervisor's Office levels in hydrology. Provided technical input on water yield, quantity, quality and uses.

Linda L. Davis - Planning Technician

Seven years of Forest Service experience at Supervisor's Office level, four years in land management planning. Responsible for format, assembly of graphics and printing of the EIS and Plan.

Steven W. Deitemeyer - District Ranger, Pikes Peak - B.S. Forestry
(Currently Deputy Forest Supervisor, Bridger-Teton NF's)

Fourteen years of Forest Service experience at District and Regional Office levels in recreation and lands including 4 years as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

John S. Dersch - Geologist, Regional Office, R-2, B.S. Geology

Seven years Forest Service experience at District, Supervisor's Office and Regional Office levels. Member of American Association of Petroleum Geologists and Society of Mining Engineers. Assisted in the provision of technical expertise in minerals.

* Gene W. Eide - District Ranger, Leadville - B.S. Forest Management

Twenty years of Forest Service experience at District and Supervisor's Office levels primarily in timber with four years as District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation actions plans.

Raymond J. Evans - Primary Staff Officer - Resources - B.S. General Forestry
(Currently Forest Supervisor, Grand Mesa, Uncompahgre, Gunnison NF's)

Nineteen years experience with the Forest Service at District and Supervisor's Office levels including four years as District Ranger. Provided technical leadership and direction in the areas of fire, wildlife, range, timber and watershed management.

Duane R. Feick - Hydrologist - B.S. Hydrology/Fisheries
(Currently Hydrologist on Cimarron District)

Three years of Forest Service experience at Supervisor's Office level in hydrology. Three years hydrology experience with U.S. Geological Survey. Provided technical input on water yield, quantity, quality and uses.

C. Emmett Foster - Recreation Staff - B.S. Landscape Architecture

Twenty-one years of Forest Service experience at District, Supervisor's Office and Regional Office levels in recreation and landscape architecture. Provided input in developed and dispersed recreation, wilderness and the private sector.

Larry O. Gadt - District Ranger, South Platte - B.S. Biology, M.S. Forestry
(Currently Group Leader, Timber Appraisals and Evaluations, Regional Office, R-2)

Twelve years of Forest Service experience at District, Regional Office and Research Station levels in timber and recreation, including 3 years teaching forestry and six years as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

George Geiger - Forester/Range Staff - B.S. Forestry

Twenty-seven years of Forest Service experience at District and Supervisor's Office levels in range management and administration, including thirteen years as District Ranger. Provided technical input on range production and management.

* Nicholas S Greear - District Ranger, South Park - B.S. Outdoor Recreation

Fourteen years of Forest Service experience at District and Supervisor's Office levels. Participated as a member of the Forest Management Team which provided management direction to the planning effort.

* Murry Hartshorn - District Ranger, San Carlos - B S. Forestry

Twenty-three years of Forest Service experience at the District, Supervisor's Office and Job Corps levels in forestry and administration. Participated as a member of the Forest Management Team which provided management direction to the planning effort

* Geoffrey L. Hulse - District Ranger, Comanche National Grasslands -
B.S. Range Management

Four years Forest Service experience at the National Grassland level in range, wildlife, minerals, soil and water. Experience also included fourteen years with other government agencies, twelve of them with the Soil Conservation Service in range conservation. Participated as a member of the Forest Management Team which provided management direction to the planning effort.

Duane D. Kick - District Ranger, South Park - B.S. Forestry
(Currently District Ranger on Chequamegon NF)

Thirteen years of Forest Service experience at District and Supervisor's Office levels in all resource areas, including one year as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

John R. Kirkpatrick - Primary Staff Officer - Resources - B.S. Forestry
(Currently Forest Supervisor, San Juan NF)

Fifteen years of Forest Service experience at District, Supervisor's Office and Regional Office levels, including Regional Safety Officer for one year, District Ranger for eight years, and Instructor in human relations for three years. Provided technical leadership and direction in the area of minerals, range, watershed and wildlife management.

* Charles A. Knight - Primary Staff Officer - Land Management Planning
and Program Budget - B.S. Conservation, Education &
Soil Science

Seventeen years of Forest Service experience at District, Supervisor's Office and Regional Office levels. Responsible for coordination of all activities necessary to prepare final Environmental Impact Statement and Forest Plan.

Rodney Lewis - Forester - B.S. Forest Utilization

Twenty-six years Forest Service experience at District and Supervisor's Office levels with seven years in recreation and eight years as District Ranger. Planning team member responsible for coordinating resource considerations, data base preparation and public involvement

Robert M. Lillie - District Ranger, South Park - B.S. Forest Management
(Currently Program Officer for Services/Support on San Juan NF)

Sixteen years Forest Service experience at District, Supervisor's Office and Research Station levels, including three years in Job Corps administration. Ten years as District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

Edward D. Lockhart - District Ranger, San Carlos
(Retired)

Twenty-two years of Forest Service experience at District level in range conservation with 8 years as District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

* Bernard G. Lyons - District Ranger, Salida - B.S. Animal Science

Fourteen years of Forest Service experience at District level in range conservation and recreation including five years as District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

Marti C. Martinez - Geologist - B.S. Environmental Geography and Geology

Three years of Forest Service experience at Supervisor's Office level in social resource management, geography, geology and minerals. Member of planning team responsible for technical input to social resources, geology and minerals management.

James G. McCallum - Forester - B.S. Forest Management

Five years Forest Service experience at the District and Regional Office levels in timber inventory and computer programming. Reproduced documentation and enhanced the FORPLAN resource allocation model. Re-ran benchmarks and alternatives.

* Donald P. Mecklenburg - District Ranger, Cimarron National Grassland -
B.S. Forestry

Twenty-six years of Forest Service experience at District level in all resource areas including 18 years as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

Randy Moore - Soil Scientist - B.S. Agronomy

Four years of Forest Service experience at Supervisor's Office level in soil science. Three years experience with Soil Conservation Service in soils. Provided technical input on soils.

Bruce H. Morgan - Forest Supervisor - B.S. Civil Engineering
(Retired)

Twenty-two years of Forest Service experience at District, Supervisor's Office and Regional Office levels. Sixteen years experience in engineering. Six years experience in Forest administration in line positions responsible for National Forest management. Provided overall management direction on the preparation of the Draft Environmental Impact Statement and Forest Plan.

Nancy Morris - Realty Specialist

Eight years of Forest Service experience at Supervisor's Office level in purchase, exchange, rights-of-way acquisition, and other real property actions. Provided technical expertise on lands.

* Harry Nickless - Primary Staff Officer - Timber/Fire - B.S. Forest Management

Twenty-two years of Forest Service experience at District and Supervisor's Office levels. Provided technical expertise in timber, fire, and insect and disease control management.

David C. Powell - Forester (Silviculturist) - B.S. Forestry

Seven years of Forest Service experience at District and Supervisor's Office level with responsibilities in recreation at District level and responsibilities in timber at Supervisor's Office level. Provided technical expertise in timber.

Cynthia D. Rivera - Outdoor Recreation Planner - B.S. Forest Recreation
(Currently at Willamette NF)

Eight years of Forest Service experience at District and Supervisor's Office levels in outdoor recreation. Two years with U.S. Fish and Wildlife Service in recreation. Member of planning team providing technical input on outdoor recreation planning.

* Richard R. Roth - Primary Staff Officer - Resources - B.S. Forestry,
M S. Wildlife Biology

Eleven years of Forest Service experience at District, Supervisor's Office and Area Office levels. Provided leadership and direction in the area of minerals, range, watershed, urban and community forestry, and wildlife management. Three years with the US Fish and Wildlife Service in water resource project evaluation

* Vernon E. Schmitt - District Ranger, Pikes Peak - B S Forest Management

Twelve years of Forest Service experience at District level primarily in recreation and lands with six years as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

Edward L. Schultz - Deputy Forest Supervisor - B.S. Forest Management
(Currently Forest Supervisor, Bighorn NF)

Eighteen years of Forest Service experience at District, Supervisor's Office and Washington Office levels, including five years as District Ranger. Provided overall management direction on the preparation of the Draft Environmental Impact Statement and Forest Plan.

David L. Smith - Soil Scientist - B S. Agricultural Science
(Currently Soil Scientist at Regional Office, R-2)

Four years of Forest Service experience at Supervisor's Office and Regional Office levels in soil science. Six years experience with Soil Conservation Service in soils. Provided technical input on soils.

* Marje Smith - Public Affairs Officer - Mass Communications/Environmental Science

Eight years of Forest Service experience at Supervisor's Office level responsible for coordinating the public involvement program directed at obtaining, analyzing and evaluating public input as an aid to decision making process. Analyze public input for evaluation by planning team.

* Karl L. Tameler - Forest Supervisor - B.S. Forestry

Twenty-seven years of Forest Service experience at District, Supervisor's Office and Regional Office levels. Thirteen years experience in Forest Administration in line positions responsible for National Forest management. Provided overall management direction on the preparation of the final Environmental Impact Statement and Forest Plan.

Kathleen D. Thompson - Computer Specialist - B.A. English/Music

Five years of Forest Service experience at Supervisor's Office level in computer applications. Provided recommendations and assistance in the use of computer-aided techniques. Responsible for data base input, retrievals and boundary plotting.

Erlin R. Trekell - District Ranger, Comanche National Grasslands - B.S.
Forest Management
(Retired)

Twenty-four years of Forest Service experience at District and Supervisor's Office levels in all resource areas including ten years as a District Ranger. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

Jim Tyree - Computer Specialist

Ten years of Forest Service experience at Supervisor's Office and Regional Office levels in computer programming. Responsible for developing programs for various resources in support of the land management plan. Provided all technical expertise in programming and was a major contributor to the design and structure of the land management planning data base.

* Marvin M. Underwood, Jr. - District Ranger, South Platte - B.S. Forestry
and Wildlife

Thirteen years of Forest Service experience at District level in all resource areas. Participated as a member of the Forest Management Team which provided management direction throughout the planning process. Provided detailed resource management input to the location and scheduling of implementation action plans.

* Marvin P. VanderKolk - Primary Staff Officer - Recreation and Lands
B.S. Forestry

Twenty-three years of Forest Service experience at District, Supervisor's Office, Regional Office and Washington Office levels in recreation, lands and timber. Four years as a District Ranger. Provided technical leadership and direction in the areas of recreation and lands.

Stan Versaw - Civil Engineer - Geological Engineer
(Currently Engineer in Regional Office, R-2)

Registered Professional Engineer and Land Surveyor (Colorado)

Fifteen years of Forest Service experience at District and Supervisor's Office levels in engineering and surveying. Member of planning team providing expertise in transportation planning. Was involved in all phases of the planning effort including mapping, data base preparation and public involvement.

Bert D. Ward - Economist - B.A. Economics, M.A. Regional Planning,
M.Litt. Economics of Natural Resources
(Presently employed as a Professor at the
University of New Zealand)

Two years of Forest Service experience at Supervisor's Office level conducting economic analysis for land management planning. Seven years experience with Pueblo Council of Governments in economic analysis for land use planning. Conducted economic analysis for the DEIS and Forest Plan. Designed and structured the allocation and scheduling linear program model, FORPLAN.

William H. Zimmer - Forester - B.S. Forest/Range Management

Twenty-four years of Forest Service experience at District and Supervisor's Office levels with responsibilities in timber, lands, minerals, range and wildlife. District Ranger for eight years. Served as planning team member and team leader for two years. Provided technical expertise in the areas of special land uses and minerals.

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